UKRC

UKRO

POSTER
ABSTRACTS

IPEM
Institute of Physics and Engineering in Medicine

THE COLLEGE OF RADIOGRAPHERS

BIR
The British Institute of Radiology

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UKRO

O-001 Radiotherapy planning results for patients in the hypofractionated Biologically Optimised IMRT for Prostate Radiotherapy Trial (BIOPROP20)

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The Clatterbridge Cancer Centre NHS Foundation Trust

Aims/objectives: We present the phase II BIOPROP20 study (NCT02125175) prostate radiotherapy planning results; 60 Gy (intra-prostatic tumour boost to 68 Gy) in 20 fractions dose-painting schedule for intermediate to high-risk patients.

Content: Patients received multi-parametric MRI and 18F-choline PET/CT prior to androgen deprivation (ADT), and planning MRI and CT following 2 months' ADT. Registration used fiducial markers. Intra-prostatic boost volumes were outlined by combining visually-identified lesions on MRI and PET. Rotational IMRT planning was performed using Pinnacle software (Philips). Patients with unexpected regional lymph node PET uptake also received pelvic radiotherapy with boost.

Relevance/impact: In the CHHiP trial, hypofractionated prostate radiotherapy with 60 Gy in 20 fractions was non-inferior to conventional radiotherapy: 74 Gy, 37 fractions. Prostate dose-painting may improve biochemical relapse-free survival similar to whole organ dose-escalation, whilst avoiding increased associated toxicity.

Outcomes: Forty-eight (of 59) patients have been planned thus far, 5 with concurrent pelvic radiotherapy. Both groups had median prostate dose excluding boost of 61.0 Gy (range 60.4-61.7 Gy). Median dose to intra-prostatic boost volume was 68.2 Gy (66.2-68.9) and 67.2 Gy (66.8-68.5) respectively. In the pelvic radiotherapy group, lymph node dose of 45 Gy with boost to 50 Gy was achievable. Normal tissue (bladder, urethra, rectum and bowel) dose volume constraints were achieved in all patients, and boost doses were reduced if this was not possible.

Discussion: Radiotherapy planning for hypofractionated prostate dose painting is practicable for patients recruited into the BIOPROP20 study thus far.

O-002 The introduction of a research funded interventional clinic within the NHS to enable participation in prostate clinical trials

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Background/purpose: Within prostate cancer clinical trials there has been an increasing move towards hypo-fractionated and Stereotactic Ablative Radiotherapy (SABR) regimes. This has led to an increased requirement for Image guided Radiotherapy (IGRT). It was therefore necessary at our centre to implement a service to facilitate the implanting of fiducial markers and other interventional procedures to enable our participation in such clinical trials.

Method: Funding for this service was secured from a research grant. A multi-disciplinary working group of consultant clinical oncologists, radiographers, hospital management, nurses, clinical trials team and clinical research fellows was formed. Meeting at regular intervals throughout the set-up process this group ensured the service was introduced in a safe and controlled manner, writing protocols and work instructions, and designing and implementation a competency-based training programme for staff undertaking and assisting procedures.

Results: All training and processes are now in place with the service receiving its first patients. The inaugural clinic was held in December 2015. This service is now a prerequisite for three clinical trials at our centre with the service also being utilised to facilitate the collection of prostate tissue for research purposes.

Conclusion: This service has been a major undertaking requiring input from a large multi-disciplinary group. Demand for this service will continue to grow with the opening of further clinical trials

O-003 Individual case review of adherence to the conformal radiotherapy planning protocol in the UK NeoSCOPE trial

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Introduction: Failure to adhere to trial protocols for planning within radiotherapy trials may have an adverse effect on, and potentially invalidate, trial outcomes. The CRUK-funded NeoSCOPE trial (UKCRN 13764) involved prospective individual case-reviews to identify and correct such variations.

Method: All participating centres had passed a pre-accrual planning benchmark case. Real-time review (feedback to centres within 3 working days) was performed on the first 10 patients recruited and the first case submitted from each participating centre. All subsequent cases were subject to 'timely-retrospective review', with review within 2 weeks of the start of RT. Radiotherapy plans for all cases were submitted in DICOM format to the RTQA centre and reviewed by the QA physicists allocated to the trial. Each case was reviewed against pre-determined acceptable and unacceptable variations. Unacceptable variation required re-submission.

Results: 83 cases were reviewed, 39(47%) of which were real-time and 44(53%) timely-retrospective. 4(5%) cases required re-submission and these were each the first plan submitted by a participating centre. Undercoverage of PTV, particularly at the superior/inferior extents, was the most common planning variation and the RTQA centre advised on techniques for improving coverage (e.g., opposed sup-inf wedges). 28(72%) of the real-time reviews were returned within 3 working days and 42(95%) of the timely-retrospective reviews were returned within 2 weeks. There were no delays to RT start time.

Conclusions: Prospective review of planning in NeoSCOPE has enabled identification and correction of unacceptable variations from the protocol without introducing treatment delays. The planning reviews were complemented by prospective review of outlining.

O-004 Quality assurance of image registration in radiotherapy clinical trials

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The Royal Marsden NHS Foundation Trust

Aims/objectives: To investigate quality assurance (QA) requirements for image registration in radiotherapy (RT) clinical trials and the associated technical issues.

Content: The National Radiotherapy Trials Quality Assurance (RTTQA) group is developing procedures for QA of image registration for RT clinical trials (e.g. PACE, INTERLACE and HIPPO). The areas to include and issues to address are presented here.

Relevance/impact: Multimodality imaging (e.g. MR, PET) is increasingly being used in RT treatments and clinical trials to more accurately identify target volumes. In addition, the use of stereotactic body radiotherapy (SBRT) intensifies the need for precisely targeted RT delivery and hence accurate registration of images used for localisation and treatment.

Outcomes: Development of the image registration QA programme will need to consider: the variety of registration techniques in clinical use (e.g. fiducial markers, soft tissue matching); how to analyse and report the registration given its subjective nature; the lack of standardisation in the exports from different systems; registration of 4D image sets; and identifying suitable software to enable assessment of the registration.

Discussion: Liaison with software manufacturers is needed to help overcome the difficulties associated with exporting and reviewing registered RT image sets. A task group has been set up within the National RTTQA group to establish these links and resolve these issues in order to draft an image registration QA programme for use in RT trials.

O-005 Identifying national research priorities for the radiography profession: An online Delphi consensus study

Simon Hills[1]; Heidi Probst[1]; Fiona Mellor[2]
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Aims/objectives: To develop consensus on research priorities for the radiography profession across all aspects of diagnostic imaging and radiotherapy for the next 5 years.

Content: The results of a College of Radiographers funded Delphi consensus study will be presented, including both quantitative and qualitative data. The expert panel consisted of 118 diagnostic and therapy radiographers and 10 from other disciplines, student radiographers and user representatives. The presentation will show the ranked radiography research priorities from the panel that were obtained through a series of online survey rounds.

Relevance/impact: Defining research priorities provides strategic direction for radiography researchers wishing to apply for research funds, as well as communicating to funders the key/emerging research priorities for the profession.

Outcomes: Round 1 produced 325 research areas (categorised into 19 themes/sub-themes) from an independently validated list of experts across a range of key specialties (n=128). In round 2 the panel ranked importance (on a 5-point Likert scale) of the round 1 topics. In round 2 consensus was defined as a mean importance rating of the topic of ≥3.5 and as ≥75% agreement (% of panel members scoring 4 (important) or 5 (very important).

Discussion: Using an online Delphi consensus technique involving key stakeholders (including a range of specialist radiographers, service users and students) enabled the prioritisation of radiography research topics. The priorities identified reflect important issues related to users of radiography services and the staff caring for them. The study will inform a research priorities framework covering the specialisms in radiography and which focuses on improving patient care, services or radiographers' education.

O-006 Consistency of bladder volumes in cervical cancer patients undergoing radiotherapy

Simon Hills; Amy Taylor
Sheffield Hallam University

Aims/objectives: Whether pre-treatment and on-treatment bladder volumes of cervical cancer patients are within local protocol recommendation of 200-300cm3.

Content: Quantitative data showing pre-treatment and on-treatment bladder volumes of patients (n=8) treated with radiotherapy for cervical cancer, using cone-beam computed tomography (CBCT) image-guidance.

Relevance/impact: If on-treatment bladder volume is not congruent with planning CT scan there can be no certainty that the plan is being delivered as intended; hence accurate and reproducible treatment cannot be guaranteed, leading to poorer patient outcomes.

Outcomes: At planning CT scan, bladder volumes ranged from 71.69-700.85cm3 (mean of 256.56cm3). Two patients (25%) had bladder volumes at planning scan within local protocol tolerance of 200-300cm3. On-treatment volumes ranged significantly, from 24.92-1097.66cm3 (mean of 276.70cm3). Mean on-treatment bladder volumes per patient were 46.73-494.80cm3. Only 10 (13%) of 84 treatment scans contoured fell within tolerance.

Discussion: A challenge in pelvic radiotherapy is accounting for internal organ motion, an issue complicated by bladder filling at time of treatment. Specific drinking protocols for gynaecological patients aim to achieve consistency and ensure bladder size is similar to that at planning scan. Despite being instructed to carry out specific drinking protocols, bladder volumes can vary both between and within patients, at planning CT scan and during treatment. If patients are not receiving daily scans to assess bladder status, then accurate and reproducible treatment cannot be guaranteed and the plan may not be delivered as intended. In order to account for the volume variations that are apparent, daily bladder assessment is recommended, either by ultrasound bladder scanner or CBCT.

O-007 Using a complex clinical algorithm to predict treatment intent from the radiotherapy dataset (RTDS)

Tracey Ellison; Christine Ball
NATCANSAT (National Clinical Analysis And Specialised Applications Team)

Background: It was recommended that intention to treatment (radical or palliative) be omitted from the national radiotherapy dataset, RTDS until such a time that there was clinical guidance or protocol in the use of radical and palliative intent. The authors have produced an algorithm of other clinical data items available in RTDS to be able to report intent on historical data 2009 – 2013.

Methodology: The algorithm analysed individual episode records by primary cancer diagnosis, anatomical site/ region, prescribed dose and fractionation, technique and number of attendances to predict the treatment intent based on clinical rules. This prediction is known as the 'Calculated Intent'. The algorithm was tested for exactitude by comparing the data entries for treatment intent collected in the RTDS from April 2013 known as 'Submitted Intent' with the data entries of 'Calculated Intent'.

Results: The results showed an overall >90% match rate, and will be stratified by primary diagnosis and NHS Trust to offer an explanation in variation.

Conclusions: This algorithm should be used to report intent on cohort based population analyses using RTDS. It could be developed further with additional complex rules to account for newer protocols. Additional linkage to other data sources i.e. TNM Staging in Cancer Registry data would allow a more accurate prediction of calculated treatment intent.

O-008 Integration of automatic Raystation scripts within the clinical pathway to provide and manage the in-vivo diode measurement data

Andrew Bird; Richard Powis; Gareth Webster
Worcestershire Oncology Centre

Introduction: Many aspects of the radiotherapy planning process are manual. Department specific auxiliary planning processes wont fall under any general solutions provided by efforts to 'automate planning'. One example process is the production of data related to the in-vivo diode dose check measurements performed in many clinics. We present a potentially general automatic solution using the Raystation scripting environment within the Raystation Treatment Planning System (TPS) for the provision and management of the in-vivo measurement data.

Methods: A Raystation script and MS-Excel template have been developed to automate the calculation, measurement and management of in-vivo diode doses. A Python representation of the geometry sufficient to ray-trace, and thus locate the diode position, has been integrated with a Raystation script to aid the positional calculations. The information relevant to the dosimetric calculation is provided and is then parsed by a simple MS-Excel template such that it is accessible directly in the clinical pathway. Further to dosimetric considerations the script provides a second Dicom RTPlan object which when imported into the Mosaiq Record and Verify system aids placement of the diode by way of positional guides in the form of 1.0cm2 light fields.

Results: Efficiencies are made by the automatic provision of the initial data, the removal of the need to transcribe and manually interpret data, the removal of paper copy and the use of light field positional guides. The results of comparisons between predicted measurement doses using this system and the former manual method show good general agreement.

O-009 Informing and improving the radiotherapy treatment planning process by the integration of automated quality and risk metrics using the Raystation Scripting Interface

Andrew Bird; Richard Powis; Gareth Webster
Worcestershire Oncology Centre

Introduction: Full optimisation of radiotherapy treatment plans is an information intense operation; there has never been more information in Radiotherapy. The TPS currently optimises a selection of metrics but the decisions and manual interventions of the operator have a large influence on the final plan. Information from the analysis of the individual case and the available population of similar cases, with consideration to the experience gained from verification measurements can be used to inform and automate parts of the manual processes.

Method: Raystation scripting has been used to calculate various metrics to describe and characterize each RT plan for a cohort of one hundred clinical VMAT prostate cases. In each instance the data has been examined for trends and correlations that could inform and improve the planning processes. Consideration has been given to methods of employing Raystation Scripting within the planning processes to provide in-line feedback and aid the operator in navigating the Problem and Solution spaces.

Results: Analysis of the results of the prostate cohort has enabled the identification of outlier plans, for example some plans are found to be overly complex. The work suggests that is it possible to perform in-line automatic analysis of the case and use results to inform influential decisions in the planning processes. Further work is underway to identify more specific metrics indicative of high and low quality, risk and deliverability and to similarly automate their use in the clinical pathway to provide a more comprehensively optimum plan.

O-010 Creation of a reporting dashboard to collect radiotherapy quality measures centrally

Tracey Ellison; Christine Ball
NATCANSAT (National Clinical Analysis And Specialised Applications Team)

In 2012/13 the NHS Commissioning Board (now NHS England) approved the creation of a Quality Dashboard pilot for specialised services. The pilot generated a Specialised Services Quality Dashboard for Radiotherapy, and produced a set of measures which were to be collected on a quarterly basis. The information provided is required to understand the quality and outcomes of services and reasons for excellent performance.

Data was submitted originally by individual NHS Trusts during a trial period. At that time there was no quality assurance and varying values were allowed to be submitted with little 'sense check'. Interrogation of this data showed that there was some misinterpretation of the measures which created disparity between providers. Some of the measures were difficult to process and validate internally.

The authors were asked by providers to generate centrally the measures reported from the national radiotherapy dataset, RTDS. Additional data sources were collated from other datasets, and a few measures were not publically available.

The creation of a dashboard which processed and reported data centrally bringing together all the quality measures has several advantages:

- Time saving
- Avoids duplication
- Prevents poor quality of data and misinterpretation
- Benchmarking
- Consistent/improved measures

The central dashboard is efficient to use allowing existing data sources to be processed centrally. It allowed service providers to influence the definitions of the measure ensuring that they accurately represented the service. It was successfully implemented with 96% of providers using it. This methodology could be applied to the other specialised measures.

O-011 Should delivered dose for palliative patients be planned using a 2D or 3D calculation model?

Elaine Reilly; Andrew Reilly
Western Health and Social Care Trust

Aims/objective: To assess whether a 2D dose calculation algorithm reliably produces sufficiently accurate results for the planning of palliative radiotherapy treatments when compared to a 3D calculation algorithm.

Content: A dose analysis was performed on 11 patients who had received 2 field palliative radiotherapy using virtual simulation and 2D dose calculation. Treatment was recalculated using a 3D calculation algorithm in a treatment planning system. The patients received treatment to either their chest or their pelvis. Variations in dose to the prescription point were calculated by fixing the number of delivered monitor units (MU) for each beam to those calculated in the original 2D calculation and assessing the variation in the contribution of dose to the prescription point from each beam.

Relevance/impact: 3D models of patients generated from CT scans are routinely used for virtual simulation of palliative treatment but not always to calculate dose. This study tested whether the 3D calculation model should be used routinely in clinical practice.

Outcomes: Of the 11 patients, 5 were excluded from the report as they proceeded to a more complicated plan. For the 6 patients included, the percentage variation of the dose contribution to the prescription point varied between 2% and 14%.

Discussion: Although the 2D calculation can be accurate in some circumstances, for some patients the accuracy of the calculations falls outside the acceptable limits of ICRU 24. It is therefore justifiable to implement the 3D calculation method for calculating the dose for all simple treatments planned using virtual simulation.

O-012 A single centre experience of high dose palliative radiotherapy (36 Gy in 12 daily fractions) in locally advanced head and neck cancers

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Objective: To evaluate the tolerability and clinical outcome of high dose palliative radiotherapy 36 Gy in 12 daily fractions in patients with locally advanced head and neck cancer.

Method: Between July 2011 and June 2013, twenty seven patients with histologically proven locally advanced were treated with 36 Gy in 12 daily fractions of radiotherapy. The data on patients' demographics, disease characteristics, treatment toxicities and clinical outcome were collected retrospectively.

