followed by a split dose of 100mls of Gastrografin faecal tagging 1 day prior to the examination. The information provided to the patient details the low residue diet and instructs the patient on when and how to administer Gastrografin.
I found the information to be extremely confusing to follow prior to the exam and my experience following CTC was not as I had previously described for many of our patients. In addition, I was not aware of the importance of following the low residue diet regime strictly. The poster will describe my experiences, the previous regime and detail the changes made, including addition of low residue diet menus on the hospital internet site.

1. Connor, A., Tolan, D., Hughes, S., Carr, N. and Tomson, C., 2012. Consensus guidelines for the safe prescription and administration of oral bowel-cleansing agents. Gut, 61(11), pp.1525-1532
2. Ghanouni, A., Smith, S.G., Halligan, S., Taylor, S.A., Plumb, A., Boone, D. and von Wagner, C., 2013. An interview study analysing patients' experiences and perceptions of non-laxative or full-laxative preparation with faecal tagging prior to CT colonography. Clinical radiology, 68(5), pp.472-478
3. Wu, K.L., Rayner, C.K., Chuah, S.K., Chiu, K.W., Lu, C.C. and Chiu, Y.C., 2011. Impact of low-residue diet on bowel preparation for colonoscopy. Diseases of the colon & rectum, 54(1), pp.107-112

SERVICE DELIVERY AND OPTIMISATION

P194 Improvement of Raystation volumetric modulated arc therapy (VMAT) delivery quality assurance (DQA) results through plan complexity reduction and beam model fine-tuning

Elizabeth Harron; Angela McKenna; Alexander Taylor; Jonathan Sutton; Anna Trezza; Jonathan Littler
Nottingham University Hospitals NHS Trust

Background: Accurate modelling of the radiotherapy beam by the treatment planning system is essential for reliable delivery of VMAT. We recently purchased Raystation, which requires the department to produce their own beam model. Open field agreement was good but VMAT DQA results were initially poor and results varied between linacs by up to 6%. We will present our process for improving the DQA results.
Method: Test plans were created for 6 challenging cases each of bilateral head & neck and prostate & nodes. DQA was performed with the Delta4 and an ion chamber. A script was written to measure the modulation complexity score (MCS)[1] of the test plans. Plans were re-optimised with a limit applied to the monitor units, which resulted in reduced complexity, but a clinically acceptable dose distribution. The new plans' DQA showed the Delta4 results were better than the ion chamber. The beam model parameters of transmission, tongue and groove width and leaf tip were then adjusted iteratively to get good agreement with both DQA methods.
Results: By reducing the plan complexity and adjusting the model, Delta4 pass rates increased by a mean of 6% (local gamma 2%/2mm) and the absolute dose agreement improved so that all linacs now deliver dose within 2% of the expected value.
Conclusion: Calculating MCS helped us to identify particularly complex beams. We have improved DQA results for beam modelling through improving plan simplicity and iteratively adjusting beam parameters so that we can be confident that plans will pass DQA.

1. Masi, Doro et al (2013) Impact of plan parameters on the dosimetric accuracy of volumetric modulated arc therapy Med. Phys. 40 (7)

P195 Keeping our patients safe 24/7 - does shift-work in Radiology have an impact on safety? A literature review

Jason Elliott
Cardiff University

Background: UK Radiology departments are under pressure to reduce waiting times whilst providing 24-hour cover for emergency imaging of patients. Departments often utilise a mixed pattern of days and nights, with prevalence of extended days and fast rotating shifts. This increases the risk of Shift Work Disorder (SWD), which has been shown to have an impact on performance; therefore raising the prevalence of error - a key concern when working in radiology for patient outcome.
Method: A review of the available literature was planned and executed to investigate the risk of error in out-of-hours work, and the subsequent impact on imaging departments. Narrative synthesis was used to describe the heterogeneous findings of the studies appraised.
Results: No radiography-based research was identified, so the search field was expanded to all shift-based healthcare professionals; and the potential impact would be discussed. Four of the five studies selected after critical appraisal suggested a positive correlation of error with increased mental and physical fatigue as a result of shift work or rapid shift rotation. It can be suggested as a result that radiology departments may be at a greater risk of IR(ME)R incidents due to staff fatigue.
Conclusion: Considerations need to be made when optimising shift work for healthcare professionals as to avoid Shift Work Disorder and consequential error; particularly in the context of ionising radiation. Research into environmental and lifestyle support should be pursued to study its effect as prevention or management. Further direct study on radiographers is recommended.

P196 Increasing the radiotherapy research profile of individual cancer centres - rising to the CRUK challenge

Samantha Cox; Russell Banner; Jayne Caparros; Douglas Etheridge; Stuart Foyle; Les Hammond; Emily Harris; Elizabeth Hawkes; Richard Hugtenburg; Jemma Hughes; Ryan Lewis; Maureen Noonan; Gillian Palmer; Ceri Powell; Adam Selby; Roger Taylor; James Williams; Sarah Gwynne

South West Wales Cancer Centre

Background: CRUK has highlighted that individual cancer centres need to participate in research and clinical trials to develop a world-class radiotherapy (RT) service and improve patient care (The Tavistock Institute, 2014). In 2017, our cancer centre established a RT Research Strategy Board tasked with increasing both clinical and academic RT-related research and innovation over the next 5 years.
Purpose: To demonstrate that it is possible to encourage an environment for clinical and academic research and innovation in smaller cancer centres; to provide information on how others can introduce a similar programme in their department.
Summary: The strategy was launched at the first RT-research showcase day in 2017 with over 20 speakers presenting recent projects. A multidisciplinary RT Research Working Group of clinicians, physicists and staff from RT, management and R&D departments was established to create an environment to encourage and support both novel research and participation in clinical trials. In the last 12 months we have implemented an annual RT showcase day; appointed the first RT clinical fellow with funding secured for a further two 1-year posts; provided structured clinical supervision for physics MSc students; introduced monthly educational meetings with local/regional speakers; created a live database detailing projects which have been published or presented at conference. Priorities for the future include promoting collaborations with industry partners and our affiliated university. Recruitment to academic posts, dedicated research time in clinical job plans, and treatment machine capacity for research are planned.

The Tavistock Institute. (2014). Recommendations for achieving a world-class radiotherapy service in the UK.

P197 Increasing recruitment to research studies by strategic support, engagement and diversification of the research portfolio to support service department delivery

Maria Maguire; Sheena Khanduri
The Clatterbridge Cancer Centre NHS Foundation Trust

Background: The Trust has long been recognised for its strength in depth in the delivery of complex systemic anti-cancer therapeutic clinical trials. However, this resulted in reduced numbers of participants recruited to research, pressures within research facing staff in service departments and decreased accessibility to research across the Trust for our patients. We identified huge opportunity as we developed a new research strategy to not only make every patients' experience count, but to enable and empower staff to undertake their own research and to diversify the portfolio so that we could support real world qualitative studies, translational research and studies led by our skilled staff in all departments.
Implementation: To enable our aims we:
1. Horizon scanned and strategically selected new studies that reflected patients' quality of life needs, real world studies following on from trials of novel agents, studies using staff expertise such as MRI Imaging studies for example, MROC
2. Implemented system change, working with partner Trusts to streamline process and supplying our expertise in return
3. Provided PA time for all staff from clinicians to AHPs to free up time for research
4. Invested in new posts that focused on recruitment to non-interventional studies
5. Invested in infrastructure so that service departments could manage and support research studies
6. Invested in training of clinical fellows.

Outcome:

- Re-energised staff focused on research
- Highest ever recruitment to both NIHR portfolio and non-portfolio studies
- Increased partnership working across Trusts
- Increased patient benefit, care and wellbeing.

P198 Validation of the electron Monte Carlo (eMC) algorithm in Eclipse 13.6

Daniel Kelly [1]; Simon Meara [2]; Kevin Fogarty [1]; Louise Gately [1]
[1]The Clatterbridge Cancer Centre NHS Foundation Trust; [2]The Christie NHS Foundation Trust

Background: The eMC 13.6.23 algorithm in Eclipse was commissioned and evaluated to replace the manual calculation of MU for electron treatments on a TrueBeam linac.

Method: Beam models at various energies were built using the Varian representative data for TrueBeam linacs. A block of water was simulated in Eclipse and used to compare to measurements taken in a water tank. 20 patients, previously treated with manually calculated MU, were re-planned using eMC and the calculated monitor units compared. End-to-end tests were performed to test situations with significant curvature, e.g. the wax dome shown in figure 1, or inhomogeneity. In-vivo skin surface measurements are performed at first fraction of treatment using TLDs according to local standard protocol. A retrospective audit of these measurements was performed.

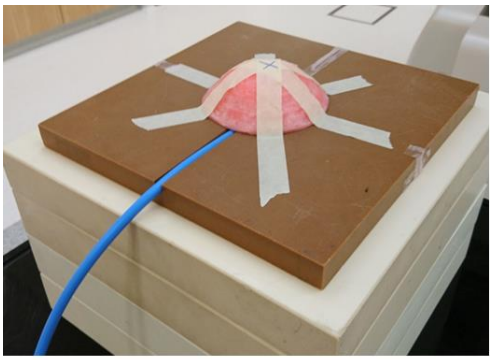


Figure 1 - Wax dome setup with Roos chamber for end-to-end test of curvature.

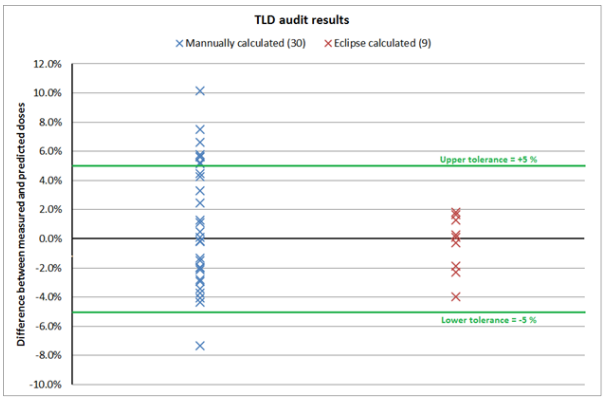


Figure 1 - TLD audit results showing the difference between measured and predicted doses.

Results:
Commissioning results compared to measurements in a water tank were satisfactory. The average difference between eMC and the manually calculated MU for the previously treated patients was 6.2% with a maximum deviation of 14.7%, hence the need for the end-to-end tests. Eclipse calculated doses matched Roos measurements underneath the wax dome to ≤±2.0% and TLD measurements to ≤±0.7%. The results of the TLD audit are shown in figure 2. All measurements so far are within the local tolerance level of ±5%.

Conclusion: All tests performed to validate the eMC beam model had satisfactory results, including in non-standard conditions. Some patient's eMC calculated MUs are significantly different to previous manual calculations. Patients planned using eMC in Eclipse have shown good agreement with skin dose TLD measurements.