Results: The total number of patients was 27 (17 males and 10 females) with a median age of 70 years (range: 49-90). Oropharynx was the leading primary site of disease ((n = 11; 40%) followed by hypopharynx (n = 8; 30%), oral cavity (n = 3; 11%), larynx (n = 2; 7%), paranasal sinuses (n = 2; 7%) and unknown primary (n = 1; 4%). Majority of the patients (n = 15; 56%) were of WHO performance status 2 at presentation, followed by 8 (30%) patients with performance status of 0 or 1. Three (11%) of patients had performance status of 3 and 1 (4%) had performance status of 4.
A vast majority of the patients (n = 24; 89%) presented with stage IV disease, including 4 patients who were having distant metastatic disease at presentation. Two (7%) patients had stage III and 1 (4%) had stage II disease.
Twenty five (93%) patients managed to complete the planned course of radiotherapy. One patient (with performance status 4) died during radiotherapy due to cancer related event and one could not complete the treatment due to co-morbidities and poor performance status. Two patients died soon after completion of radiotherapy (2 and 3-months respectively).
Measureable response was available in 23 patients. Five (22%) had complete response and remain disease-free, 24-36 months after initial diagnosis. Thirteen (57%) patients had partial response, 3 (13%) had a stable disease. In 2 patients (9%) disease progressed. The incidence of grade III mucositis and grade III dermatitis was 18% and 4% respectively. There was no grade IV toxicity.
To date, 19 patients (70%) have died with a median overall survival of 13 months (range: 2 -40).

Conclusion: Our limited study confirms the efficacy of this hypofractionated dose fractionation schedule. Multicentre phase III trial is essential to validate these results in large patient population.

O-013 Informing a secondary dose calculation with a region of interest representing the water equivalent depth of the calculation point created automatically using Raystation Scripting

Andrew Bird
Worcestershire Oncology Centre

Introduction: It is common practice to perform a secondary dose calculation of the radiotherapy treatment plan. The introduction of complex planning techniques has required that secondary dose calculations develop to support complex techniques. While some perform full inhomogeneity and scatter corrected dose calculation on the RT-CT dataset many perform calculations assuming the external Structure Set contour is composed of water. This work developed and tested a script that creates a 'water equivalent' external contour representing the effective depth of the calculation point at each VMAT control point.

Method: A script was developed in the Raystation scripting environment which adds a Region of Interest (ROI) to the Structure Set and reshapes it such that at each control point, the radius of the ROI represents the effective depth of the calculation point. This ROI can then be exported within the Dicom Structure Set and used to represent an accurate water equivalent depth in the secondary dose calculation. We have used this technique to perform secondary dose checks on VMAT prostate plans using the Diamond secondary check software from PTW.

Results: Twenty-two clinical VMAT prostate plans were calculated on the real external ROI and on the effective depth ROI. Diamond assumes the external ROI to be water filled. In both cases the secondary calculation result was compared to the TPS. The mean difference was reduced from -3.7% to 0.9%. In this case the use of this script increases the accuracy of the secondary dose calculation potentially improving sensitivity of the check.

O-014 The dosimetric impact of changing anatomical contours in radical radiotherapy treatment to the head and neck

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Purpose: A course of radiotherapy to the head and neck is traditionally planned using one initial planning CT, obtained more than a week prior to commencing treatment. Over the course of the treatment patient's contours can change significantly, leading to questions regarding potential dose implications. This paper reports a single-institutional experience when analysing the actual delivered doses to core organs at risk (OARs) over the course of treatment.

Methods: All routine treatment cone-beam computed tomography (CBCT) images for 10 patients with locally advanced oropharyngeal or nasopharygeal cancer were retrospectively analysed in the department's planning system. Actual delivered doses were then calculated and compared to the initial planned doses. Observed variations were analysed in respect to weight loss, separation changes and duration in to the course of treatment.

Results: Variations between planned and delivered doses were noted in all observed OARs. The delivered doses to the contra-lateral parotid gland exceeded the tolerance dose of 24Gy in 3 patients. The spinal cord planning risk volume delivered dose also exceeded the 48Gy tolerance dose in 3 patients. Spinal cord doses remained under 45Gy for all patients. There was no statistical significance between the observed dose differences and weight loss, separation changes, or duration; although it was noted that all dose breeches had occurred by the end of week 3.

Conclusion: The data reveals that adaptive radiotherapy may benefit some patients. A mid-treatment analysis is recommended in order to develop a targeted approach to this treatment strategy.

O-015 The absorbed dose rate to water from Valencia applicators; validation by direct measurement of the commissioning guidance issued by Elekta

Gary Barfield; Ian Green; David Carnegie
United Lincolnshire Hospitals NHS Trust

Aims/objectives: To increase confidence in the commissioning process of Valencia type brachytherapy applicators for utilisation in skin treatments by using ion chamber measurements to perform an absolute dose measurement under a clinical based setup.

Content: To outline a methodology and the measurements acquired in order to measure the absorbed dose to water at a given depth from Valencia type applicators.

Relevance/impact: An advantage of brachytherapy is the steep fall off of absorbed dose with distance from the source. Due to this and other dosimetric issues, the validation of brachytherapy treatment plans by measuring the Absorbed Dose at a given point is frequently omitted from any commissioning process. Therefore at commissioning the recommended guidance is to infer the absorbed dose rate to water rather than directly measuring the absorbed dose rate to water at a given depth.

To increase confidence in the output of the applicators a procedure was developed to measure the absorbed dose rate at 3mm deep in water using standard ion chambers.

Outcomes: For the 2cm and 3cm diameter Valencia Applicators being commissioned the absorbed dose rate to water at 3mm deep in water was measured to within 3.6% and 6% respectively of the absorbed dose rate to water given by Elekta.

Discussion: This measurement is independent of the procedure given by the manufacturers of the applicators. Therefore by measuring the absorbed dose rate to water for a clinical setup the outlined methodology adds confidence of the Elekta commissioning guidance.

O-016 Review of acute toxicity in anal cancer patients following progression from 3D conformal radiotherapy to volumetric modulated arc therapy

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Aims: The aim of this study was to review changes in acute toxicity in anal cancer patients treated with volumetric modulated arc therapy (VMAT) in comparison to those treated with 3D conformal radiotherapy (3DCRT).

Method: The 3DCRT technique followed the ACTII trial protocol [1], consisting of an AP/PA pair of fields (30.6Gy in 17 fractions) followed by a conformal plan to the primary PTV (19.8Gy in 11 fractions). The current method involves

a dual-arc VMAT plan (53.2Gy in 28 fractions) following the National Guidance [2]. A randomly selected cohort of VMAT patients were re-planned following the CFRT protocol, to ensure no detriment in terms of target coverage using VMAT compared to CFRT. Review clinic notes were interrogated to determine the maximum recorded toxicity for a sample of patients treated using each technique.

Results: Initial results of the planning comparison show that VMAT plans result in similar PTV coverage with improved conformality compared to 3DCRT. Notably, significant reductions in dose to the genitals (D5%-VMAT=38.9Gy; D5%-3DCRT=51.0Gy) correlates with reduced incidences of Grade 3 skin toxicity (VMAT 20%; 3DCRT 90%). There were no significant differences in other toxicities.

Discussion: The transition to VMAT from 3DCRT technique has allowed an increase prescription to target volumes while reducing acute toxicity in patients.

References

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[2] R. Muirhead, et al. "NATIONAL GUIDANCE FOR IMRT IN ANAL CANCER." Available: http://www.analimrtguidance.co.uk/analimrtguidance.pdf.

O-017 Interdepartmental verification of the dosimetric accuracy of VMAT treatment delivery

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Aim: To verify that VMAT treatments at six departments meet the minimum Gamma analysis pass rate of 95% (3% dose difference, 3mm distance to agreement).

Method: An anonymised dataset representing a prostate treatment including elective irradiation of the pelvic nodes was used by all participating centres to create a treatment plan based on a locally developed protocol. The resultant treatment plan was measured on a linear accelerator at each centre using the SunNuclear ArcCheck phantom. Gamma and Dose Volume Histogram (DVH) analyses were carried out. The DVH analysis consisted of comparing planned against measured mean doses for all target volumes (PTVs) and the planned against measured volume of the rectum for V70Gy and V30Gy indices.

Results: All participating centres achieved the required Gamma pass rate. The mean pass rate was 99.5% while the minimum and maximum pass rate were 98.6% and 100% respectively. The average deviation of the measured PTV mean doses against planned doses across all centres were 0%, +0.3% and +0.1% for PTV1, PTV2 and PTV3 respectively. On average over all centres, the volume of rectum receiving at least 70Gy was 0.4 percentage points lower than planned while the volume of rectum receiving at least 30Gy was 0.1% higher than planned.

Conclusion: All participating centres achieved the required Gamma analysis pass rate though some variations were observed across the sites. The DVH analysis showed close agreement between planned and delivered dose to targets and organs at all sites.

O-018 VMAT with image guided verification for rectal cancer patients; a service evaluation to current CBCT protocol

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We aim to develop current rectal CBCT protocol at use in our large radiotherapy centre.

VMAT for rectal cancer patients is used when dose constraints to the small bowel cannot be met using 3D conformal planning. In these cases CBCT data was acquired for the purposes of on-treatment verification to ensure geometric accuracy. This data has been analysed to ensure the current matching process allows for adequate target volume coverage.

CBCT data has been analysed and the protocol justified, there can be a move towards treating all rectal cancer patients using VMAT at our centre.

It was found that performing an online match using stable bony anatomy alone allowed for adequate GTV coverage in 81.4% of cases. In 100% of cases, a bone match allowed for adequate coverage of the CTV and PTV. A significant

association was found between the presence of gas and poor GTV coverage. The study also found patients treated in a supine position had smaller geometric set-up errors in all directions compared to patients treated prone. This did not lead to statistically fewer CBCT scans.

The benefits of treating using VMAT in terms of improved dose distributions, whilst reducing organ at risk (OAR) exposure, make this an advantageous technique for treating rectal cancer. There has been a reluctance to do so due to concerns about steep dose-gradients and an inability to verify geometric accuracy appropriately. This work has given confidence in the use of VMAT for rectal cancer through the analysis of CBCT scans.

O-019 Effective comparative indices for complex brain radiotherapy involving overlapping target and normal tissue structures (in glioblastoma multiforme patients): VMAT vs 3D conformal

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Purpose: This study is concerned with the effectiveness of physical and radiobiological brain radiotherapy plan quality metrics considering target/normal structure proximity/overlap. The evaluation is based on comparisons between three-dimensional conformal radiotherapy (3D-CRT) and volumetric modulated arc therapy (VMAT) using physical and radiobiological parameters. Dosimetric criteria are widely used as surrogates of biological response for plan assessments but can dosimetric superiority of a plan be directly translated as superiority at a radiobiological level?

Method: Retrospective data from 56 3D-CRT and 33 VMAT glioblastoma multiforme (GBM) plans were used. All patients received 60 Gy in 30 fractions and concomitant chemotherapy. Mean, minimum and maximum doses were used for dosimetric evaluation of the planning target volumes (PTV) and principal organs-at-risk (OAR) (brainstem, optic nerves and optic chiasm). Target coverage with the 95% isodose, conformity and homogeneity were also evaluated. Data were analysed after sample stratification based on target-OAR proximity. Relative TCP, normal tissue complication probability (NTCP) and equivalent uniform dose (EUD) values were calculated in BioSuite using published Linear-Quadratic and Lyman-Kutcher-Burman model parameters.

Results and conclusion: VMAT was substantially superior in terms of target mean dose, coverage and homogeneity in cases of tumour/OAR overlap while, for less challenging cases, differences were insignificant. VMAT displayed consistent optimal conformity of the 95% isodose to the PTV regardless of geometrical challenges. The radiobiologically based observations were generally in good agreement with observations based on dosimetric quantities which may imply that the latter are adequate surrogates of biological effectiveness, although direct translation in therapeutic gain is questionable.

O-020 Development of an imaging guided radiotherapy strategy for radical cervix radiotherapy

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Purpose/objective: This study aims to assess if the current departmental IGRT strategy can guarantee that both uterine and pelvic nodes are covered adequately with the existing planning target volume(PTV) margins.

Methods/materials: All radical cervix patients were treated with departmental bladder/bowel preparation protocols. The imaging protocol was daily bony match with kilovoltage(kV) planar imaging pairs. Cone beam computed tomography(CBCT) was done for the first three treatments and then repeat weekly(total of 6). Additional CBCTs were performed provided that there were concerns on PTV coverage. A retrospective review of CBCTs was carried out. The primary uterine PTV coverage was assessed and scored as good/poor after bony matching solely. Bladder/rectum status on CBCTs was assessed. Chi square test was used to determine if there was any significant association between primary PTV coverage after bony match and changes in bladder/rectum.

Results: 14 patients(137CBCTs) were included. 6/14patients required additional CBCT beyond the imaging protocol. The mean number of CBCTs per patient is 10(range 6-18). The coverage of the primary PTV was rated as poor in 35% (48/137) of images after using bony matching solely. Significant associations were found between the primary PTV coverage and changes in bladder/rectum($p<0.05$).

	Number of CBCTs showing changes in bladder filling	Number of CBCTs showing no change in bladder filling
Number of CBCTs showing Good uterine PTV coverage	57	32
Number of CBCTs showing Poor uterine PTV coverage	39	9
Chi Square p-value	0.036	
	Number of CBCTs showing changes in rectum filling	Number of CBCTs showing no change in rectum filling
Number of CBCTs showing Good uterine PTV coverage	38	50
Number of CBCTs showing Poor uterine PTV coverage	30	19
Chi Square p-value	0.043	

Conclusion: It's suggested that using bony anatomy matching solely could not guarantee adequate primary uterine PTV coverage. Bladder and rectum filling have been shown to influence uterine movement in this study. CBCTs can be utilised to provide volumetric information on bladder/rectum status. The findings will inform the development of an adaptive protocol for this patient group.

O-021 A comparison of measured and calculated Field Edge Area (FEA) width for Flattening Filter Free (FFF) beams in low density media

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Aims/objectives: To evaluate and validate the performance of the MC algorithm in MONACO in low density materials against measurements with EBT3 radiochromic films in FFF beams. The region of interest is the FEA: 20-80% of dose maximum.

Content: The film was placed in a phantom at depths of 3 (water), 10 (lung) and 20 (water) cm and three field sizes were used: 2x2, 5x5 and 10x10cm2. These setups were reproduced within Monaco. Profiles were measured from the film and compared to those calculated with the TPS. The FEA was calculated and the results were compared.

Relevance/impact: The comparison was part of the treatment planning system validation.

Outcomes: The profile differences between the two methods were primarily within 1mm for all field sizes and at all depths. The largest difference between Monaco and measurement at 10 cm deep was 0.7, 1.2 and 1.0mm in the crossline direction for 10x10, 5x5, and 2x2cm2 respectively. The respective differences in the inline direction were 2.2, 1.2 and 1.0mm. The FEA calculated with Monaco is overall broader than that measured, with differences being largest in lung.

Discussion: The excellent agreement indicates that the TPS satisfactorily predicts profiles even in low density material. Some limitations of Monaco's algorithm may affect the beam profile when the medium changes density. The differences could be due to partial volume effect as the spatial resolution of Monaco is lower than that of film. Jaw misalignments may be responsible for differences in FEA between the different jaws.

O-022 Determination of clinically appropriate flattening filter free (FFF) energy for treating lung SABR

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Purpose: To determine a clinically appropriate flattening filter free (FFF) energy choice for lung stereotactic ablative body radiotherapy (SABR).

Materials/methods: A lung SABR planning study was conducted (following UK Consortium Guidelines [1] using Eclipse V.11, AcurosXB) for 11 patients using both 6FFF and 10FFF energies, with two half arcs and the MU Objective function [2]. Plans were compared with the original 6MV 'flattened beam' clinical plans. A number of parameters

including organ at risk (OAR) doses, target doses, treatment time, conformity index and gradient measure were examined for significance.

Results: Clinically acceptable plans could be produced for all beam energies. 6FFF provided statistically significant OAR sparing, compared to the standard 6MV plans, for spinal cord and Lungs-GTV. 10FFF provided a small yet significant increase in dose to the contralateral lung but otherwise OAR doses were comparable to the clinical baseline. 6FFF plans showed greater OAR sparing, improved gradient measure and V50%/V(PTV) over 10FFF plans but not for skin sparing or treatment time. PTV conformity was similar in both FFF plans. 10FFF treatment times were 0.8 minutes shorter than 6FFF and 3.8 minutes shorter than 6MV plans (excluding gated beam holds).