P199 **Utilising a multi-disciplinary work force to optimise efficiency in delivering a palliative radiotherapy service: The Northampton experience**

Kashif Jarral [1]; Anu Gore [1]; Michael Graveling [2]
[1]University Hospitals Leicester; [2]Northampton General Hospital

Introduction: Palliative radiotherapy is an intervention for symptom control in patients with advanced cancer, when indicated the rapid delivery of treatment is warranted. The 2017 RCR workforce census has highlighted challenges in maintaining sufficient numbers of clinical oncologists who lead radiotherapy services. Those currently working have multiple commitments, making availability for palliative radiotherapy planning difficult. In response, skills mix initiatives have been developed to support delivery of this treatment modality. Therapeutic radiographers are experienced in delivering radiotherapy and their specific training in palliative planning can increase work force capacity to deliver timely treatment.
Methods: We collected data from the Radiotherapy Department at Northampton General Hospital for all palliative radiotherapy prescribed by radiographers over a 6-month period, from July to December 2016. Radiographers were trained as part of a departmental initiative to independently plan and prescribe palliative radiotherapy without direct Clinical Oncologist supervision.
Results: 92 patients were treated with palliative radiotherapy planned by radiographers during the 6 months period. Treatment sites included bone metastases (54), whole brain radiotherapy (22) and malignant spinal cord compression (16). The median time taken from planning CT scan to first treatment was 1 day, with a range of 0 to 7 days.
Conclusions: The average time from planning CT to treatment was one day, with many patients treated the same day. This suggests access to palliative treatment for cancer patients can be improved with skills mix initiatives to support rapid delivery of radiotherapy and improve overall patient experience and quality of life.

2017 Clinical Oncology Workforce Census Report, BFCO(18)1, June 2018, www.rcr.ac.uk

P200 **Comparison of inter-and intra-observer variability in image registration using cone-beam CT and MRI for cervix radiotherapy**

Rosie Hales; John Rodgers; Lisa McDaid; Louise McHugh; Jacqui Parker; Lee Whiteside; Robert Chuter; Anthea Cree; Cynthia Eccles
The Christie NHS Foundation Trust

Background: Despite known advantages of soft tissue visualisation in MRI over CT, image registration accuracy in MR-guided radiotherapy workflows remains a source of uncertainty. Accurate soft tissue registration is fundamental in adopting an

adaptive radiotherapy workflow on the Elekta Unity MR-linac. This work quantifies inter- and intra-observer agreements in an MR-to-CT registration workflow compared to CBCT-to-CT.
Methods: Soft tissue image registration was undertaken by five therapeutic radiographers for cervical cancer patients undergoing radiotherapy on an ethics-approved imaging study. CBCTs and on-treatment MRI sequences were registered to the planning CT in Monaco (v5.19.05 Research, Elekta, Stockholm, Sweden) for optimal target soft tissue matching. Resulting translations, matching confidence and perceived image quality were recorded for inter-observer comparisons. To assess intra-observer variation, repeat registration was undertaken on three patients by each observer.
Results: Three CBCTs, T2w and mDIXONw sequences were matched to planning CT for ten cervical cancer patients. Mean displacements for all observers and difference from the mean for each registration were calculated. Intra-observer variation was calculated from two observations on three datasets. There was negligible inter-observer variation for all modalities used. Intra-observer variability was greater than inter-observer in longitudinal and vertical planes. Image quality and confidence were higher for MR than CBCT. Whilst all observers considered MR images superior in quality and matched with higher confidence, inter-observer variation was consistent regardless of modality.
Conclusion: Inter-observer variability for MR-to-CT is similar to CBCT-to-CT workflow. As familiarisation and experience with MRI increases, accuracy and agreement between therapeutic radiographers registration is expected to increase.

P201 Independent MU check for halcyon using RadCalc

Ahmed Ifthaker; Vasu Ganesan; Dom Withers; Ghirmay Kidane; Liz Crees
Barking, Havering and Redbridge University Hospitals NHS

Background: The aim of the study was to commission Radclac as independent MU check for Halcyon treatment plans. Independent MU check software has been in use for several years in radiotherapy to verify the MUs from a treatment planning system. Since October 2017, our department has installed two Halcyon linacs, used only for IMRT and VMAT. Initially, patient specific QA was performed for all patients as no independent commercial MU check software was available. A version of RadCalc released in early 2018 had Halcyon compatibility, and our department commissioned and validated its use as an independent MU check system for Halcyon treatments.
Method: Halcyon (Varian Inc., Palo Alto, CA, USA) is a new linac platform that has only 6MV FFF and double-stack MLC, with no jaws. The MLC leaves project 1cm thick at iso-centre, with, the distal leaves off-set by 0.5cm to the proximal leaves, thereby producing a 0.5cm aperture resolution. Halcyon is only capable of delivering sequenced fields i.e. IMRT, VMAT, merged field-in-field, surface compensator or flattened-sequence plans. Treatment plans were generated using Eclipse V15.6 (Varian Inc., Palo Alto, CA, USA). Radcalc V6.3 (Lifeline software, USA) was commissioned for MU determination of IMRT and VMAT treatment fields.
Results: The preliminary results give a good agreement between MUs calculated in RadCalc and those calculated in Eclipse. Mean differences were in the range 0.2-2.5% depending on the site and delivery technique.
Conclusion: RadCalc can be used to perform independent MU check on plans produced for Halcyon treatment plans.
1. Halcyon Physics User's Manual V2.0 2. RadCalc Users Manual V6.3

P202 Penile rehabilitation for prostate cancer patients undergoing radiotherapy and androgen deprivation therapy

Wes Doherty [1]; Pete Bridge [2]
[1]The Christie NHS Foundation Trust; [2]University of Liverpool