Conclusions: 6FFF plans showed statistically significant OAR sparing compared to 6MV and 10FFF plans but all were within clinical tolerance and acceptable [1]. 10FFF plan deliveries gave reduced delivery time which could yield great benefits for elderly SABR lung patients with existing comorbidities.

References:

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O-023 Development of an imaging guided radiotherapy strategy for prostate and nodes radiotherapy

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Purpose/Objective: This study aims to develop an image-guided radiotherapy(IGRT) strategy in prostate and nodes radiotherapy(PPN RT) to ensure both prostate and nodes are covered adequately with our current departmental planning target volume(PTV) margins.

Methods/Materials: A retrospective review of verification images of PPN patients was carried out. The imaging protocol was daily kilovoltage(kV) planar imaging pairs with weekly conebeam computed tomography(CBCT) in combination with departmental bladder and bowel preparation protocols. The image matching was performed on the kV planar images using bony anatomy and fiducials respectively. The differences between two matching methods in terms of vertical(VERT), longitudinal(LNG) and lateral(LAT) shifts required were calculated. The CBCTs were used to assess the prostate and nodal PTV coverage after applying bony and fiducials match results.

Results: 18 PPN patients(120kV pairs&CBCTs) were included. The mean differences between two matching methods are 2.5mm(95%CI:2.1-2.9mm) in VERT, 2.3mm(95%CI:1.9-2.6mm) in LNG, and 1.3mm(95%CI:1.0-1.6mm) in LAT. 89%(107/120) of the image sets were with <5mm difference between bony and marker matches. 31% (37/120) resulted in sub-optimal prostate PTV coverage by applying bony matches solely. Using fiducials-based matching, the nodal volumes were outside PTV only when the difference between bony and fiducials matches was more than 5mm(4/120).

Conclusion: The two steps matching process using kV planar imaging (first bony match and then fiducial match) should work for 90% of our patient population without compromising prostate and nodal PTV coverage, provided that the difference between bony and marker matches is no more than 5mm. CBCTs can be utilised as an intervention to provide volumetric information to explain why the difference exists.

O-024 Experience of “Going Dutch” for VMAT commissioning of an Elekta VersaHD

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A Versa HD Elekta linac with flattening-filter-free (FFF) beam facility was commissioned at Nottingham. Tests specific for Volumetric Modulated Arc Therapy (VMAT) included assessment of the ability of the linac to vary the dose rate, gantry rotation and Multi-Leaf-Collimator (MLC) motion. One of the aims of VMAT commissioning was to test the ability of the new linac to accurately deliver stereotactic ablative radiotherapy (SABR) and stereotactic radio-surgery (SRS) VMAT plans.

Our tests were structured according to the VMAT commissioning report 24 by Netherlands Commission on Radiation Dosimetry: “Code of Practice for the Quality Assurance and Control for Volumetric Modulated Arc Therapy”. It comprised tests of MLC and dose rate with static gantry, as well as more complex tests, where all dynamic

parameters (dose rate, MLC motion and gantry rotation speed) are included, one by one. Test results with static gantry are used as the baseline for the tests with dynamic gantry, e.g. output linearity, beam profile, MLC position accuracy. We used the Elekta iComCAT tool to create required complex bespoke plans.

All clinically relevant tested parameters were within the tolerance levels suggested in the NCS report. The overall accuracy of MLC position was within 1mm for both static and dynamic gantry. The MLC test was more accurate with Gafchromic film instead of the EPID (electronic portable imaging device). We also tested the accuracy of the delivery of interrupted VMAT treatments.

Overall, the performance of the linac was acceptable for VMAT deliveries, including high dose treatments with over 1000MU.

O-025 Commissioning intracranial SRS: Imaging, treatment planning, quality assurance, end-to-end verification and audit.

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Aims/objectives: To commission a system to treat intracranial brain metastasis.

Content: The different stages of commissioning will be described, including: Exactrac imaging system V6.1 and iPlan treatment planning system V4.5 (Brainlab, Germany); planning study; plan-specific quality assurance (QA); end-to-end verification and a collaboration Audit with National Physics Laboratory.

Relevance/impact: Increasing numbers of patients are treated with stereotactic radiosurgery (SRS). The technique requires high precision and accurate small field dosimetry. This work describes methods for the safe implementation of stereotactic radiosurgery.

Outcomes: The system was successfully commissioned within 6 months; current minimum clinical field size of 1cm using Varian HD-MLC with the potential to use conical collimators with diameters of 4-15mm . The treatment technique chosen from the study was 4 dynamic conformal arcs (DCA), with a 10MV flattening-filter-free (FFF) beam. Initial plan-specific QA results show greater than 95% within 2%/1mm for EBT3 film, with pinpoint chamber doses within +/-1%. The audit results were within +/-2%.

Discussion: Hardware and software required for a new intracranial SRS service was commissioned. Using FFF reduces treatment time and out-of-field dose. DCA reduces the volume of normal brain receiving high dose compared to fixed-field treatments, but increases the low-dose volume. Our implemented methods show an exceptionally high degree of correlation between planned and measured dose distributions.

O-026 Intracranial stereotactic radiosurgery: Class solution and assessment of plan quality using VMAT

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Aim: Develop and evaluate a class solution using volumetric modulated arc therapy (VMAT) for intracranial stereotactic radiosurgery (SRS) with a view to development of a local SRS service.

Method: 12 cases were planned using Monaco treatment planning system for an Elekta Versa FFF linac. Single and multiple lesions were included. Organ at risk constraints were set using published data. Plans were scaled so 95% of the PTV and 98% of the GTV received >/=100% of the prescription dose.

Results: A class solution using 3 arcs was established: 1 full arc at couch 0°, and 2 non-coplanar partial arcs.
Plan quality was assessed using a range of published conformity indices, including the Paddick conformity index (PCI) and gradient index. PCI was noted to increase whilst gradient index reduced with increasing PTV volume. Organ at risk constraints could be met for all cases except one
Typical beam on time was 7-8 minutes for a single lesion treated with a single fraction of 20Gy.

Conclusion: Planning studies indicate VMAT using 5mm MLC can be used to produce highly conformal plans for single and multiple intracranial lesions. Treatment times are short which is beneficial for patients and for efficient work flow. Conformity and organ at risk doses may be improved further for smaller lesions with micro-MLC; however our results indicate that high quality SRS plans can already be produced with our existing radiotherapy platforms.

O-027 The impact of a consultant radiographer to stereotactic radiotherapy service

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Mount Vernon Cancer Centre

Purpose/objective: This study aims to investigate the impact of a consultant radiographer on stereotactic radiotherapy service at our institution.

Materials/methods: With the increasing demand for Stereotactic Radiosurgery and Radiotherapy(SRS/SRT), our institution has appointed a consultant radiographer to lead the service since 2014. The post holder was expected to enhance our SRS/SRT service delivery and hence improve patient outcomes by increasing capacity and patient throughput. This helps the service to meet national and cancer targets. A retrospective review of SRS/SRT patients who were treated in 2013 (without the consultant radiographer) and 2015 (with the consultant radiographer) at our institution was carried out to determine the interval between decision to treat and treatment start dates(INT). Mann-Whitney U test was performed to test for any significant difference in INT between the years.

Results: 155 consecutive patients from January2013 to September2015 were included.

There was a 35% increase in the number of patients treated in 2015 compared to 2013. A significant difference ($p<0.05$) was found in INT between 2013 and 2015. The mean INT in 2015 is shortened to nearly half of that in 2013 despite the increase in workload.

Year	2013 (Jan-Sept)	2015 (Jan-Sept)
Number of patients treated	66	89
Mean INT (days)	39.4	22.0
95% Confidence Intervals for Mean INT (days)	32.2-46.7	18.9-25.

Conclusion: This analysis suggests that intervals between decision to treat and treatment start dates of our SRS/SRT patients have been shortened since the consultant radiographer was appointed. The post holder has streamlined the patient pathways that still deliver high quality services but in more resourceful and innovative ways including radiographer led target volume delineations and consent.

O-028 Audit on overall treatment time for cervical chemo-radiotherapy with weekly HDR brachytherapy

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Objectives: To assess the feasibility of delivering radical chemo-radiotherapy utilising contemporary brachytherapy in relation to recommended overall treatment time (<56 days).

Content: We have looked at overall treatment time on patients treated between 2013 and 2015. Patients received external beam radiotherapy (EBRT) +/- chemotherapy. Brachytherapy is delivered with a single implant followed by a single fraction; this is usually given weekly, but a twice a week fractionation is occasionally used. Insertion is carried out under general anaesthesia. All fractions are planned on CT scan, MRI is done on the day before the 1st brachytherapy, without applicators in situ. No interstitial needles were used.

Results: We identified 24 patients treated between 19/02/2013 and 09/11/2015. Average treatment time was 45.2 days (38-52). 4 patients received 4 fractions due to difficulties meeting the recommended dose constraints.

Conclusion: It is possible to complete an outpatient treatment within a 56 day timeframe, even with weekly fractions. Starting brachytherapy before completing EBRT allows overall treatment time to be kept within recommended guidelines.

O-029 The impact of CT scanner settings on image quality and Hounsfield units for radiotherapy CT planning

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Aim: To characterise the performance of a Toshiba Aquillion LB CT scanner in terms of the variation of Hounsfield Units (HU) with scan settings. Information obtained was to support optimisation of CT image quality and dose for head and neck planning whilst understanding any effect on radiotherapy dose calculations. There are few publications on radiotherapy CT optimisation and its impact.

Content: A Catphan 600 phantom was used to assess the variation of: HU, visibility of low contrast details, image noise and high contrast spatial resolution for different scan parameters: namely reconstruction field of view, acquisition and reconstructed slice thickness, effective mAs and reconstruction algorithm. HU variation was compared against tolerances of +/- 50HU for air, +/- 30HU for water and +/ 150HU for bone. Literature suggests these correspond to radiotherapy dose changes within +/-2%.

Outcomes/Relevance: The choice of reconstruction algorithm had the biggest impact on HU variation. For most of the algorithms tested, HU variations remained within tolerances when compared to the mean HU for different materials. HU variation was minimal when all other parameters were separately varied. Important parameters for detail visibility were reconstruction algorithm and effective mAs for low contrast details, and reconstruction field of view for small, high contrast details.

Discussion: Results demonstrate the impact of scan parameter changes on HU values and image quality. Improvements in H&N CT images may be possible without significantly affecting treatment planning calculations.

O-030 An image acquisition and analysis strategy for comparison of ventilation CT and HP gas MRI

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University of Sheffield

Introduction: "Ventilation CT" assumes that lung expansion and density change of corresponding parenchymal voxels equate to lung ventilation. However, its physiological accuracy has yet to be fully validated against established ventilation modalities. Here, we present an imaging protocol for acquiring pulmonary CT that can be used to calculate ventilation surrogates for direct comparison with hyperpolarised (HP) gas 3He-MRI.

Methods: Our protocol was tested on six lung cancer patients who underwent expiration and inspiration breath-hold CT. On the same day, 3He and 1H-MRI were acquired in the same breath and at the same inflation state as the inspiratory CT. Registration accuracy was validated using a reference 4D-CT data set for 6 patients with 100 expert anatomical landmarks defined on both images. Ventilation CT images were calculated from voxel-wise intensity differences in Hounsfield unit (HU) values. To ensure that 3He-MRI was in the same spatial domain and inflation state as the CT ventilation surrogate, the former was registered to the inspiratory CT data via same-breath anatomical 1H-MRI. The transformation from 1H-MRI to CT was then applied directly to 3He-MRI allowing direct comparison of 3He-MRI and CT ventilation.

Results: Visual examination indicated accurate registration of inspiratory and expiratory breath-hold CTs and the reference data set had a mean registration error of 1.1±0.2mm (mean±SD). Successful registration enabled direct comparison of ventilation CT with MRI.

Conclusion: It is feasible to acquire CT and 1H/3He-MRI with similar breath-holds and posture such that registered data can be used to directly compare CT ventilation and 3He-MRI ventilation maps.

O-031 A clinical investigation of optimal CBCT image matching for non-SABR radical lung cancer patients

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Purpose/objective: Spine-based image registration has traditionally been used for patient setup for non-SABR radical lung cancer radiotherapy. Enhanced visualisation of soft tissue structures through volumetric imaging has led to research of various landmarks that may offer target localisation of increased accuracy compared to spine-based registration. The objectives of this project were to answer the following: Can using carina or tumour as registration landmarks for IGRT offer superior target coverage compared to spine registration? Does the position of tumour affect which registration landmark offers superior target coverage? What are the implications of carina or tumour registration on spinal cord safety?

Material/methods: Ten patients with central tumours and ten patients with peripheral tumours were selected. A clinical expert assessed a sample of CBCTs from each patient and selected which thoracic landmark (spine, carina, or tumour) produced the the optimal match. CBCTs from each patient (238 CBCTs in total) were matched using the spine and the optimal match and translational displacements were recorded. The difference between the spine-match displacements and optimal-match displacements were calculated. The shortest distance between the spinal cord and tolerance isodose was measured for each patient.

Results: Carina-and tumour-matching produced target localisation of increased accuracy compared to spine-matching. The average bone-to-optimal 3D vector displacement was 0.4 cm. The 2D vector (vertical and lateral) displacements were more relevant for spinal cord safety because longitudinal displacements did not affect the spinal cord-to-tolerance isodose distance in this sample. The 90th percentile of the 2D vector bone-to-optimal displacements were 0.6 cm and 0.5cm for the central and peripheral groups, respectively.

Conclusion: For central and peripheral tumours, carina- and tumour-matching produced the most optimal target coverage, respectively. The spinal cord-to-tolerance isodose distance is important, as any deviation from spine-matching could result in spinal cord tolerance being exceeded. Using a threshold spinal cord-to-tolerance isodose distance, based on the 90th percentile 2D vector bone-to-optimal displacement, is a measurable method of indicating if carina or tumour match introduces a risk of exceeding spinal cord tolerance dose.

O-032 Neo-adjuvant chemoradiation for resectable OG cancer: a single centre experience

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Background: The addition of neoadjuvant chemoradiation (NACRT) to the treatment of resectable oesophageal cancer increases R0 resections and improves survival. Postoperative morbidity however remains a concern with this approach.

Methods: Between October 2012 and July 2015, 34 patients with resectable oesophago-gastric cancer underwent treatment NACRT in our institution. Treatment consisted of 3 cycles of Cisplatin 60 mg/m2, day 1, and capecitabine 1250 mg/m2, days 1-21, and 3-D conformal radiotherapy with 45Gy in 25 fractions starting on day1 of cycle 2. Survival analyses were performed with the Kaplan-Meier method.

Results: There were 27(79%) male and 7(21%) female patients with a median age of 66 years (42-78). 32 (94%) were adenocarcinomas. 27(79%) patients were UICC stage III. 31 patients underwent surgery at a median of 67 days after the last fraction of RT. Pathological complete response (pCR) was 15% (n=5). Circumferential resection margin was negative in 22 (73%), within 1mm in 6 (20%).
Median hospital stay was 12 days (1-55). Post-operative complications included anastomotic leak in 2(6%), wound complications (1, 3%), sepsis (5,16%) and cardiac events (6,20%). 6 (19%) patients died in the postoperative period (range:15-78 days) with 30-day mortality at 9.8% (n=3).
With a median follow-up of 21.1 months 95%CI (15.8 - 26.4), 20 (59%) patients remained alive. Median overall survival was not reached [mean: 22 months 95%(17.8-26.3)].

Conclusion: This report indicates the feasibility and effectiveness of pre-operative chemoradiotherapy for resectable oesophageal /GOJ cancer. Postoperative morbidity and mortality remains a relevant concern.

O-033 Outcomes from adjuvant radiotherapy to regional lymph nodes after therapeutic lymphadenectomy for malignant melanoma: 7 year experience from a single UK centre

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Background: Adjuvant nodal radiotherapy after lymphadenectomy reduces the risk of loco-regional recurrence in high risk malignant melanoma but has no effect on overall survival1. We have audited the outcomes of our patients receiving adjuvant nodal radiotherapy for malignant melanoma.

Methods: This retrospective audit included all malignant melanoma patients with regional lymph node metastasis treated with lymphadenectomy plus adjuvant radiotherapy. Data was collected through case notes review, radiology and histopathology reports and analysed for treatment outcomes and side effects.

Results: 96 patients received adjuvant nodal radiotherapy between January 2008 and December 2014. Median age was 65 years (20 to 91) and median follow-up was 22 months (m) (IQR2 9-30). 83 patients were treated with 60Gy, 11 patients with 50-60Gy, and 2 received <50Gy. At the time of analysis 53 (55.2%) patients were still alive, 7 (7.2%) had recurrence with in the radiotherapy field and 51 (53.1%) developed distant metastasis. Median PFS was 22.4 m (CI 16.6-28.1). 31 patients with metastatic disease received systemic treatment. Median overall survival was 35.3 m (CI 25.1-45.4). Overall the treatment appeared to be well tolerated with 23 (24%) patients developing lymphedema, 1 (1%) being grade≥ 2 and one had (1%) grade≤1 peripheral neuropathy.