Background: Treatment-induced erectile dysfunction (ED) is a common side-effect of radiotherapy and androgen deprivation therapy (ADT) that impacts on patient quality of life. (Howlett, 2010) Penile rehabilitation interventions including both pharmacological and physical therapies aim to reduce the impact of ED. Despite NICE (2014) guidelines recommending access to ED services, penile rehabilitation is not widely discussed or implemented. This systematic review aimed to appraise the evidence base for penile rehabilitation and identify evidence-based recommendations for practice.
Methods: A systematic review of the evidence base was undertaken using the PRISMA guidelines. The SCOPUS and Medline databases were searched for papers relevant to penile rehabilitation interventions for prostate radiotherapy patients. Study quality was graded using the Oxford Levels of Evidence and the Scottish Intercollegiate Guidelines Network.
Results: Nineteen papers related to penile rehabilitation in prostate radiotherapy patients. Despite the range of available physical and pharmaceutical interventions, relevant research focussed solely on the use of phosphodiesterase type 5 (PDE5) inhibitors. Findings confirmed the value of early PDE5 inhibitor intervention with a need for ongoing prophylactic use during ADT. The evidence mostly comprised quantitative data of low quality. A qualitative approach to this issue would help inform development of personalised penile rehabilitation programmes appropriate for individual patient needs.
Conclusion: Future research into the impact of the full range of penile rehabilitation interventions will ensure patients have access to those therapies that are most appropriate for them. A paradigm shift towards qualitative research in this field may be of more value than reductive quantitative studies.
1. Howlett K, Koetters T, Edrington J, West C, Paul S, Lee K, et al., editors. Changes in sexual function on mood and quality of life in patients undergoing radiation therapy for prostate cancer. Oncology nursing forum; 2010
2. NICE. Prostate cancer: diagnosis and management 2014

P203 **MR only radiotherapy for prostate cancer: First UK clinical implementation**

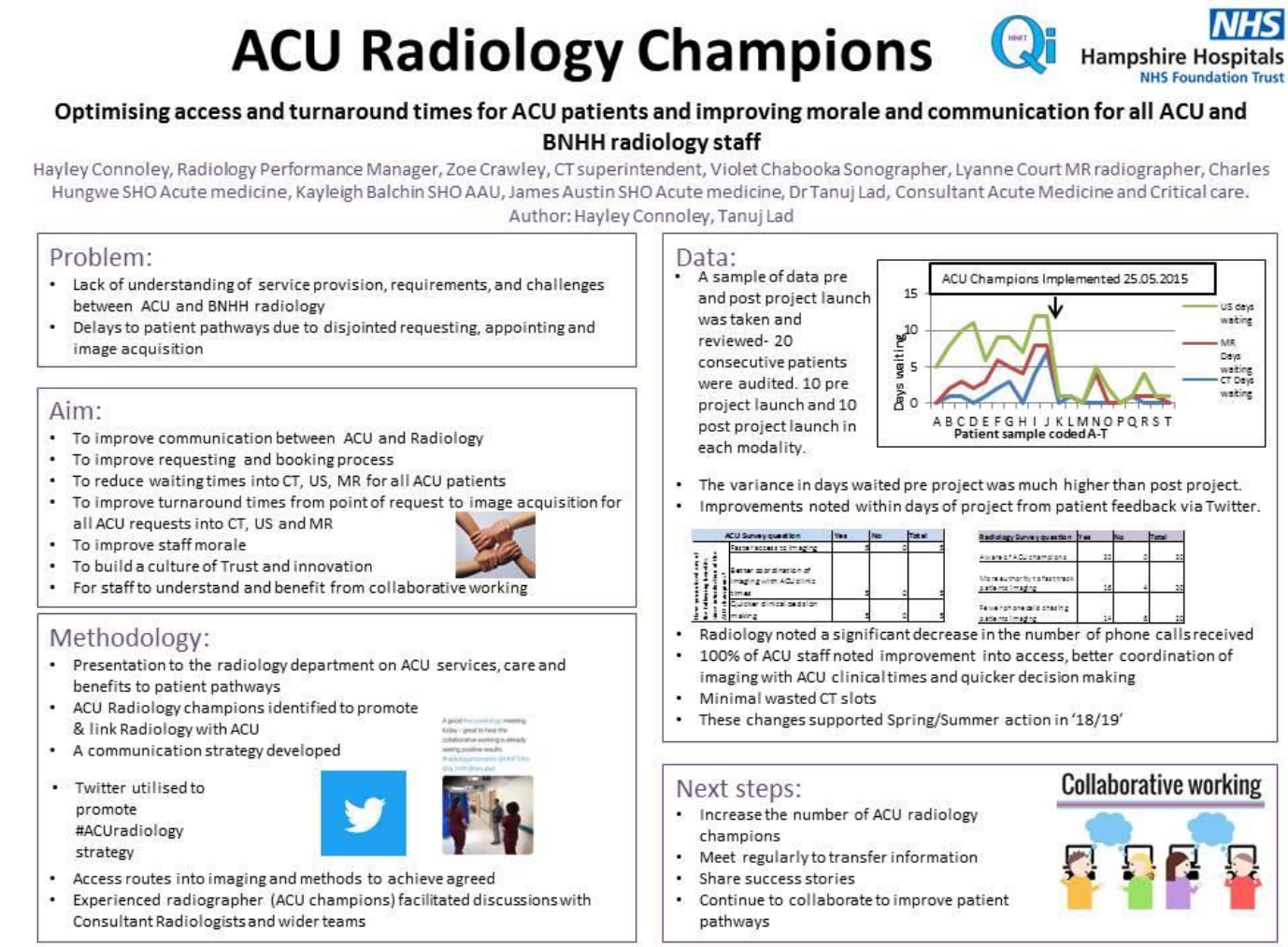
Jonathan J Wyatt; Rachel A Pearson; John A Frew; Serena C West; Michele Wilkinson; Karen Pilling; Rachel Brooks; Christopher Walker; Hazel M McCallum
Newcastle upon Tyne Hospitals NHS Foundation Trust

Background: MR only radiotherapy provides the superior soft-tissue contrast of MR for delineation without the MR-CT registration uncertainty, as well as improved patient experience and departmental efficiency. However, MR only radiotherapy requires a synthetic CT (sCT) for dose calculations. sCT algorithms are now commercially available. This study aimed to pilot clinical implementation of MR only radiotherapy for prostate cancer.
Method: Five patients will receive a planning MR scan with a radiotherapy couch top and immobilisation. The patients will be set-up using in-house developed skin markers and lasers. Two MR sequences will be acquired: a small Field Of View (FOV) image for target delineation and a large FOV image for healthy organ delineation, sCT generation and on-treatment verification. A CT scan will also be acquired for quality assurance. The sCT will be generated using MriPlanner (Spectronic Medical, Sweden). The treatment volumes will be copied to the sCT and a VMAT plan created. The plan will be recalculated on the CT and dose differences determined. For on-treatment verification the CBCT will be matched to the large FOV MR. Offline this match will be compared to a CBCT-CT match.
Results: The first patient has been treated; their large FOV MR image with skin markers and the online CBCT-MR match is shown. The sCT with dose distribution and dose difference map is recorded. The target dose differences were 0.5%. The mean couch shift difference to CT was 0.8 mm.
Conclusion: MR only planning has been successfully clinically implemented for one patient.