Conclusion: Local recurrence was low in these unselected high risk patients receiving adjuvant radiotherapy after lymphadenectomy. Patients with lymph node recurrence remain at high risk for developing distant metastasis indicating the need for adjuvant systemic therapy possibly in addition to radiotherapy.

1 Henderson MA, et al. Lancet Oncology 2015; 9:1049-60
2 interquartile ranges

O-034 The impact of linac output variation on clinical outcomes

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Aims: When delivering radiotherapy treatments, linac output is considered constant, with a +/-2% tolerance during daily checks. This work aims to quantify the impact on clinical outcomes due to variation in daily linac output.

Method: Daily output data from 133 linacs in 23 UK radiotherapy centres was collected from January to June 2015, creating a national picture of dose variation. The potential impact on clinical outcomes has been assessed from the steepness of dose response curves for a variety of cancers and variation in outputs for individual linacs and within centres.

Results: There was a difference of 3.6% between the maximum and minimum mean linac outputs, with a range of 2% between the 5th and 95th percentiles. Within a single centre a maximum difference of 2.8% was found between linacs. Only a single linac had a mean output which exceeded +/-2%, with 13 linacs (9.8%) outside +/-1%.
Head and Neck cancers have steep dose response with 1% dose change giving 2% TCP change and 5% in side effects. Based only on the measured output variations it is predicted that TCP would vary by 7.2% across all studied linacs, and 5.6% in an individual centre, with side effects varying by 18% and 14% respectively.

Conclusions: Variations in clinical outcomes due to linac output are not insignificant which has potential implications for QA tolerances as well as QA in clinical trials. This work is part of the larger QUASAR project aiming to quantify the impact of QA and audit on clinical outcomes.

O-035 Commissioning experience for PTW QuickCheck daily constancy test devices for matched linear accelerators

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The QuickCheckWebline (PTW, Freiberg) is a constancy device with 13 vented ionisation chambers for measuring daily output, flatness, symmetry and beam quality (BQ) with automatic temperature and pressure correction. This purpose of this work was to commission and characterise three such devices for daily QC of four matched Varian linear accelerators with photon and electron beams. No prior publication exists.

The devices were cross-calibrated against ionisation chambers traceable to the NPL (Teddington, UK) primary standard for dose and to an ionisation chamber array (MatriXX Evolution (IBA, Freiberg) for flatness and symmetry. The BQ measurement, which is measured using four chambers with copper filters and a polynomial relation, was calibrated against local beam quality measurements. The device was characterised by assessing the linearity of dose (50-200cGy), reproducibility and consistency.

All three devices exhibited a linear dose response over the investigated range (R2=1.00), with day-to-day dose reproducibility within 0.5% compared to absolute dose measurements. This suggests an initial pre-irradiation period for the devices. The BQ measurement was very stable (<0.5%) but linac specific, with up to 2% variation between

matched linacs (within 0.5% for TPR2010 for photons). This may suggest significant energy dependence of the system. The QuickCheck measured flatness and symmetry were within 1.5% of the MatriXX.

It has been shown that QUICKCHECKs are suitable and convenient for linac consistency checks. The performance indicates that the devices can improve the efficiency of monthly QC testing.

O-036 Performance evaluation of an MV constancy device (PTW Linacheck) for use on an orthovoltage unit

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MV constancy devices have been used for orthovoltage units [1]; however, at beam qualities below 1mmCu, detector response showed sufficiently large beam quality dependence to require beam quality assessment before output could be determined. Similarly, the update of IPEM report 81 [2] is likely to recommend that copper foils be used to harden soft beams to avoid device saturation due to low energy fluorescence, if used over large energy ranges. However, we propose to use the LINACHECK (PTW) constancy device without additional filtration (energy range 70-250kV) following commissioning and clinical performance evaluation.

The LINACHECK was cross-calibrated against a Farmer chamber at 250kV on a Gulmay 3300 unit. The detector's energy response was characterised and an appropriate MU selected for routine measurement. Linearity, repeatability and reproducibility were assessed by repeat measurements. Routine HVL measurements show little beam quality variation (2σ=3.5%), therefore neither beam quality adjustment factor nor added filtration is necessary.

LINACHECK response was linear from 15MU to saturation; sensitivity ranged from 0.146-0.050arb.unit.MU-1 across 70-250kV. Measurement repeatability varied with energy from 0.1-0.5% of the mean (2σ), with mean reproducibility at 0.3% (range 0.2-0.4%). Six months' clinical data will be presented at the conference.

Assessment of device performance indicates that the LINACHECK is an acceptable solution for constancy measurements for a clinical kV unit without any additional build-up or filtration.

[1] Nikolic M and Van Dyk J 1993 Med. Phys.
[2] Correspondence with co-editor of draft updated IPEM Report 81

O-037 Critical evaluation of the management options of radiotherapy related diarrhoea for pelvic cancer patients

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Around 17 000 people treated each year in the UK. Pelvic RT, delivered daily over treatment periods of 5–7 weeks, can cause radiation induced diarrhoea (RID) in about 50% of treated patients. Due to the close proximity of the gastrointestinal tract to the pelvic organs, radiation results in defect in bile salt malabsorption. RID usually develops during or after the second week of RT and can last until 2 weeks (acute RID) and/or 18months to 15 years (chronic RID) after RT is completed. Diarrhoea can interfere with patients' daily activities markedly affect their psychological well-being and overall quality of life (QoL). The aim of this poster is to critically evaluate the current management options of RID for pelvic cancer patients.

The role of RT in the treatment of pelvic cancer is progressively increasing due to both effectiveness and the rapid advent in the technology. Despite technological advances, ionising radiation toxicity remains a major obstacle to radical pelvic cancer treatment. A new therapeutic strategies are needed to tackle acute RID. A high quality RCTs are imperative to investigate novel pharmacological and nutritional interventions. A more prominent role for Specialist Therapeutic Radiographers within a multidisciplinary gastroenterologist-led clinics. Finally, it is important to raise awareness of the extent and impact of long-term RID. These will not only inform new strategies for managing acute RID, but also improve QoL including function and emotional wellbeing for pelvic cancer survivors.

O-038 Establishing the prevalence of patient-reported late-effects of pelvic radiotherapy symptoms utilising a simple patient reported outcome measure (sPROM)

Benjamin Roe; Karen Morgan; Mohini Varughese; Catherine Roe
Taunton & Somerset NHS Foundation Trust

Aims/objectives: To establish the prevalence of self-reported symptoms of late-effects in the pelvic radiotherapy treated population, to identify service needs and model correlative factors.

Content: The risks of late radiotherapy side-effects occur months to years post treatment. Mechanisms associated with these effects are complex and not fully understood, making risk-stratification post-treatment challenging. Assessment of the efficacy of the sPROM questionnaire in identifying and managing late-effects was assessed and statistical regression methods used to review associative factors.

Relevance/impact: The survey was a cost effective method of establishing the burden of patient-reported late treatment effects in the population, supporting service planning and patient focused care.

Outcomes: An excellent response rate (77.7%) was achieved, with a high level of data completion.
The prevalence of patients self-reporting symptoms of late treatment for any sPROM question was 76.0% and a clinically significant sPROM question was 38.1%.

Discussion: The study captured data on 25 specific functional sPROMs with 7 of these sPROMs designated as requiring clinical follow up and management.
It was not possible to identify overall any correlation or model of sPROM late effect triggers with age, elapsed-time from treatment, prescribed dose or gender. 6 questions revealed statistically significant associated variables with maximum pelvic dose being the most statistically significant.

O-039 Introduction of improved bladder filling and use of an ultrasonic bladder volume scanner to improve reproducibility of bladder volume in patients undergoing pelvic radiotherapy

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East Gloucestershire NHS Foundation Trust

Background: Maintaining consistent bladder volumes is important to decrease bowel toxicity and PTV movement and to enable implementation of intensity-modulated radiotherapy (IMRT).This can be challenging despite the use of bladder filling protocols. This study looks at the reliability of an improved bladder protocol and benefit of implementing bladder ultrasound (BUS) for obtaining bladder consistency for pelvic radiotherapy.

Methods: Following retrospective review to look at the variation in bladder filling with our original protocol, we performed an observational study in women with cervical and uterine cancer undergoing IMRT with a new bladder protocol. BUS was performed immediately prior to planning CT and each cone beam imaging (CBCT) in line with departmental verification protocol. Bladder volume was measured on planning CT and all CBCTs and BUS.

Results: Retrospective review of 4 patients and 53 CBCTs with the original bladder protocol showed large variation of between 20 and 125% in bladder volume at treatment compared with planning CT.
Following implementation of the new bladder protocol, results from 15 patients undergoing 135 scans showed more consistent bladder filling during the course of treatment. Furthermore, the volumes from BUS were comparable with planning CT/CBCT showing on average, a difference of +/- 50ml.

Conclusion: By implementing more defined and robust bladder filling protocol it has been possible to implement IMRT while maintaining small CTV-PTV margins.

BUS provides a quick, easy and reliable method for measuring bladder volume avoiding unnecessary repeat CBCTs, optimizing treatment times and patient experience.

O-040 Patient acceptability of clarity ultrasound image guided radiotherapy to the prostate

Kathryn Mitchell; Nicola Barry; Petra Jacobs; Serena Hilman
University Hospitals Bristol NHS Foundation Trust

Aims/objectives: The Clarity system is one of the most recent advances in image guided radiotherapy. The 3D ultrasound system has significantly improved the accuracy of target localisation for daily radiotherapy treatment. The technique addresses both the potential for movement following the original planning CT scan, as well as motion occurrence during treatment itself. In addition, the technique is non invasive and requires no further radiation to the patient.
The aim of this project is to assess whether the Clarity ultrasound system is acceptable to patients undergoing prostate radiotherapy.

Content: Between January and July 2015, patients undergoing prostate radiotherapy using the Clarity system were asked to complete a simple feedback questionnaire during treatment. The questionnaire asked patients to rate aspects of their treatment on a Likert scale. They could also provide further feedback in free text boxes.
25 patients completed the questionnaire and only 4% reported that the ultrasound procedure was either intrusive or uncomfortable. The majority of patients (88%) would agree to having a further prostate ultrasound in the future.

Relevance/impact: Alongside improvements and advances in radiotherapy technology, it is important to remember that a patient's experience during treatment is crucial to providing good quality care.

Outcomes/discussion: Image guided radiotherapy using the Clarity system is both acceptable and comfortable for patients. In comparison to other image guided techniques, it is neither invasive nor requires a further dose of radiation to the patient.

O-041 Image guided radiotherapy for prostate cancer using transperineal ultrasound

Serena Hilman; Ruth Smith; Helen Coomber; Petra Jacobs; Susan Masson
Bristol Cancer Institute

Aims/objectives: To describe our experience implementing Clarity Ultrasound™ (Elekta) as daily image guided radiotherapy (IGRT) for prostate only radiotherapy. We are utilising this to monitor interfractional motion.

Content: The prostate gland moves between fractions (interfractional motion) and during the radiotherapy fraction (intrafractional motion). This, and the impact of changes in bladder and rectal filling during treatment can lead to geographical miss and increased toxicity to organs at risk. Transperineal ultrasound (USS) allows soft tissue matching and is less invasive than inserting fiducial markers. It allows the visualisation of the prostate, penile bulb, symphysis pubis and assessment of bladder fill. There is no additional radiation exposure unlike with daily cone beam computerised tomography (CT) scans or kV imaging for fiducial markers. CT and USS images are acquired during planning and physics staff mark a reference positioning volume (RPV) within the clinical target volume. Radiographers use the RPV to perform a soft tissue match on set. Clinicans currently do not use the USS images for planning.

Relevance/outcomes: Radiographer training, audit and patient satisfaction surveys have confirmed this to be a clinically acceptable system. There is a 95% agreement with offline and on-line matching by radiographers to within < 3mm. Shifts exceeding 10mm have been seen, if they occur systematically for 5 fractions the patient has a repeat CT scan to assess prostate motion.

Discussion: This IGRT tool is now used daily and we hope to use it for intrafractional monitoring in the future.

O-042 Image-guided radiotherapy strategies for prostate cancer in the United Kingdom

Hemal Ariyaratne[1]; Hayley Chesham[2]; Roberto Alonzi[1]
[1]Mount Vernon Cancer Centre; [2]GenesisCare

Aim: To survey the technology and practice of image-guided radiotherapy for prostate cancer in the United Kingdom

Materials/methods: A pre-tested semi-structured online questionnaire was sent to NHS and private radiotherapy providers in the United Kingdom between March and April 2014. The survey was carried out using the Opinio online platform.

Results: There was a high survey response rate of 83%. Bladder preparation was similar across radiotherapy centres, but there was wide variation in bowel preparation protocols. There is widespread use of intensity-modulated radiotherapy and advanced verification imaging modalities. The majority of centres used 74 Gy in 37 fractions treatment regimen, with few doing dose escalation. Cone beam CT is the main verification imaging modality in radical prostate radiotherapy, used in 66% of UK centres. Fiducial markers in combination with imaging were used in 30% of centres. Over half the centres used daily imaging of some sort, with a day 1-3 followed by weekly frequency being the next common schedule. 26% of centres used daily cone beam CT.

Conclusions: There is widespread use of volumetric verification imaging with cone beam CT for prostate radiotherapy in the UK. Further research is required to determine the optimal verification schedules for prostate image-guided radiotherapy.

O-043 Dose fractionation of radical radiotherapy for prostate cancer in the UK

Chris Ball
The Clatterbridge Cancer Centre NHS Foundation Trust

Aim: To understand the variation by analysing the national radiotherapy dataset, RTDS.

Background: Recent results from the CHHiP Trial D. Dearnaley et al 1 which compared this standard to hypofractionated radiotherapy recommended the study regime of 55 Gy in 20 fractions over 4 weeks will change practice.
RTDS allows analysis of current radical dose fractionation and the reduction in attendances.

Methodology: For patient receiving radiotherapy between April 2009 and March 2015 episodes of radiotherapy were selected from teletherapy RTDS records by primary diagnosis of prostate cancer (ICD10 C61), by treatment site of pelvis, with curative intent to report the prescribed and given dose fractionation.

Outcomes: The results show the dose fractionation by provider and by overall activity.

Discussion: The results show that from 2014 to 2016, prostate cancer patients received radical radiotherapy intent with a dose fractionation regime of 20 or more fractions. With hypofractionation becoming the standard regimen the number of attendances will decrease in the UK.

O-044 Provision of site specialist therapeutic radiographers in the treatment and care of men with prostate cancer in the United Kingdom

Spencer Goodman; Sarah James; Charlotte Beardmore
The Society and College of Radiographers

Aims/objectives: The overall aim of the project was to describe the current situation in relation to the UK prostate specialist therapeutic radiographer (RT) workforce and to understand the specific nature and value of these roles. The support and development needs of practitioners were identified in order to create an online community forum and framework for collaborative practice with associated resources, opportunities for networking and future role developments.

Content: Exploration of a mixed methodology project comprising quantitative data collection from key stakeholders targeted at every cancer centre in the UK through an online survey, and qualitative data via workshops with identified individuals working in the field.

Ongoing work to support a growing workforce.

Relevance/impact: More men will receive radiotherapy treatment for prostate cancer than any other treatment modality. Integrated care across the whole patient pathway is crucial for ongoing development of service delivery and this project explores this across multiple stakeholders.

Outcomes: This project has demonstrated that prostate specialist RT roles are reliably in place in 18 cancer centres, mostly in England, and their numbers are increasing with comparative data available for other specialist roles

Discussion: Specific recommendations are proposed for stakeholders including prostate specialist RT's, radiotherapy service managers, professional and charitable bodies.

Sustainability for an online community developed for these roles.

O-045 The use of a comprehensive low fibre diet sheet to reduce the number of radiotherapy CT planning scan attempts for patients receiving radical radiotherapy to the prostate

Renita Pawaroo; Helen Corbishley; Ian Sayers
New Cross Hospital, Wolverhampton

Background: Patients receiving radical radiotherapy to the prostate are required to have a bowel volume of 4cm or less for their CT planning scan to reduce variation during treatment. This is difficult to achieve and some patients require numerous attempts before their bowel volume is correct.

Due to limited facilities, the use of daily microenemas is not possible therefore patients are advised to follow a low fibre diet and take daily laxatives. A comprehensive low fibre diet information sheet was created and trialled on a group of patients to investigate if its use could reduce the number of attempts.

Method: 24 patients followed a low fibre diet sheet 1 week prior to their CT planning scan, alongside taking a laxative (Group A)
Patients educated about following a low fibre diet and importance of bowel preparation
Number of CT scan attempts and bowel volume recorded for Group A and compared to a control group (Group B)
Patients completed a service evaluation questionnaire

Results: 74% of Group A successfully scanned within 2 attempts compared with 52% in Group B, t test performed not significant (p=0.312)
100% of patients found the low fibre diet sheet easy to follow and only 10% found it affected their daily life
79% of Group A found the clear explanation of the diet useful, 58% preferred an additional clinic appointment for this
Conclusions: Although not statistically significant there is a trend towards a benefit of the dietary advice that is consistent with our subjective assessment of their usefulness.

O-046 Concurrent boost technique in prostate IMRT under-treats significant proportion of PTV at periphery

Ananth Sivanandan; Georgina Walker; Santhanam Sundar
Nottingham University Hospitals NHS Trust

Introduction/relevance: The CHHiP trial supports the hypothesis the α-β ratio is low for prostate cancer and larger fractions of radiation have better cell kill. It follows the concurrent boost technique, which has become a standard of care in the UK, has a radiobiological flaw as the use of fraction sizes smaller than 2 Gy/fraction under-doses a significant proportion of PTV1 and PTV2.

Aims: To determine the extent of the PTV in patients in our centre treated with radical radiotherapy to the prostate receiving less than 2 Gy/fraction.

Methods: We audited the PTV volumes of patients treated with radical radiotherapy to the prostate over a 10-month period from April 2014 to February 2015. Patients selected were comparable to those in the CHHiP study. PTV1 received 60Gy, PTV2 71Gy and PTV3 74 Gy with PTV1- PTV2 receiving 1.62 Gy/fraction and PTV2 - PTV3 receiving 1.92 Gy/fraction.

Outcomes: 74 consecutive cases were eligible for analysis. We found median volumes of PTV1, PTV2 and PTV3 were 178cc (range 119 - 259), 126cc (range 68 - 229) and PTV3 76cc (range 36 - 144) respectively. Median percentage volume receiving 1.62Gy/fraction was 32% (5 – 54%) and 1.92Gy/fraction was 39% (33 – 61%).

Discussion: The results from our centre indicate a significant proportion of the PTV receives less than 2 Gy/fraction, which is at odds with the low α-β ratio of prostate cancer. We suggest adoption of a constant PTV rather than a shrinking PTV may alleviate the problem of concurrent boost.

O-047 Initial experience with the prone breast technique

Emma Orchard; Sarah Lambert
Peterborough City Hospital

Introduction: The prone breast technique is widely used in a number of departments worldwide but has not gained popularity within the UK. Locally, patients with large, pendulous breasts have previously been scanned with a bra to improve breast tissue coverage. This was found to be unreliable throughout treatment with images showing a large variation in breast tissue position. A service improvement was undertaken to introduce the prone breast technique after considerable research into its use elsewhere and a multidisciplinary working group established to finalise the method we wanted to use locally. To date, 3 patients have been successfully treated in the prone position.

Method: Patients were selected as suitable if the standard supine tangent field failed to cover breast tissue adequately or included >2cm central lung distance (CLD).
At CT patients were positioned on the Bionix Prone Breast System. Additional tattoos and alignment marks given to ensure reproducibility.

Daily CBCT for treatment and treatment times recorded.

Results: For all 3 patients the lung V12Gy was reduced considerably, for one patient 17.2% to 0.1%. The patient separation was reduced allowing 6mv plans to be delivered, PTV coverage comparable but reduced 105% in the prone position.
Treatment times recorded and comparable to standard supine technique and feedback from the radiographers suggests that with experience it is straightforward to deliver and tolerated well by the patients.
Conclusions: Our experience to date has shown the prone breast technique to be a successful solution for treating patients with large and pendulous breasts where conventional supine radiotherapy would lead to increased dose to critical structures.

O-048 Using 3D stereophotogrammetry to evaluate the stability, and positional accuracy of a breast immobilisation device

Keeley Rosbottom; Heidi Probst; Simon Choppin; Heath Reed; Andrew Stanton
Sheffield Hallam University

Developments in breast cancer radiotherapy require greater accuracy in patient positioning.

Aim: Testing the capabilities of a novel support bra to accurately reposition breast tissue and provide modesty.

Content: The usefulness of 3D stereophotogrammetry as a method for establishing immobilisation capabilities is addressed. Surface scanning images of twenty healthy volunteers wearing the prototype support bra are used to ascertain the repeatability of breast positioning over repeated bra fittings. How repeatedly breasts can be positioned within the bra is used to inform design modifications.

Impact: 3D stereophotogrammetry provides an opportunity for device testing and refinement ahead of patient testing; facilitating a smoother more effective design process. Greater reproducibility of breast tissue is paramount with modern breast irradiation techniques; a support bra may also dramatically change the patient experience by preserving dignity.

Outcomes: This exploratory study informed design developments before a clinical feasibility study. 3D stereophotogrammetry allowed quality measurements to be obtained which are difficult to obtain using traditional techniques. Positional movements of breast tissue (measured in mm) with repeated wearing of the bra, changes in breast shape and experiences of comfort while wearing the bra were assessed.

Discussion: 3D stereophotogrammetry is a new technique that could be adopted for evaluation of other immobilisation devices prior to clinical implementation. It reduces patient exposure during product development phases and may ensure a shorter clinical pilot testing phase, enabling refinement based on quantitative non-invasive data. The opportunity to evaluate public perceptions and preferences gives early insight to patient compliance.

O-049 A review of the immobilisation in patients receiving radical radiotherapy for lung cancer

Katie Bye Harris; Lauren Todd; Deborah Brown; Ruth McLauchlan; Danielle Power; Conrad Lewanski
Imperial College Healthcare NHS Trust

Radiotherapy is improving at a rapid rate and the need for accurate treatment delivery is vital. Radical radiotherapy aims to deliver a high dose to the tumour whilst minimising dose delivered to normal tissues. During four dimensional computed tomography (4DCT) planning, lung and tumour movement are accounted for, improving dose conformity and potentially reducing planning margins. Immobilisation plays an integral part in ensuring treatment position reproducibility. This review examines both accuracy and efficacy of using the CIVCO wing board to immobilise these patients.

A retrospective sample of 20 patients with a primary lung diagnosis was identified by clinicians at referral to receive a 4DCT planning scan. Patients were immobilised as per departmental protocol. Cone beam computed tomography (CBCT) and megavoltage portal images with the cine function was used for verification. Experienced observers reviewed the images and data was collected daily on treatment set up and performance status. The systematic and random errors in treatment set up for each group were calculated and results confirmed that the immobilisation is sufficient for our current margins.

All patients presented at different clinical stages with varying co-morbidities contributing to variance in the data. The results demonstrate that bony anatomy is not a good surrogate for confirming a gross target volume within the lung. The development of tumour lobe specific immobilisation with increased image guided radiotherapy may reduce the treatment set up error further. A plan to re-audit with improved immobilisation is underway.

O-050 Assessing set-up accuracy and reproducibility in breast cancer patients – one department's experience over 8 years

Ruth McLauchlan[1]; Katie Bye Harris[2]; Camarie Welgemoed[2]; Susan Cleator[3]; Pippa Riddle[3]

[1]Department of Radiation Physics and Radiobiology, Imperial College Healthcare NHS Trust; [2]Department of Radiotherapy, Imperial College Healthcare NHS Trust, [3]Department of Radiation Oncology, Imperial College Healthcare NHS Trust

In 2007, a set-up accuracy and reproducibility study was first performed in our centre for patients receiving radiotherapy for breast cancer in preparation for entry into the IMPORT trial. This identified some issues regarding immobilisation and staff training that were addressed and shown to be effective in a repeat audit the following year. As we have moved from a 2D planning technique to more sophisticated 3D optimisation and the use of breath-hold for suitable patients, we have repeated our set-up studies to ensure we obtain the maximum benefit of improved dosimetry.

Each study comprised a prospective review of on-treatment verification images. In the latest study this included separate groups of whole breast free-breathing patients, whole breast breath-hold patients, and chest-wall free-breathing patients to enable any set-up differences to be identified. All patients had MV portal images of the medial tangential field taken daily with the cine functionality used for the free-breathing patients to allow intra-fraction variation to be assessed. The portal images were compared with planning CT generated Digitally Reconstructed Radiographs and measurements of the following parameters were reviewed by a single, experienced observer: Central Lung Distance, Central Flash Distance, and Inferior Central Axis Margin. The systematic and random errors in treatment set-up for each group were calculated and demonstrated both an improvement over the previous study and agreement with published data.

Over the past 8 years we have ensured that improvements in planning technique have translated to patient treatment via thorough evaluation of our clinical set-up.

O-051 The influence of tumour location in the breast on boost modality selection

Elaine Reilly[1]; Colin Baker[2]; Maria Flynn[3]; Helen Mayles[4]; Andrew Reilly[1]

[1]Western Health and Social Care Trust; [2]Royal Berkshire NHS Foundation Trust; [3]University of Liverpool; [4]The Clatterbridge Cancer Centre NHS Foundation Trust

Background/purpose: To establish whether photon or electron beams provide better dose coverage to tumour bed sites in different regions of the breast.

Methods: 10 patient data sets were selected from a trial cohort, 2 patients each with tumour beds in one of 5 regions within the breast – Superior Lateral Quadrant (SQL), Superior Medial Quadrant (SMQ), Inferior Lateral Quadrant (ILQ), Inferior Medial Quadrant (IMQ) and the Central Quadrant. The dose to the whole breast treatment of 50Gy in 25 fractions was combined with a boost plan to the tumour bed of either photons or electrons with a dose of 16Gy in 8 fractions. Dose to the Planning Target Volume (PTV), lung, heart and breast tissues outside the tumour bed were assessed by using dose volume histograms (DVH).

Results: Tumours in the SLQ received better dose coverage by the photon boost plans. All other areas in the breast received comparable coverage with either photons or electrons. However electron coverage is dependent on surface contour regularity and tumour geometric shape. Lung and breast outside the tumour bed had consistently lower doses with photon boost plans. The heart doses were not consistently lower with either a particular modality of tumour position within the breast.

Conclusion: Electrons were a less favourable treatment modality for SLQ tumours, but either photons or electrons were suitable for treating tumours in other regions of the breast. Attention must be paid to the use of bolus for electron beams planned on irregular surface contours.

O-052 PROSPECT: Phase 2 rescanning of seromas in patients to evaluate CTV reduction in breast cancer

Gillian Smith; Peter W Robson
The Clatterbridge Cancer Centre NHS Foundation Trust

Aim: Single centre feasibility study to assess the reduction in sequential boost volume treated by rescanning patients during their final week of whole breast radiotherapy (WBRT).

Content: Patients requiring a sequential boost treatment who had a tumour bed seroma greater than 1cm on initial radiotherapy planning (RTP) CT scan were considered for entry into the study.
Thirty patients were sequentially recruited at the planning stage if they met this inclusion criteria. Patients were consented for entry into the trial and a second planning scan (RTP2) was conducted in their final week of WBRT. RTP2 scan was used to determine the volume treated for their sequential boost.

Impact: The CTV on both scans were outlined by the chief investigator and the CTV changes were annotated.

Outcome: 83% of patients had a substantial reduction in CTV (>25%) in RTP2 compared to RTP1. The mean CTV reduction overall was 41.9% with a median reduction 42.5%. Mean time between scans was 27 days; median time 29 days. Mean time from start of WBRT treatment to RTP2 was 14 days.

Discussion: This study shows that rescanning breast patients during the final week of WBRT leads to a significant decrease in treated boost volume in the majority of patients.

O-053 Febrile neutropenia rate in patients on adjuvant fec-d receiving primary G-CSF prophylaxis with docetaxel

Hannah Williams; Thiagarajan Sreenivasan
United Lincolnshire NHS Hospital Trust

Background: The efficacy of adjuvant chemotherapy with FEC-D (5-fluorouracil–epirubicin–cyclophosphamide followed by docetaxel) is superior to that with FEC-100 in node positive breast cancer. However, as the use of FEC-D increased, health care providers noted higher-than-expected toxicity rates and frequent early treatment discontinuations due to this. Local study showed an unacceptably high (35.5%) rate of febrile neutropenia (FN) requiring hospital admission following first dose of Docetaxel. Primary GCSF prophylaxis was therefore introduced for the Doctaxel arm of the regime in our institution from October 2012. In this study we have looked at the impact of this change in practice in reducing the rate of hospital admissions with FN.

Methods: Patients prescribed adjuvant FEC-D for node positive breast cancer within our centre form October 2012 to April 2015, where all retrospectively reviewed. They all received prophylactic G-CSF as standard. Information was collected from discharge summaries, chemotherapy charts, blood and microbiology online results.

Results: One Hundred and thirty four patients were included in the study, receiving this regimen. FN or neutropenia requiring admission occurred in 14/134 (10.4%). A reduction from 35.5% rate without G-CSF. Median days in hospital 4. Range 1-7. No death was related to treatment.

Conclusion: Introduction of GCSF primary prophylaxis for the Docetaxel arm of FEC-D regime has clearly shown significant reduction in rates of hospital admissions with neutropenia after Docetaxel. It is therefore a standard practice in our centre to use primary GCSF prophylaxis with both arms of the sequential FEC-D regime for patients with breast cancer.

O-054 Radiotherapy skin reactions: Assessment and management

Samantha Bostock
Gloucestershire Hospitals NHS Foundation Trust

Aims: To standardise the assessment and management of radiotherapy skin reactions across care settings over a wide geographical area.

Content: Having evaluated the use of a novel dressing in managing radiotherapy-induced skin reactions (RISR) it was identified that staff required education to recognise and treat RISR. Radiotherapy skin care varied widely across care settings. A range of patient and healthcare professional (HCP) documentation including an assessment and intervention pack were designed which adhere to Society and College of Radiographers guidance. RISR can be

challenging to dress due to the anatomical areas affected. A guide for fixing dressings on RISR in difficult to dress areas of the body was also created as a result of a multidisciplinary focus group.

Impact/outcomes: Using the Radiotherapy Oncology Group (RTOG) assessment criteria a guide for assessment and management of RISR was created and distributed throughout the author's health economy resulting in standardised care for patients receiving radiotherapy. It has also been adopted across other Trusts nationally. Presenting at conferences and study days ensured HCPs were aware of the new tool.

Discussion: By implementing a standardised approach to the management of RISR, staff knowledge is enhanced and the quality of patient care has improved. Patients are better informed and therefore more involved in their care outcomes by the provision of clear, relevant information. By educating HCPs involved at all stages of the patient pathway the effects of RISR can be reduced meaning patients do not have to face discomfort/pain or delayed healing relating to sub-optimal skin care regimes.

O-055 No ifs, no butts: Compliance with NICE guidance smoking cessation by providers of cancer therapies in the UK

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Introduction: The introduction of the Health Act in England, coupled with the white paper Healthy lives, healthy peopleprompted many NHS trusts to adopt smoke free policies. Despite evidence that stopping or abstaining from smoking reduces acute sequelae and enhances the efficacy of treatment, there have been problems with engagement, compliance and enforcement.

Method/materials: A semi-structured questionnaire containing quantitative and qualitative elements was developed to audit compliance with NICE (PH48) guidance.

Results: 10 trusts reported that their hospital site was smoke free in practice. 47 trusts reported to be smoke free although only in theory. A third of respondents encouraged, those patients who did not stop smoking, to abstain for a period of time prior to treatment. One trust allowed the use of e-cigarettes inside the hospital. Very Brief Advice training was used by 44% of respondents. Over half reported having no smoking cessation training.

The reduced effectiveness of treatment in patients, who continue to smoke, if communicated, was communicated in the main verbally. The verbal message was supported by written information in less than a third of respondents. Given that patients understanding may be compromised by anxiety coupled with a lot of information it is considered good practice to provide the message in multiple formats.

Conclusion/discussion: Practice relating to smoking cessation varied significantly from policy and guidance.

This work identifies beacons of best practice in terms of smoking cessation support to better support patients and their families to abstain or stop smoking.

O-056 Opening up that "can of worms" to discuss sexual orientation and sexuality with lesbian, gay and bisexual cancer patients

Sean Ralph[1]; Steve Brown[2]
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Background: Previous research has identified that a significant number of lesbian, gay and bisexual (LGB) patients are having poor experiences of healthcare services as a result of their sexual orientation. A major source of frustration for LGB cancer patients are the constant assumptions of heterosexuality which are made by health professionals. 57% of LGB people surveyed at gay pride events in 2012 and 2014 think it is important for health professionals to know about the sexual orientation of patients; however, 57% of health and social care professionals surveyed by YouGov in 2014 don't consider a patient's sexual orientation to be relevant to their healthcare needs.