P204 **ACU radiology champions**

Hayley Connoley; Tanuj Lad
Hampshire Hospitals NHS Trust

A great example of collaborative working between HHFT radiology and ACU at Hampshire Hospitals NHS Trust where significant improvements were recorded in ACU patient access and turnaround times into radiology. Better coordination, staff awareness



of different departments services, challenges and processes alongside minimal wasted CT slots were all noted in the conclusion phase of this project.

P205 **We can break your fall: An AHP collaboration**

Sarah Mould; Jonathan McConnell
NHS Greater Glasgow & Clyde

Introduction: In early summer 2018, a Pilot Study introducing an innovative radiographer to occupational therapist (OT) referral pathway took place. The study encompassed four teaching hospitals in a large UK city, and GP patients (>65yrs) with a falls history were the focus. The imaging departments operate a "drop in" service for GP patients attending X-ray. Radiographers introduced a simple questionnaire into X-ray examinations, and with consent passed details to the OT team for further assessment. Current practice involves GP referral to the occupational therapy falls prevention team

Aim: The aim of this study is to streamline patient pathway by enabling access to available services sooner.

Method: A three month period (May-July), screening questionnaire and referral process was agreed with OT falls prevention team colleagues. Radiographers working in participating departments incorporated the questionnaire in to X-ray examinations, and completed forms were submitted. The OT team used triage calls to consenting participants to assess individual support requirements. Following the Pilot, retrospective statistical analysis was performed.

Results & discussion: During the Pilot, 16 patients were referred to the OT falls team. Of these, 5 accepted input - including physiotherapy, pharmacy review and community alarm referral. None of the patients referred by radiographers had duplicate GP to OT referrals during the Pilot. Statistical analysis showed that only 9% of potentially suitable candidates were referred to OT by radiographers.

Conclusion: Introduction of a direct inter-professional referral route to streamline services and improve holistic patient care has also resulted in strengthened communication and collaborative links.

1. Scottish Government. The Prevention and Management of Falls in the Community. A Framework For Action For Scotland 2014/16. Crown Copyright. Edinburgh 2014
2. Scottish Government. Allied Health Professions co-creating Wellbeing with the People of Scotland. The Active and Independent Living Programme in Scotland. Scottish Government, Edinburgh, June 2016

P206 **Managing the tide: Controlling access to imaging referrals from nursing, midwifery and allied healthcare profession staff**

Paul Simpson
City Hospitals Sunderland NHS Foundation Trust

Background: The Ionising Radiation (Medical Exposure) Regulations (IR(ME)R) 2017 state that a referrer is "a registered healthcare professional who is entitled in accordance with the employer's procedures to refer individuals for exposure...", but leave the processes for governing exactly which registered healthcare practitioners are entitled to refer to individual employers to decide.

Traditionally this Trust, a large Acute Foundation Trust in North East England, used "Radiology Group Directions" to allow medics (doctors) to delegate the responsibility of referring patients for examination requiring the use of ionising radiation to nursing, midwifery and allied healthcare professionals. However, due to the rising number of access requests and huge variation in access scope, this system had become un-sustainable.

Purpose: This poster will outline the changes made to our access process, which has moved from paper-based to paperless, and has introduced more structured pathways designed to standardise referral criteria. It will also outline how an electronic system can make referral audit easier.

Summary: The poster will display the rationale for the changes, alongside a process flowchart and example pathways and access request forms. There will also be a section on audit of referrer access.

The Ionising Radiation (Medical Exposure) Regulations 2017 (SI 2017/1322)

P207 **Large peri renal haematoma post ESWL, the role of the advanced practitioner in patient care**

Amanda Swift; Sally Hodgkins
Mid Yorks NHS Trust

Background: Currently there are over 300 patients who undertake Extracorporeal Shockwave Lithotripsy (ESWL) to renal stones each year within the trust. The associated complications include infection, steinestrasse, medication reactions and potentially serious peri renal haematoma. The reported haematoma rate is less than 1% however, when a patient becomes acutely unwell following treatment it is important that they are managed quickly and appropriately to avoid any renal impairment and limit the chance of any possible life threatening blood loss.

Purpose: This poster will discuss the haematoma incidence rate and show both US and CT findings of a patient who immediately presented with severe flank pain post ESWL. It will detail the criteria followed prior to ESWL treatment, the taking of patient consent and discuss the impact of the advanced practitioner role on patient management and follow up. The poster will show UKIO participants the ultrasound and CT appearances of a renal haematoma. US is a fast and most easily accessible method of

imaging the kidneys in an acute setting and large haematomas are easily identified on US therefore it should be considered as a cause of pain post ESWL by sonographers.
Summary: Introduction - background of haematoma's as a complication post ESWL and potential on going implications. Describe the patient and display images Look at possible treatments of an actively bleeding haematoma. Conclude/recommendations advice for clinical practice.