Aims: To enhance the cancer journey for LGB patients by:
Exploring the views and experiences of health professionals on discussing sexual orientation and sexuality with LGB patients.
Exploring ideas on how service improvement and advances in clinical practice can best be facilitated.

Methods: This study is inviting health professionals working with cancer patients to take part in an initial semi-structured interview. Following on from this some participants will then be invited to take part in a focus group to discuss the findings from the interviews and explore in more details how clinical practice might best be improved in order to enhance the cancer journey for LGB people.

Results/conclusions: This study is being undertaken as part of an NIHR CLAHRC NWC clinical academic research internship and will be completed by the end of February. Recruitment is still therefore currently ongoing.

O-057 Drinking protocols: Understanding why prostate patients may not comply

Leah Untisz; Amy Taylor
Sheffield Hallam University

Aims/objectives: To enhance accuracy and reproducibility of prostate radiotherapy, patients are required to adhere to a local drinking protocol throughout their treatment. Noncompliance however is often anecdotally reported and can impact not only the treatment accuracy and daily set-up variations, but also the working practices of radiotherapy department. The study aimed to identify possible barriers to protocol compliance, the results of which intended to aid changes in local practice to help improve patient compliance.

Content: The presentation will discuss the findings of a qualitative focus group (n=7) conducted at the authors department

Relevance/impact: Patients receiving radical radiotherapy often adhere to a local drinking protocol, ensuring a reproducible bladder size is maintained, this helps to reduce the amount of bladder and small bowel within the field. Improving compliance to such protocols can improve treatment accuracy; in turn this can reduce bladder related side effects.

Outcomes: The focus group identified a number of common themes perceived as barriers to compliance including lack of understanding, limited knowledge of hydration and a lack of involvement of family members and carers.

Discussion: The issue of compliance may not only be as simple as a lack of understanding towards the drinking protocol but as a consequence of other factors. A change in the way information is delivered should be considered along with the content included, such as addressing the necessity of hydration. The focus group aided the department to develop a visual aid and address other current practices.

O-058 Trainspotting

Lorraine Whyte
Beatson Cancer Charity

Cancer patients with addiction issues are a high risk group that require broader health care input, including health improvement & targeted interventions. We as therapy radiographers are not well equipped to deal with this patient group and require specialist education and guidance. However, there are no addiction specialists equipped to deal solely with cancer patients. It is the case that these patients' needs are not being met and there is an educational deficit.

A learning needs analysis was carried out amongst staff at the Beatson to assess whether there was a need for specialist education with regards to caring for patients with both cancer and addiction issues. The answer was a resounding yes.

Many unexpected issues were raised, especially from the teenage cancer trust and the use of Legal Highs amongst their patient group. The Trainspotting generation were also raised as an issue as people who are opioid dependent have an excess risk of a range of cancers compared with the general population.

Patients with cancer and addictions are an important group to look at when investing resources into patient support and staff education. Addiction specialists need a new evidence base and guidance when it comes to dealing with cancer patients in order to educate us effectively. In order to address this unmet need a conference has been arranged for Autumn 2015. This is a considerable task as sympathy is often very low for drug addicts, who may are deemed by some as unworthy of care or attention.

O-059 Enhancing the clinical learning environment for undergraduate therapeutic radiography students

Lynne Gordon; Paula Powell; Susan Murray
University of Hertfordshire

Aim/objective: By understanding the clinical demands on therapeutic radiographers, we can work together with the partners who provide clinical practice placements to ensure that appropriate opportunities are provided to enable student radiographers to develop their clinical skills.

Content: The purpose of this submission is to report on the findings of 3 consecutive annual surveys of therapeutic radiographers and students at our contracted practice placements in order gain an understanding of the placement experience. Survey data collected during the first semester of academic years 2013-14, 2014-15 and 2015-16 will be analysed in order to determine the perspective of participants on the strengths and weaknesses of the clinical placement experience and the learning opportunities they offer. This is a work in progress with final data collection due to complete in February 2016.

Relevance/impact: With the recent Government spending review expected to create change in the way health students (and therefore student radiographers) are recruited, it is likely that new initiatives will be developed that aim to increase recruitment and retention of students. Existing evidence has pointed to clinical placement experience being an important influence on recruitment and retention. This survey may provide a useful contribution to this body of evidence as well as informing our local educational provision.

O-060 An audit to evaluate the use of tablet computers in undergraduate radiotherapy student practice education

Sue Murray; Lynne Gordon; Paula Powell; Anthony Herbland
University of Hertfordshire

We aim to investigate how tablet computers can be used to enhance the learning of radiotherapy students while in clinical practice. The following secondary aims will be addressed:
1: Evaluate the use of the tablets by means of a diary-based audit of Link Lecturers and survey of students;
2: Data generated by educational technologists will aid understanding of the technical support required for the use of tablets in the clinical setting.

Staff have been asked to diarise their use of the tablets and the barriers/challenges to use. Findings related to clinical practice learning and teaching, administration, communication, technological support and programme delivery will be presented. Use of technology to support learning has been a recent theme in radiography research but has focussed on academic learning (Bleiker, Knapp & Frampton 2011; John-Matthews, Gibbs & Messer, 2013; Lorimer & Hilliard, 2009), therefore this research adds to the existing small body of knowledge. Although use of technology to enhance learning is commonplace in academic settings, no published research related to tablet use (or similar) in radiotherapy clinical education settings was found.

O-061 How does anatomy teaching influence a medical student's ability to interpret cross-sectional imaging?

Jill Christy[1]; Gill Barnett[2]; Li Tee Tan[2]; Richard Benson[2]; Sarah Jefferies[2]; David Noble[2]; Tilak Das[3]
[1]School of Clinical Medicine, University of Cambridge; [2]Department of Oncology, Cambridge University Hospitals NHS Foundation Trust; [3]Department of Radiology, Cambridge University Hospitals NHS Foundation Trust

Aims/objectives: To investigate the relationship between undergraduate anatomy teaching and anatomical knowledge, and confidence and ability to interpret cross-sectional imaging

Content: Results of an online questionnaire completed by 103 clinical medical students at our institution are presented. Students were asked to rank the contribution of different teaching methods to their knowledge and confidence in interpreting CT scans. They were then asked to identify 12 anatomical structures on CT images in an online quiz.

Relevance/impact: Understanding of cross-sectional anatomy is relevant to all trainees interpreting scans to assist in patient management and is a critical skill for radiotherapy planning.

Outcomes: 94% of students selected cadaveric dissection as contributing 'A Lot' to anatomical knowledge. Ward-based teaching was thought to contribute least. Dedicated radiology teaching sessions were ranked most useful in developing CT interpretation skills. The mean score for the CT anatomy quiz was 57% (range 17%-92%). There was

no significant correlation between increased years of study and higher scores (p=0.82) or increased confidence (p=0.65). There was no correlation between different teaching methods and quiz scores. However, there was a correlation between increased confidence and higher quiz score (Pearson's correlation coefficient 0.37, p=<0.001).

Discussion: The lack of correlation between ability to correctly identify CT anatomy and year of study suggests a need for improved methods of teaching cross-sectional imaging. Conclusions drawn from this study are limited due to the relatively small numbers. There is potential to expand this survey to include medical students in other universities and doctors of all levels.

O-062 The use of self-directed, group project work for teaching technical aspects of radiotherapy equipment to undergraduate therapeutic radiography students

Kerrie-Anne Calder; Mike Kirby
University of Liverpool

Aims/objectives: To demonstrate enhancement of student learning and engagement through successful use of group project work for technical aspects of radiotherapy equipment.

Content: Group project work forms a key element of teaching methods for our radiotherapy equipment module; in resonance with our philosophy of combining academic depth with relevant clinical practice. The cohort is divided into groups to research a relevant key subject area. In the academic setting, groups analyse the problem using PBL and mind mapping methods; strategizing and directing information collation, especially during clinical placement. When completed, the final group work is presented to class and edited by the lecturer prior to revision for the unseen written exam.

Relevance/impact: Learning and teaching with group project work is vital to developing deep learning experiences, tying together clinical scenarios with academic depth; a must for therapeutic radiographers in clinical practice.

Outcomes: Originally groups were chosen randomly throughout the cohort, now students at each clinical site research a particular topic – this has improved the evaluations having no negative comments regarding the group dynamics/ work. The technical focus has also changed to align with the oncology module studied concurrently, again resulting in positive comments. Marks achieved show a steady rise in maximum and mean marks for the group work.

Discussion: Developments have resulted in positive changes in results and evaluations; reduction of adverse comments through a continued philosophy of change and refinement to teaching strategies and maintenance of clinical focus on what is technically and content-wise a difficult and voluminous module.

O-063 PBL Accreditation for educators

Brian Hewitt
North Wales Cancer Treatment Centre

This poster was produced as part of the assessment component for my accreditation and entry onto the SCoR Practice Educator register. I chose to deal with the introduction of the student to & training in the use of the virtual simulation system. I had previously been undertaking student education in the workplace for over 10 years but had received no formal training in educational techniques. As my own most recent brush with formal education had been a number of years previously most of the principles and techniques were new to me and the notion of reflection was a mystery.

The learning outcomes described in the SCoR publication on practice educators are quite specific and these formed the basis for my work.

6.2.1 The Practice Educator should provide evidence that s/he is able to:

1. Describe the role and identify the attributes of an effective Practice Educator;
2. Apply learning theories that are appropriate for adult and professional learners;
3. Plan, implement and facilitate learning in the practice setting;
4. Apply sound principles and judgement in the assessment of performance in the practice setting;
5. Evaluate the learning experience;
6. Reflect on experience and formulate action plans to improve future practice.

When the time came to present my work I felt somewhat more confident. Since my participation on the course I have modified my approach to teaching. I now spend a lot more time with my students before we begin working within the clinical setting assessing their favoured learning style and try to alter my teaching accordingly.

O-064 The use of a virtual environment for continuous professional development in the training of deep inspiration breath hold (dibh) technique

Urvina Shah; Angela Williams; Michael Brown; Hema Shah
East and North Herts Trust

Radiotherapy techniques are accelerating rapidly and ongoing training is essential to maintain and develop knowledge. This presentation aims to demonstrate how a virtual reality tool can provide an effective, fun and alternative learning environment in order to gain the knowledge and skills of a new technique.

The training package consists of a workshop to include a virtual reality training tool, DiBH technique for breast radiotherapy with a comparison to the conventional method, discussion based on visual scenarios and multiple choice questions. It includes an introduction to DiBH, the equipment used, identification of chest anatomy, set up errors to problem solve and also decision making skills. CPD questions were also provided.
31 therapy radiographers attended the session between August and September 2015.

An evaluation questionnaire was completed to determine if this tool was effective in aiding learning and understanding technique. The results showed that 100% of trainees found the session useful, helpful and aided their learning through visualisation, revision and thought provoking and engaging scenarios.

Analysis of the data suggests the virtual reality teaching tool can enhance learning, influence decision making, improve knowledge and understanding. To this effect further training sessions will be held and evaluated within the multidisciplinary setting.

O-065 The implementation of advanced pelvic radiotherapy training for multidisciplinary professionals using a virtual reality environment

Angela Williams; Urvina Shah; Gregory Fury; Louise Codd; Michael Brown; Yat Man Tsang
East and North Herts Trust

Radiotherapy accelerates rapidly and ongoing training is essential to develop and maintain knowledge. This study aims to demonstate how a training package for advanced pelvic radiotherapy can be implemented in a mutidisciplinary setting using a virtual reality environment.

The training package consists of a virtual reality training tool (visual demonstration) and site specific workbooks (self filled questions). It includes identification of pelvic anatomy, review of different radiotherapy treatment planning and delivery techniques (conformal, static field intensity modulated radiotherapy and volumetric modulated radiotherapy), image guided treatment scenarios and radiotherapy related side effects.

Pre and post training questionnaires were complete by trainees by scoring their knowledge from 1 (not confident at all) to 10 (exceptionally confident). These were designed to assess the effectiveness of the training package in terms of the trainees' knowledge and decision-making skills in advanced prostate and cervix radiotherapy. An evaluation of the training sessions was also completed.

Between September and December 2015, 20 staff (14 therapy radiographers, 4 physicists and 5 clinical oncologists) attended the training sessions. All trainees found the session useful and appropriate for their level of experience. All would recommend the training package to their peers.

Using Wilcoxon signed rank test, significant improvements in scoring were found in all questions ($p<0.05$).

Analysis of the data suggests the virtual reality teaching tool can enhance learning, influence decision making, improve knowledge and understanding of cervix and prostate radiotherapy for radiographers, physicists and clinicians. To this effect, further multidisciplinary training sessions will be held and evaluated.

O-066 Perceptions of feedback in undergraduate diagnostic radiography and radiotherapy students

Bridget Porritt
The University of Liverpool

Aim: To investigate how a student defines feedback and how it impacts upon them as learners both in the academic and clinical practice environments.

Method: Qualitative approach using focus groups to capture the thoughts and experiences of undergraduate students. Dialogue is recorded and then analysed using i n order to establish key themes.

Results: Definitions of feedback vary greatly. As indeed does the student experience regarding the effectiveness and impact on student learning.

Conclusion: As educators we have to ensure our feedback practices are robust, enabling development of key skills and attributes in all our students. As future mentors and teachers, our students need to have an understanding of feedback processes, ensuring future students have a positive training experience.

O-067 Assessment of reproducibility of patient positioning using mask immobilisation on the Leksell Gamma Knife® Icon™

Miranda Edens; Ruth Smith
Bristol Haematology and Oncology Centre

Aims: To assess the reproducibility of patient positioning using mask immobilisation on the Leksell Gamma Knife® Icon™.

Content: A reference Cone Beam CT (CBCT) and a CBCT prior to treatment determine changes in patient positioning in terms of translation and rotation. This is corrected for by recalculating the bed position for each shot. GammaPlan® v11.0.1 computes the changes in dose distribution.
Eight mask patients had their translation and rotation errors between reference CBCT and initial treatment CBCT recorded. The mean and standard deviation of the set-up error were used to assess random and systematic variation of patient positioning. The impact of this correction regarding dose to tumour and OAR was evaluated on GammaPlan®.

Relevance: This study quantifies the reproducibility of this new technique and assesses the clinical impact of correcting for this set-up error on the delivered dose distribution.

Outcomes: Seven single fraction patients; mean (±standard deviation): translation x=0.3 (±0.8) mm, y=-0.1 (±0.5) mm, z=1.0 (±2.0) mm; rotation x=-1.1 (±1.8) °, y=0.3 (±1.5) °, z=-0.1 (±0.6) °.
One 25 fraction patient; mean (±standard deviation): translation x=-0.1 (±0.2) mm, y=-0.3 (±0.1) mm, z=0.5 (±1.5) mm; rotation x=0.2 (±0.8) °, y=-0.3 (±0.3) °, z=1.3 (±1.0) °.
Displayed doses to tumour and OAR typically changed by 0-0.2Gy (0-0.5% of tumour prescription dose) so treatment proceeded for all patients.

Discussion: Early results indicate the mask provides sufficiently reproducible patient immobilisation with no significant systematic set-up error. The mask is an appropriate fixation for stereotactic treatments. Further data will be presented at the meeting.

O-068 A comparison of the dosimetric merits of Leksell Gamma Knife® versus Radionics® X-knife

Louise Charlton; Christopher Herbert; Ruth Smith
Bristol Haematology and Oncology Centre

Objective: The relative dosimetric merits of the Leksell Gamma Knife and the Radionics X-Knife systems are compared.

Content: Differences in Gradient Index (GI), Paddick Conformity Index (PCI) and the volume of tissue receiving a minimum of 12 Gy (V12) are shown and their effects evaluated. Preliminary work studied ten patients with brain metastases treated using each system. The median dose for X-Knife patients is 16.5 Gy to the 50% isodose, and median tumour volume is 5.16 cm^3. The median dose for Gamma Knife patients is 20 Gy to the 50% isodose, and the median tumour volume is 4.03 cm^3.

Relevance/impact: Previous studies indicate that the risk of experiencing brain injury becomes significant when V12 exceeds 20 cm^3.

Outcomes: Initial results show that GI is comparable for both systems, with a mean value of 2.89 for X-Knife and 2.82 for Gamma Knife. V12 is also comparable for both systems. The median dose delivered to Gamma Knife patients is greater, which significantly benefits patients treated on Gamma Knife. The mean value of PCI for X-Knife is 0.61 compared to a mean value of 0.84 for Gamma Knife. Further results will be presented at the meeting.

Discussion: Gamma Knife treatment produces significantly increased conformity, demonstrated by having a higher PCI. The PCI for X-Knife patients shows no significant improvement with increase in tumour volume, however a significant improvement in PCI is observed with increase in tumour volume for Gamma Knife patients.

O-069 Radiotherapy plus concurrent and adjuvant temozolomide for glioblastoma multiforme: A 4-year case series

Charles Fong; Jamila Mohammed; Ildiko Fekete; Pek King Koh; Rozenn Allerton
Deansley Cancer Centre, New Cross Hospital, Wolverhampton

Aims/method: Retrospective review to determine treatment outcomes for glioblastoma multiforme (GBM) patients treated in a UK centre from October 2009 to September 2013, with follow-up cut-off at October 2015. Kaplan-Meier survival curves were used. We also compared our outcomes against the benchmark Stupp study, as well as selected contemporaneous series.

Results: 70 patients underwent treatment with radical intent using radiotherapy plus concurrent and adjuvant temozolomide, as per Stupp regimen. 94% had ECOG performance status of 0/1. Nine (13%) patients were 70 years or older. Ten (14%) had biopsy only. Median time from decision-to-treat to starting treatment was 12 days. 94% received 60Gy/30#. 68 (97%) patients were alive post-chemoradiation. Of these, 22% received none, whilst 28% received 6 cycles or more of adjuvant temozolomide. 5 patients (7.1%) encountered grade 3/4 toxicity - all were haematological and died within 30 days of completing chemoradiation. Venous thromboembolism rate was 17%. Median and 2-year overall survival was 13.6 months, and 19.7% respectively. Median time to progression was 9.8 months. Of the 55 patients with documented relapse, 36 (66%) received further therapy, including surgery in 8/36.

Discussion/conclusion: MGMT molecular status was not routinely performed yet during this study period. Our treatment outcomes were comparable to the Stupp study. Patient selection criteria is important when comparing results with other series.

O-070 Time based ionometry for patient specific QA in multiple field IMRT

Rollo Moore[1]; Abigail Bryce[2]
[1]The Royal Marsden Hospital NHS Foundation Trust; [2]University of Hertfordshire

Aims: Usual approaches to assurance in delivery in commissioned dose calculation and delivery systems are point-like or planar dosimeters of varying complexity and cost. The ionometric fluence (not dose) based approach presented uses a 1 litre air filled ionisation chamber and a fast electrometer to log current as delivery progresses to the phantom. It has potential to affirm consistency under non-fault indication in quasi-real-time like (retrospective) log file analysis, although measurement based and with useful tolerances.

Content: Although traceable dosimetry is a keystone of radiation therapy, geometric distribution of dose is paramount. IMRT and its precision are difficult to map onto a metric. Dosimeters are used with appropriate metrics, uncertainties and tolerances. In performing patient specific QA, often a subset of commissioning experiments is repeated, with the aim of traceable dosimetry. These experiments and their precise systems may include complexities of a similar nature to the original TPS system. The operation of ion chambers and electrometers are reasonably understood and in this work have been demonstrated to follow well reported function, such as ion recombination dependence on ion density.

Relevance/impact: This work sacrifices traceability in an attempt to bring measurement to bear on risk in IMRT by modeling the relationship between ion current and input geometry of radiation.

Outcomes: Whilst it does not yet permit traceable dosimetry, the data show linearity with MU as a function of beam aperture within a useful tolerance of a few percent. The simplicity of this approach exhibits resilience and reliability.

P-071 Evaluation of wrist biomechanics on radiographic imaging

Victoria Ballard; Siobhan Dallibar
BSUH NHS Trust

Aims/objectives: To evaluate variation in wrist anatomy on plain radiography and the resultant effect on wrist biomechanics.

Content: Comprehensive guide to normal wrist anatomy, variations and their causes, the radiographic appearances, and implications of these variations.

Relevance/impact: Good radiographic technique is vital to enable accurate assessment of wrist alignment. Understanding of the implications of radiographic technique on anatomy helps radiographers achieve quality diagnostic imaging. Use of relevant supplementary projections can assist recognition of significant abnormalities. Early diagnosis of conditions affecting carpal stability allows early intervention so can minimise the debilitating effects on the patient.

Discussion: Normal anatomical variants, traumatic injuries and arthropathy alter the biomechanics of the wrist joint. Plain film radiography is the primary method of imaging the wrist. Recognition of these appearances on imaging and awareness of their significance can facilitate early diagnosis and appropriate management resulting in limitation of disability and improved patient outcome.

P-072 Ankle pain! Posterior malleolar fractures: A review of the imaging findings and orthopaedic classification of injuries

John Paul Mullany; Athar Barakat; Lyndon Mason; Sumita Chawla
Aintree University Hospital

Aims/objectives: We present a pictorial synopsis of posterior malleolar fractures found at the back of the tibia at the level of the ankle joint. We aim to emphasis the importance of pre and postoperative imaging capabilities and the surgical fixation options. We facilitate the observer in better recognizing posterior malleolar fractures and their classification pattern.

Content: We will highlight cases of simple and complex posterior malleolar fractures using plain radiographs, computed tomography (CT) and three-dimensional (3D) volume rendered images. We will also consider the indications for surgical management and discuss the classification of injuries.

Relevance/impact: Posterior malleolus fractures can be divided into simple or complex fractures depending upon the fracture morphology and the impact upon the stability of the ankle joint. Factors that favour surgical fixation over conservative management include the degree of comminution, articular involvement, fragment size and joint stability.

Classification of injuries: Type I fracture has high degree of syndesmotic instability
Type II fracture is an articular push off fracture
Type III fracture has low degree of syndesmotic instability with common posteromedial injury +/- anterior avulsion (Y fracture)

Outcomes: We focus on the importance of a joint radiological and orthopaedic approach in accurately reporting and managing posterior malleolar fractures.

Discussion: The advances seen in recent years in CT and 3D volume rendered images have improved our ability in demonstrating and delineating different posterior malleolar fracture patterns. We hope to inform the audience by presenting cases, which illustrate important imaging findings and the classification pattern.

P-073 The use of the Ottawa ankle rules in the emergency department

Lauren O'Kane; Marcelo Vasquez Rios
Derriford Hospital

According to the Ottawa ankle rules, radiographs should be requested in cases of trauma only when there is malleolar pain associated with one of three other criteria: bone tenderness over the posterior distal tibia or medial malleolus tip, the posterior distal fibula or lateral malleolus tip or an inability to weight bear immediately and on presentation for 4 steps.

Aim: An audit to determine the frequency with which radiograph requests in the Emergency Department comply with the Ottawa ankle rules.

Objectives: To audit the contents of radiology requests against the Ottawa ankle rules stipulated above.
To provide educational material for staff within the emergency department to improve the quality of requests.
To re-audit following our intervention.

Method: We conducted an audit of 200 consecutive cases attending the Emergency Department with traumatic ankle injury in October and November 2015. We identified all requests that did not satisfy the criterion for the Ottawa ankle rules.

Results: 32% of requests did not contain adequate information in relation to the Ottawa ankle rules. We are currently in the process of implementing teaching and posters within the emergency department. Results of re-audit are awaited and will be presented.

Discussion: Our presentation will also discuss the evidence basis for use of the Ottawa ankle rules for traumatic ankle injury.

P-074 Total knee replacement wear debris presenting as a complex soft tissue mass: A multimodality diagnostic approach

Sara Riley; Emma Rowbotham; Sarah Freer; Claire Kirkpatrick
Leeds Teaching Hospitals NHS Trust

Aims/objectives: To describe the phenomenon of wear debris disease related to prosthetic joint replacement and to illustrate how a clear history and multiple imaging techniques may be required to reach the diagnosis of this condition in a patient with a history of joint replacement.

Content: Pictorial presentation of ultrasound, X-ray and MRI images of a patient referred by the local ultrasound department to the regional sarcoma MDT with a complex soft tissue lesion in the popliteal fossa. Discussion of the prevalence of this condition and the presenting findings.

Impact: To highlight the importance of wear debris disease, the common features at presentation and imaging findings.

Discussion: The cancer network soft tissue sarcoma guidance is that suspicious soft tissue masses on local imaging should be reviewed by the regional sarcoma multidisciplinary team. In patients who have undergone a total joint replacement, any mass occurring in or adjacent to the joint requires thorough investigation and a wear debris-induced cyst should be considered in the differential.

P-075 The sternum and sternoclavicular joints - a pictorial review

Matthew Jaring; Nicholas Ridley; Karon Litton
Great Western Hospital

A variety of imaging modalities can be used to assess sternal and sternoclavicular pathology. The aetiology can be traumatic, infectious, rheumatological, inflammatory or neoplastic (both primary and secondary), with an equally wide variety of appearances.

As the traditional sternal radiograph and sternoclavicular views become less frequently used, we present a pictorial review of pathology not only on plain radiographs but also on CT, MRI, nuclear medicine and ultrasound.

Despite being a relatively common site of pathology, sternal pathology is often overlooked, sometimes because the imaging plane or reconstruction kernel is inappropriate to adequately view the region. Sternal pathology can suggest further systemic pathology not just in neoplastic disease, but in trauma, where it is associated with a substantial force of impact, increasing the likelihood of underlying injury.

Case examples include imaging of congenital anomalies before and after treatment (for example pectus excavatum following the Nuss Procedure as well as following non surgical silicone implant), trauma, osteoarthritis, infection, tumour and SAPHO syndrome.

P-076 The pathogenesis of osteomyelitis correlated with radiological findings: A pictorial review

Yu Jin Lee; Sara Sciacca; Gajan Rajeswaran
Chelsea and Westminster Hospital NHS Foundation Trust

Introduction: Radiologists have an important role in establishing the diagnosis of osteomyelitis and characterising the extent of infection spread. A multimodality approach is often utilised as part of the diagnostic work-up. MRI in particular has emerged as the imaging modality of choice because of its sensitivity for detecting early osteomyelitis and excellent soft tissue resolution.

An understanding of the pathogenesis of osteomyelitis is necessary for recognition and interpretation of its imaging features. In this pictorial review, the pathological features of acute and chronic osteomyelitis are illustrated and correlated with radiological images from four clinical cases.

Objectives: Describe the key pathological features of acute and chronic osteomyelitis
Recognise the key imaging findings in osteomyelitis such as bone marrow oedema, subperiosteal abscesses and sequestra
Understand the underlying mechanisms through which these features arise

Content: An illustration of the pathogenesis of acute and chronic osteomyelitis

Definitions and explanations of key terms used to describe the pathological features

Plain film, CT and MRI images from four cases of long bone osteomyelitis

P-077 Pictorial review of peripheral nerve sheath tumours

Jessica Watts; Bilal Sethi; Georgia Priona; Alim Yucel-Finn; Benjamin Winter
Aberdeen Royal Infirmary; University of Aberdeen

We are presenting 6 cases of peripheral nerve sheath tumours (PNST) and their radiological appearances as depicted on MRI.

PNST can affect any nerve and may be associated with neurofibromatosis. The main subtypes are: Schwannoma, Neurofibroma, and malignant PNST, encapsulating fibrosarcoma and malignant schwannoma. Schwanomas are encapsulated and rarely undergo malignant change. Multiplicity suggests neurofibromatosis. Neurofibromas can be localised (~90%), diffuse or plexiform. The latter is pathognomonic for NF with half undergoing malignant degeneration.The range of PNST presented in this review includes 5 cases of benign PNST of varying appearances and one case of neurofibroma with malignant change (fibrosarcoma).

PNST's have an incidence of ~1 per 100,000/year. They can be a great source of anxiety, morbidity and potential mortality. Imaging acts as an adjunct to diagnosis; most cases will require tissue biopsy.

The modality of choice for PNST's is MRI, in which they are seen as well defined lesions of low T1/high T2 signal with avid gadolinium enhancement. A target sign suggests benignivity and may be produced from T2 MRI. Although malignant and benign lesions cannot be reliably distinguished, certain findings should raise the suspicion of a malignant tumor: size >5 cm, ill-defined margins with adjacent oedema, heterogeneity with central necrosis.

In general, radiologic findings are nonspecific and tissue diagnosis is paramount. In conclusion, knowledge and recognition of the characteristic signs for peripheral nerve sheath tumors can aid in the proper diagnosis and treatment of these lesions.

P-078 Patient reported outcomes of suprascapular nerve block

Nassim Parvizi; Catherine McCarthy
Oxford University Hospitals NHS Foundation Trust

Purpose: To assess patient reported scores of shoulder pain following suprascapular nerve blocks at a tertiary referral centre.

Methods: Prospective analysis of patient reported pain score questionnaire results for chronic shoulder pain (January 2013 -May 2015.

Standard: 75% reduction in pain score after supra-scapular nerve block was set at 2 weeks follow-up.

Results: 118 suprascapular nerve block injections performed. 102(86%) completed and returned pain diaries with 8% comprising bilateral injections. Indications were 82% rotator cuff tear, 68% degenerative disease, 5% rheumatoid arthritis and 3% humeral neck fracture. 79% of patients were female with mean age 76 (48-95) years. Average pre-injection scores 8.5 on a 10-point visual analogue scale.

Intervention: A mixture of steroid (40mg depomedrone or triamcinolone acetate) and 0.5% Marcaine injected under ultrasound guidance into the suprascapular fossa using 9MHz linear probes by experienced consultants or MSK fellows.

Post-intervention results: Average post-injection scores at two days and two weeks were 5.7 and 5.8 on a 10-point scale, respectively. An average reduction of 68% in patient reported pain outcomes. Most reported daily activities were carried out the same and analgesic use was the same or reduced, with an overall report that the injection was somewhat helpful. No complications were recorded.

Conclusion: Suprascapular nerve block plays a promising role in patients with severe, chronic shoulder pain not amenable or responsive to other forms of therapy. Ongoing active surveillance must be made and patient selection should be targeted to ensure an improvement in pain response.

P-079 Multimodality imaging review of the post-amputation pain

Nawaraj Subedi; Fergus Jepson; Vinay Parmar; Simon Beadmore; Teik Chooi Oh; Syed Ali
Lancashire Teaching Hospitals NHS Foundation Trust

Limb amputation is one of the oldest known surgical procedures performed for a variety of indications. Little surgical technical improvements have been made since the first procedure but peri-and post-operative refinements have occurred over time.

Postamputation pain (PAP) of the stump is a common complication but is an extremely challenging condition to treat. Imaging allows early diagnosis of the underlying cause such that timely intervention is possible to minimize physical disability with its possible psychological and socioeconomic implications. A multidisciplinary approach should be taken involving rehabilitation medicine team, surgeon, prosthetist, occupational therapist and social workers.

Conventional radiographs demonstrate osseous origin of PAP while high resolution ultrasound is preferred to assess soft tissue abnormalities. These are often the first line investigations. Magnetic Resonance (MRI) imaging remains as a problem solving tool when clinical and imaging findings are equivocal.

In this presentation, we aim to raise clear understanding of common pathologies expected in the assessment of PAP. A selection of multi-modality images from our specialist mobility and rehabilitation unit will be presented such that radiologists are aware of and recognise spectrum of pathological conditions involving the amputation stump. These include but not limited to aggresive bone spurs, heterotopic ossification, soft tissue inflammation (stump bursitis), collection, neuromas, osteomyelitis etc. The role of radiologists in reaching the diagnosis early is vital so that appropriate treatment can be instituted to limit long term disability.

P-080 Ultrasound-guided platelet-rich plasma injections for the treatment of musculoskeletal soft tissue injuries

Geoffrey Chow; Desmond Owusu; Qaiser Malik; Sami Khan
Basildon Hospital

Aims: Platelet-rich plasma (PRP) is a fragment of whole blood that contains a much higher concentration of platelets compared to whole blood itself. Its predicted benefit is enhanced healing of soft tissues through the delivery of multiple growth factors and the formation of a fibirin or platelet clot. Our aim was to assess the use of ultrasound-guided platelet-rich plasma (PRP) injections for the treatment of musculoskeletal soft tissue injuries.

Methods: Retrospective review of 18 patients who received ultrasound-guided PRP injections for injuries including patella and achilles tendonitis. Diagnosis was confirmed using ultrasound or MRI. Patients were evaluated using the

Victorian Institute of Sport Assessment score, a pre-operative assessment score; patient's subjective impression of their pain severity expressed on a visual analogue scale and their functional state.

Results: Mean age was 38 with an average duration of symptoms of 22 months. All patients had previously failed conservative therapy including physiotherapy or steroid injections. At 1 month and 3 months, 72% and 61% of patients reported improvement in symptoms, respectively. There was sustained improvement throughout the follow up period for 5 patients, with 3 patients discharged from orthopaedics due to resolution of symptoms. There were no documented complications. Three patients reported worsening symptoms and 5 patients went on to receive other treatment methods, such as surgery.