P208 **The perils of consent in radiological interventional procedures**

Mohammed Nabi; Rowena Johnson; Rajat Chowdhury
Oxford University Hospitals NHS Trust

Informed consent is an essential step in our interventional work. There is however little known about the real practice in image guided interventional procedures, and there are no clear guidelines on how to standardise and continuously improve the process in this setting. Although informed decision-making for clinical treatment is a fundamental part of modern medical practice, it has different purposes in different contexts and is inconsistently practised, often falling short of the theoretical model.
In this review, we emphasise points from the RCR standards for patient consent, as well as the 12 key pieces of information that patients should be given as detailed by GMC. We discuss important issues such as the delegation of consent, the legal implications of written versus verbal consent, and the appropriate elements of robust written consent. In addition we discuss the impact of the National Safety Standards for Invasive Procedures that was released by NHS England in September 2015 and how the law on informed consent has changed following landmark Supreme Court judgments. Finally, we highlight the NICE guidelines in consenting patients for procedures where the benefits and risks are uncertain, such as in autologous blood injection for tendinopathy.

1. General Medical Council. Consent: patients and doctors making decisions together (June 2008)
2. Montgomery v Lanarkshire Health Board (2015) SC 11 (2015) 1 AC 1430
3. NHS England patient Safety Domain. National Safety Standards for Invasive Procedures (September 2015)
4. NICE: Consent - procedures for which the benefits and risks are uncertain (2003)
5. Royal College of Radiologists. Standards for patient consent particular to radiology (2nd edition 2012)

P209 **Phone calls giving you a headache? Reducing unnecessary interruptions on-call**

Sara Ffrench-Constant; Luke Dixon; Dermot Mallon; Chris Watura; Amrish Mehta; Brynmor Jones
Imperial College NHS Trust

Background: Despite a shortage of radiologists, the radiological workload is ever-increasing and compounded by an increasing frequency of interruptions, the majority of which are phone calls. It is therefore essential that efforts are made to optimise radiologist productivity and their working environment. While radiologists must be readily accessible, unnecessary interruptions must be minimised for maximal clinical effectiveness.
Aims: Identify common and potentially avoidable sources of telephone call interruptions to the on-call radiologist.
Method: The number and reason for telephone calls to the on-call radiology registrar were prospectively collected during two 3 week periods, 1 month before and 3 months after the implementation of a novel protocol for the automated vetting of non-contrast CT head scans.
Results and intervention: 54% of telephone calls related to vetting of a radiological examination, of which approximately half (48%) were for vetting of non-contrast CT heads. Following this, based on current guidelines an automated vetting protocol for adult CT heads was formulated and introduced. Post protocol implementation, there was an 80% reduction in phone calls regarding CT heads and a 21% overall reduction in the total number of calls. The number of CT heads performed remained unchanged.
Discussion: In an attempt to reduce pressure on radiologists, we demonstrate the successful implementation of a novel protocol for automated vetting of unenhanced CT heads. By doing so, we have achieved a marked and sustained reduction in the number of telephone interruptions. This has improved both radiology workflow and in turn, patient flow through the emergency department.

P210 **Tele-oncology: Presenting a remote radiotherapy treatment planning solution**

Susannah Jansen van Rensburg; Delos Wilbur; David Wastall
GenesisCare, UK

Background: The role of remote reporting in radiology is well-established[1]. There is very little literature discussing the use of remote radiotherapy treatment planning on a large scale; its implementation can help increase access for referring oncologists and reduce delays in the patient's radiotherapy planning pathway. We present a successful approach to the use of remote radiotherapy planning.
Purpose: Outline of the technical requirements for successful implementation of the remote radiotherapy planning solution, with reference to software and systems used. The work will help readers to understand the training requirements for both staff and referring oncologists. Describe the advantages to be gained in terms of planning days, as this practice facilitates a 5 working

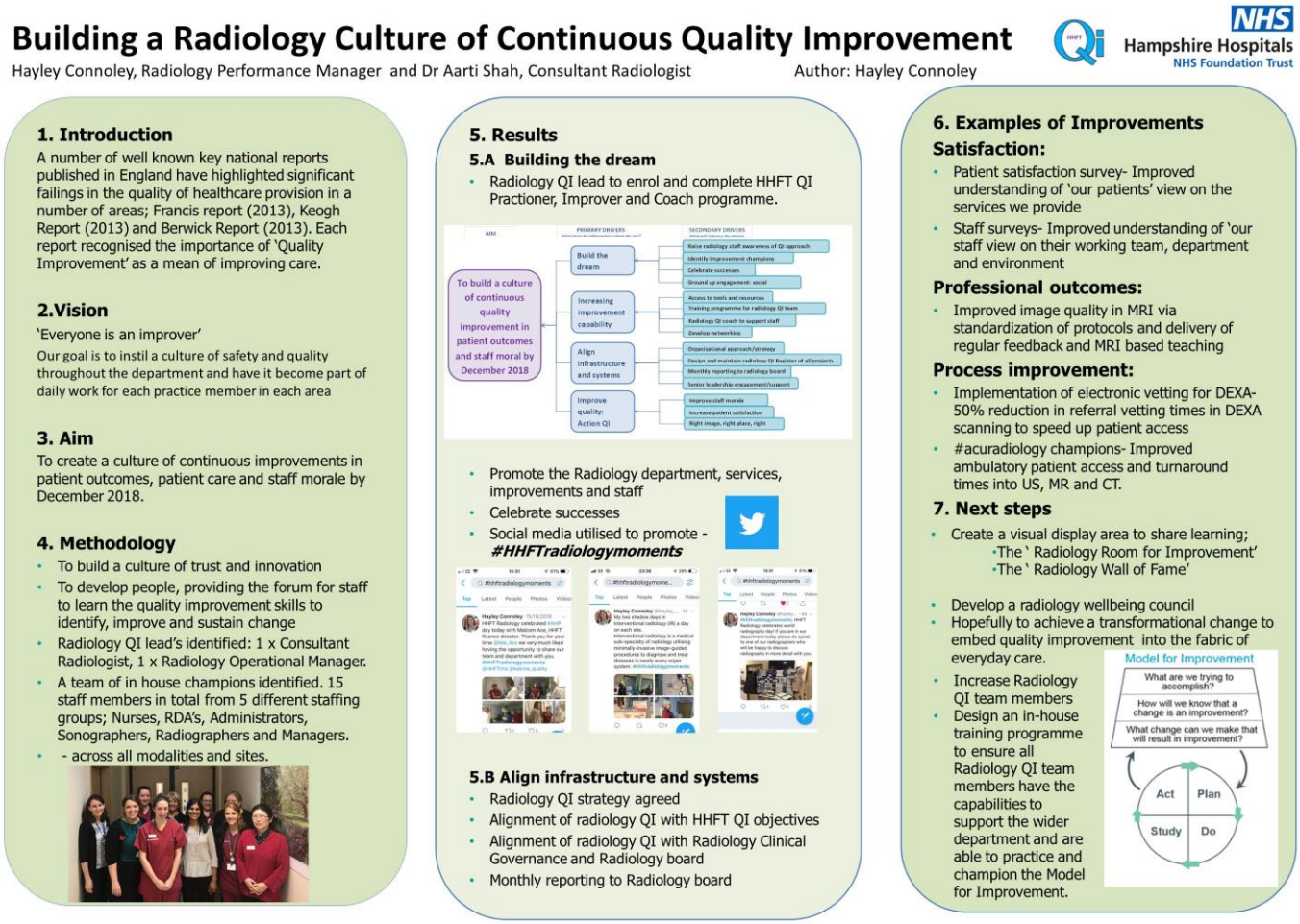
day turnaround from CT to treatment for radical radiotherapy cases. Consideration will be given to the ethico-legal requirements with respect to patient confidentiality and data protection.

Summary: An initial overview of the institution will include the number of referring oncologists and linear accelerators, to give context to the scale of the solution. There will be an outline of the remote planning pathway (including flow diagram) with the software used. Feedback will be included from referring oncologists regarding the solution. There will be a discussion of the strengths and limitations of the solution, as well as recommendations for implementation.

1. Thrall, J. H. (2004). Teleradiology. Part I. History and clinical applications. Radiology 243: 613-617

P211 Building a radiology culture of continuous quality improvement

Hayley Connoley; Aarti Shah
Hampshire Hospitals NHS Trust



Francis report (2013), Keogh Report (2013) and Berwick Report (2013)

P212 Potential efficiency savings in daily QA of a linear accelerator

Matthew Bolt [1]; Andrew Nisbet [1]; Catharine Clark [2]; Tao Chen [3]; Gail Distefano [4]
[1]Royal Surrey County Hospital; [2]National Physical Laboratory; [3]University of Surrey; [4]Royal Surrey County Hospital/University of Surrey

Background: Current practice is to measure beam output for each beam energy during daily QA, which is time consuming. If changes in beam output are energy independent there is potential scope to reduce the daily QA, therefore increasing clinical linac availability.

Methods: Four years of output measurements from 8 Varian linacs across two clinics were collated, including 6MV, 10MV, 15MV, 6FFF, 10FFF photons and 6MeV, 9MeV, 12MeV, 16MeV and 20MeV electrons. Daily PTW-Linacheck and weekly ionisation-chamber measurements in solid water were analysed. Linear least-squares regression was performed between the 6MV and all other beams for each linac. Corrections were applied to account for beam calibrations during this period (to offset the drift in beam output).

Results: Correlation was observed for all beams with respect to 6MV. The greatest correlation was for 10MV and least for 15MV with Spearman's correlation coefficients of 0.97 and 0.89 respectively. R-squared values ranged from 0.62 (6MeV) to 0.97 (10MV). In Figure 1, a plot of 10MV and 12MeV against 6MV is shown for one linac with different calibration periods highlighted showing the correlation.

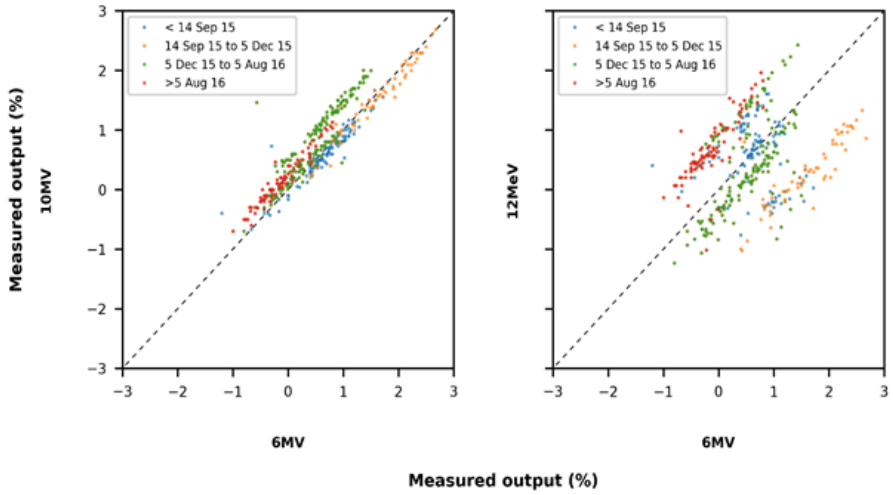


Figure 1: Plots of 10MV (left) and 12MeV (right) against 6MV results measured on the same day for one linac. The measurements have been separated into time periods determined by the point at which a calibration or equipment adjustment occurred.
A banded structure appears which indicates the beam output of different energies on the same linac are correlated. It has been observed that the MV beams have greater correlation than the MeV beams.

Conclusions:
Strong correlation is observed between measured outputs for all beams on an individual linac. There is potential to reduce the time needed for daily QA if a reduced number of beams are measured. For a multi-modality linac this may currently take 45 minutes using an ionisation chamber, which could be reduced to 15 minutes if a single energy was measured, resulting in 2.5 additional clinical hours per week per linac.

P213

Who do reporting radiographers consider their peers?

Kirsty Wood
University of Derby

Background: Over the last 30 years there has been an increase in radiographers expanding into image reporting roles, traditionally undertaken by radiologists. Often both radiographers and radiologists report the same scope to the same standard (Brealey et.al 2005; Stevenson et.al 2012; Hardy et.al 2013). This research aimed to investigate who reporting radiographer considered their peers, particularly in relation to peer review.
Method: In order to gain a national perspective an online survey was distributed via a professional network and social media. Sixty-five responses were received, estimated approximately 10% of the radiographer reporting workforce. The survey asked "As a reporting radiographer do you have peers?" 100% of responses stated 'yes', followed by a free text entry of who they considered their peers. Information including geographic location (region), scope, time reporting radiographer practice established (team and individual), mentor and supervision arrangements and peer review/audit arrangements was also collected in an aim to contextualise answers.
Results: Radiology colleagues (registrars, radiologist, consultant radiologist) was identified as a peer in 26.5% of responses. 27% specified advanced practitioner rather than reporting radiographer, 45% stated reporting radiographers as their peers. Free-text answers reflected that a peer was not defined by scope of practice or experience, but by who undertakes the same task.
Conclusion: When reporting medical images, a peer is one who undertakes the same task regardless of job role or title, experience or scope of practice. Radiographers identify strongly with their own profession, and acknowledge similarities to the radiology profession- relating to scope.

Brealey, S. King, D. Hahn,S. Crowe,M. Williams, P. Rutter, P. Crane, S. (2005) Radiographers and radiologists reporting plain radiograph requests from accident and emergency and general practice. Clinical Radiology, 60 (6). 710-717pp
Stevenson, P. Hannah, A. Jones, H. Edwards, R. Harrington, K. Baker, S. Fitzgerald, N. Belfield, J. (2012) An evidence based protocol for peer review of radiographer musculoskeletal plain film reporting. Radiography. 18 172-178pp
Hardy, M. Hutton, J. Snaith, B. (2013) Is a radiographer led immediate reporting service for emergency department referrals a cost effective initiative? Radiography 19(1) 23-27pp

P214 **What effect does decreasing the time to report radiographs have on reporting accuracy?**

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Background: The increasing number of radiographs undertaken along with the introduction of hot reporting appendicular Emergency Department radiographs has inevitably brought about increased pressure on the Advanced Practitioners (AP) raising the concern about the effect on reporting errors. Previous similar studies focused on radiologists, despite it being documented that APs report most of the radiographs within the NHS. Plus: they did not investigate the effect on satisfaction of search (SOS) and voice recognition (VR).

Method: One group of 60 appendicular radiographs were reported by APs within 4hours and the second within 2 hours. The true and false positives and negatives, sensitivity, specificity, accuracy, positive and negative predictive value were calculated before the P-value to identify statistical significance. The number of SOS and VR errors were calculated alongside the P-value. Results being split into the observation of the acute and chronic pathologies.

Analysis: Initially there was no statistical significance, further investigation highlighted that one participant was faster when allocated more time. With this consideration negative results were statistically more accurate when more time was taken, with both acute and chronic pathologies. It was observed that not all APs discuss the chronic pathologies. No statistical difference was seen when looking at SOS and VR errors. Notably the wrong patient's radiograph was reported when working fast, a 'never event'.

Limitations: It was noted that no participants took longer than 3hours when given 4hours, something to be considered in future studies.

Conclusion: Reporting accuracy was improved when more time was allocated to report.

1. Edwards. A. J et al (2003) The effect of reporting speed on plain film reporting errors Clinical Radiology **5** (8) 971-979
2. Hardy. M, Spencer. N and Snaith. B (2008) Radiographer Emergency Department hot reporting: An assessment of service quality and feasibility. Radiography **14** 301-305
3. Snaith. B and Hardy. M (2014) Emergency Department image interpretation accuracy: The influence of immediate reporting by radiology International Emergency Nursing **22** 63-68
4. Sokolovskaya. E et al (2015) The effect of faster reporting speed for imaging studies on the number of misses and interpretation errors: A pilot study Journal of the American College of Radiology **12** 683-688

SHARING BEST PRACTICE

P215 **Development of radiographer led on-treatment review clinics, following a competency based framework**

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Purpose: To share our experience of developing and delivering Radiographer led On Treatment Review clinics for patients receiving radiotherapy across 2 clinical sites, following a medical model for review, and the projection of how this will work across a 3rd site. The poster follows a timeline of how the service was set up, initially at a satellite centre, the results of a pilot project for implementation of the service at the main hospital site, and follows the development of the service, with expansion of the treatment sites reviewed, and the development of the staff involved.

P216 **Feasibility study of one-stop emergency palliative treatments on Halcyon linac**

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Background: The Halcyon linac has mandatory imaging as part of patient workflow. It produces high-quality kV-CBCT images up to 24.5cm long and 49.1cm wide. Emergency palliative patients (e.g. cord compressions) are usually scanned on a CT scanner, wait for a plan to be completed, and are then treated on a linac, requiring moving a patient onto two separate couches. A workflow is considered where localisation and treatment are both done on the Halcyon, thereby reducing patient re-location.

Method:

- The process was developed using a thorax phantom
- A plan with a field is prepared in advance on a separate phantom
- A kV-CBCT scan of the phantom is obtained on the Halcyon
- In Eclipse, the kV-CBCT has a body contour applied where the density is forced to water
- The prepared plan has the kV-CBCT assigned to it, and the field altered for appropriate treatment
- An MLC-based irregular surface compensator is created to flatten the Halcyon 6MV FFF beam
- The plan is exported to RadCalc for MU check
- After review and approval, the plan is used for treatment.

Results: Using a phantom, all the steps from the start of the localisation scan to the end of treatment beam delivery can be completed within 15 minutes.