Conclusion: At short term follow-up PRP can be shown to be a successful treatment for soft tissue injuries, without immediate complications. Further work is required to consolidate its role within this field.

P-081 Service evaluation of image guided glenohumeral hydro distension

Sukh Jutla; Simon Hilliard; Scott Mcdonald
Addenbrookes Hospital

Aim: To evaluate process and initial outcome of consecutive image guided hydro distension procedures.

Methods: All patients undergoing image guided hydro distension between November 2014 and December 2015 were retrospectively identified using the integrated patient record (Epic, software manufacturer). Patient characteristics, pre procedural range of movement, technical procedural details and initial clinical outcome were retrospectively evaluated from the integrated patient record.

Results: 81 patients underwent 82 procedures/ 81 patients (29 male 52 female, median age 52, range 19-76) underwent image guided hydro distension (27 US/ 54 fluoroscopic) between Nov2014 - Nov 2015. Intra- articulate Steroid was administered on 81 occasions. Average volume of injection was 26 mls (range: 10-42) and intra-procedural capsular rupture occurred in 29. Immediate post procedure physiotherapy was performed within 24 hours in 62. Initial clinical outcomes (6/52) demonstrated improved range of 10 degrees or greater of external rotation in 53 with no complications. Early discharge was possible in 41. Post-procedural pain scores were incompletely and inconsistently obtained.

Conclusion: Image guided hydro distension improves range of movement in the majority of patients, with improvement of 10 degrees or greater in 65%, and permits early discharge in 50%, without complication in this series. Pre and post- procedural pain scores are inconsistently documented, which forms a useful point for service improvement.

P-082 Eponymous injuries in musculoskeletal radiology

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Learning objectives: To provide a pictorial review of commonly encountered eponymous extremity musculoskeletal injuries in radiology.

Description: Many injuries are known by their eponymous names, however little is known about the initial person who described them injuries. We present examples of a variety of upper and lower limb extremity injuries as well as a brief description about the

Conclusions: Imaging plays a fundamental role in the diagnosis and treatment follow up of orthopaedic injuries. We hope this pictorial review will be of learning value for both radiologists and orthopaedic surgeons.

P-083 Audit for SUFE imaging - is one view enough?

Neena Kalsy; Caren Landes
Alderhey Children NHS Foundation Trust

Aims/objectives: Determine our centres accordance to guidelines for including anterior posterior (AP) and frog lateral views for query SUFE. Determine if only a frog lateral view is enough to diagnose pathology?

Content: The frog lateral leg view is used to identify the presence of a posteromedial slip. Our centre protocol advises patients undergo AP and frog lateral leg radiographs to determine pathology. We want to evaluate our centres accordance to guidelines and determine if one view is enough to diagnose pathology.

Relevance/impact: Determine our hospital rate of accordance to guidelines.
Conducting one view can reduce radiation and radiographer time.

Outcome: Radiographs from January 2013 to October 2015 were reviewed, with 77.5% accordance to the guideline. 11 positive SUFE were identified with the diagnosis only seen on frog lateral view in 2 cases, despite there being an AP film. However, due to the low numbers of data we are unable to determine statistically if one view is enough for SUFE diagnosis.

Discussion: To improve accordance to guidelines:
Radiographer education – in house and presentation
Change guidelines to include radiographer autonomy i.e. when the physis is fused further views are not conducted.
Re audit: Further data collection to determine if one view is enough for diagnosis.

P-084 Assessment of the appropriateness of lumbar spine radiograph referrals for non-specific lower back pain

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Aims/objectives: To evaluate the appropriateness of lumbar spine radiography referrals for lower back pain, compared to NICE and the Royal College of Radiologists 'iRefer' guidelines, which states that lumbar spine x-ray provides no additional role in non-specific back pain, except when presentation suggests osteoporotic collapse.

Content: A retrospective study of trust wide lumbar spine radiographs was conducted. The request card was analysed and placed into either: Group 1- appropriate referral; Group 2- inappropriate referral (red flag signs or acute pain), or Group 3- insufficient clinical detail. The reports were analysed to determine if the resulting images were normal or abnormal, and if abnormal, were they in keeping with the request. The referral source was also noted.

Results: 200 patients were analysed, only 29% of referrals met current guidelines. Of the inappropriate referrals 62% had normal radiographs and only 6% of the abnormal scans demonstrated osteoporotic collapse or fracture. 82% of referrals were from General Practice.

Discussion: The results demonstrate a large proportion of referrals are inappropriate. Providing relevant clinical information, requesting in accordance with guidelines and strict vetting procedures together will reduce inappropriate referrals leading to less unnecessary radiation doses and more prompt management for patients in accordance with current guidelines; as well as a considerable reduction of cost and workload in the radiology department.

Outcome: A summary of guidelines and vetting protocols were distributed to all referral sources and radiology staff. Additional vetting training for radiographers will be provided and re-audited in 2016.

P-085 Lumbar spine X-rays: Is the posterior-anterior projection better than anterior-posterior?

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Purpose: There is significant evidence that changing the lumbar spine projection from Anteroposterior (AP) to Posteroanterior (PA) may reduce the patient dose, with little compromise in image quality (Heriard, et al., 1993, Mekiš, et al., 2010). However there is a paucity of research focusing on improving image quality and this research is film-screen based. (Heriard, et al., 1993). Therefore although techniques of reducing dose are still appropriate, there may be different requirements for digital systems which remain unexplored (Uffmann & Schaefer-Prokop, 2009).

Method: A phantom was used to produce set AP and PA radiographs of the lumbar spine. Magnification was controlled by changing the source to image distance, exposure was controlled using AEC and pre-designated kVp values, and entrance surface dose (ESD) was measured alongside exposure index values. The images were anonymised and scored for image quality by qualified radiographers using a scaler based on EC guidelines.

Results: Analysis of data has highlighted that PA projections may demonstrate the sacro-iliac joints better than AP. This was also the case for the reproduction of intervertebral joints, with the exception that AP projections at an SID of 180cms appear to be comparable. Results demonstrated no significant difference in ESD between AP and PA projections.

Conclusion: Further investigation is needed to determine the clinical significance of any perceived differences in quality of radiographs, however visual analysis looks promising alongside the already documented dose advantages of PA lumbar spine projections.

P-086 The trouble with trolleys: A modified shoulder view on trauma patients

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Patients attending the Accident and Emergency (A&E) Department with trauma to the shoulder are often placed on a trolley as it is easier for the clinical team to assess them. However, obtaining the correct radiographic positioning, with minimal discomfort for the patient, is particularly challenging for the radiographer.

The St Helens and Knowsley Teaching Hospitals (STHK) protocol for shoulder imaging in trauma is an AP view, followed by an axial view. When pain restricts sufficient movement to obtain an axial the alternative is a modified axial ('Wallace' or 'Velpeau') view. This is important to assess the relationship between the humeral head and glenoid (Rockwood and Green's, 2015).

This modified axial is obtained by leaning the patient backward 30 degrees over the cassette on the table (UW Medicine, 2015). The x-ray tube is placed above the shoulder and the beam projected vertically down through the shoulder onto the cassette centring over the head of the humerus (UW Medicine, 2015).

A&E trolleys have been specifically designed with a tray beneath the patient mattress, to assist radiographers in obtaining high quality diagnostic images. For a modified axial view, this tray can be used as a 'table' and the patient positioning can be achieved by lowering the backrest of the trolley to the required 30 degrees. This minimises patient discomfort and produces a high quality image.

References

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· University of Washington, Orthopaedics and Sport Medicine, 2015.

P-087 Does dose matter? A retrospective comparison of clinical outcome of ultrasound guided subacromial bursa steroid injections in relation to the dose given

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Background: Ultrasound guided steroid injections into the subacromial bursa are currently used to provide relief for patient's symptoms from inflammation. There is limited evidence proving or refuting its efficacy. This is partly due to the wide-ranging techniques used as well as variations in doses of corticosteroids used.

Aim: To determine whether high dose injections provides more effective relief in comparison to a lower dose.

Methods: A retrospective study. Participants (n=13) where identified as having received either 80 mg triamcinolone (n=6) or 40 mg triamcinolone (n=7). Participants were contacted after treatment and assessed via questionnaires on symptom relief.

Results: Average age of group=72 years. None of the participants experienced worsening of their symptoms post-treatment. Only 46% found an improvement in the symptoms they experienced (pain and impact on daily activities); the remainder experienced no change. Analysis showed that 67% of patients receiving 80mg experience an improvement in symptoms, compared to only 29% of those who had received 40mg. However, this was not found to be statistically significant.

Conclusion: With the majority of participants finding no improvement in symptoms (regardless of dose), this study refutes the efficacy of steroid injections. Closer analysis of the data suggested that more of those who had received a higher dose experienced an improvement of symptoms. However, due to the small sample size and confounding

factors (a subjective and retrospective study), this is statistically insignificant. However, this highlights the need to further investigate the relationship between dosing and symptom relief through a larger prospective study.

Head, neck and neuroradiology

P-088 HONK chorea: 5 cases and 1 mimic

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Non-ketotic hyperglycaemic hemichorea-hemiballismus is an uncommon neurological presentation of type 2 diabetes. Examples of 5 different cases and 1 mimic are presented.

Non-ketotic hyperglycaemia is characterised by severe hyperglycaemia without significant hyperketonaemia or acidosis. It is one of the presentations of type 2 diabetes, and usually affects elderly patients. Hyperglycaemic non-ketotic coma (also sometimes abbreviated to HONK) may lead to death if untreated.Hemichorea-hemiballismus (HC-HB) may occur as an unusual complication of non-ketotic hyperglycaemia. The typical appearance on CT is of unilateral caudate and/or lentiform nucleus hyperattenuation, and on MRI there is unilateral T1 shortening. There is no surrounding oedema or mass effect.

The prevalence of diabetes and neuroimaging within practice suggests that Hemichorea-hemiballismus could well be encountered in a general radiology setting and our examples demonstrate that.

Our cases of Hemichorea-hemiballismus confirm previous studies in demonstrating that lentiform and caudate nucleus hyperdensity may or may not occur. Furthermore the lesion on imaging is consistently in the opposite hemisphere to the affected limbs.

The most common cause of hemichorea-hemiballismus is a vascular insult in the region of the striatum and subthalamic nucleus.Other causes include tumours, neurodegenerative disorders, encephalitis, drugs, systemic lupus erythematosus and hyperthyroidism.Acute treatment of non-ketotic hyperglycaemia is with fluid replacement and insulin with potassium. The movement disorder can be treated with sulpiride, haloperidol and tetrabenazine. Most patients recover fully within 6 months

P-089 Integrating whole brain volume measurement with PACS

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Background: Measurement of the effectiveness of pharmaceutical treatments for Multiple Sclerosis (MS) now involves measuring whole brain atrophy. These subtle changes in volume cannot be detected by visually reviewing 2D MRI datasets

Objectives: Safe and seamless integration of novel CorTechs NeuroQuant MR analysis software with Agfa IMPAX PACS.

Content: Description of the technical prerequisites and integration requirements with reference to the associated clinical safety, information governance issues and clinical benefits.

Relevance/impact: This work is relevant to neuroradiologists, clinicians, commissioners and pharmaceutical companies as it allows us to objectively determine the effectiveness of expensive MS treatments. It guides PACS teams in the safe integration with external analysis software.

Outcomes: We configured bidirectional DICOM integration of a dedicated NeuroQuant terminal (64bit OS, dual core, 4GB RAM, 500GB HDD, 100Mbps) with our clinical Agfa PACS. Clinicians transmit volumetric T1 weighted MR series to NeuroQuant from within their PACS Viewer. To improve information governance NeuroQuant was installed within the hospital IT network and the results archived only in PACS avoiding the need for anonymisation and reidentifcation. We have achieved seamless, automated, objective analysis of brain volume in a clinically safe PACS environment.

Discussion: In collaboration with CorTechs Labs, neuroradiologists and MS clinicians and supported by Novartis, the NeuroQuant pilot looks promising as a tool for measuring whole brain volume measurement in MS patients. In the future we hope to bring this into clinical use within our Trust and make it available to wider NHS Trusts.

P-090 Gadolinium-based contrast causing t1-hypersignals in human brain: A systematic review

Zi-Yi Tew; Kirsty McNeil; Kirsty Butt; Deirdre Cassidy; Conor Macdonald; Laura Young; Shona Matthews; Graeme Houston

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Introduction/objectives: Linear and macrocyclic gadolinium-based contrast agents(GBCAs) are commonly used in MRI to investigate and assess tumours, inflammatory conditions and infectious processes. Recent studies reported an association between cumulative number of some GBCA's and signal hyperintensity in specific brain regions. This systematic review aims to collate and evaluate data from current research relating to T1-hypersignals in the brain and repeated GBCA exposure.

Methods/materials: Electronic databases(Pubmed, MEDLINE and Scopus) were searched for studies investigating the relationship between GBCA exposure with gadolinium accumulation and/or hypersignals in the brain using predefined inclusion/exclusion criteria. Eligible randomised control trials(RCTs), prospective and retrospective cohort studies were identified, and data was extracted by three reviewers. Risk of bias for each study will be independently assessed by two reviewers and discrepancies discussed.

Results: Initial search identified 424 abstracts for review, from which 6 articles met the inclusion criteria for full text review. T1-hypersignals were found to be present in both dentate nucleus and globus pallidus. Data to date showed significant relationship between T1-hypersignals with linear GBCA compared to macrocyclic GBCA and significant dose-dependent relationship between T1-hypersignals and GBCA administration.

Outcomes: Observations to date indicate that the number of GBCA administrations is associated with T1-hypersignal intensities found in the brain, in patients with normal renal function. This has been shown to be predominantly associated with linear GBCA, however the clinical significance of this observation is unclear. Further studies, including autopsy analysis and preclinical interrogation, are needed to add to our current understandings of this topic.

P-091 Identifying syrengomyelia: A case report

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Syringomyelia can present as a form of neurological pathology as the result of the compression of the spinal cord. It is known from the literature that cases of syringomyelia are under-reported, especially in the elderly group of patients with decreased mobility. This case report showed the diagnostic process of detecting syringomyelia and the role of imaging in establishing the diagnosis. The patient was a 81–year-old male with the history of unsteadiness, frequent falls and widened base gait for the duration of two years. He was diagnosed with the thoracic syrinx following the admission after the fall with the prolonged lying, which resulted in the right upper-limb weakness. This patient also had the evidence of adhesive arachnoiditis on his previous computed tomography images of the head. There is the evidence in the literature that the chronic adhesive arachnoiditis is a rare condition, often complicated by syringomyelia. Therefore, it can be used as an indicator for the screening of syrinx. The syringomyelia is a treatable condition and the role of early diagnosis is important in order to stop the progression of the disease. This paper highlights the important role of diagnostic imaging as well as detailed history taking for establishing the diagnosis of syringomyelia at the early stage.

P-092 Case study: Acute spinal cord ischaemia syndrome (ASCIS)

Lorraine James; Darren Hudson

InHealth Group

ASCIS is a rare condition affecting the spinal cord which results in severe neurological symptoms within 12-72 hours, and overall prognosis for recovery is poor.

Presentation: 70 year old female developed neurological symptoms with associated loss of sensation in her left leg following total right knee replacement performed under epidural anaesthesia. An urgent MRI scan of her lumbar spine was requested to rule out possible causes for her symptoms, such as compression resulting from a haematoma.

Findings: MRI Scanning showed diffuse signal changes with her terminal cord, which with the addition of sagittal imaging of the cervical & thoracic spine, showed this to continue up as far as the level of T6. There was no associated cord compression or evidence of any haemorrhage or subdural collections. These appearances are characteristic of ASCIS which has been reported as a rare adverse side effect resulting from epidural anaesthesia.

Outcome: The patient showed mild improvement over the following 2 weeks and a brain scan was requested to ensure there were no other abnormalities related to her condition. This showed small vessel ischaemic changes in the white matter of both hemispheres, suggesting a history of pre-existing ischaemia which was not known about prior to surgery. An echocardiogram of her heart was also carried out following this which showed no evidence of cardiovascular disease, which can also be associated with ASCIS.

Patient continues to improve slowly and is now walking with the aid of a frame.

P-093 A simple solution to reduce artefacts on post-surgical MRI scans

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University Hospitals of North Midlands NHS Trust

Magnetic Resonance Imaging (MRI) is an invaluable tool for assessing many different neurological conditions. One of the problems with MRI is that the presence of metal can cause artefacts on the images, which degrade the image quality and reduce diagnostic power. Following surgery it is common for patients to have metal retained in their body which can cause problems for follow up imaging.

One such example is the use of surgical staples following tumour resection. It was noted that the staples currently used by our Trust resulted in a significant artefact on the follow up MRI images.

We investigated three different brands of staples to determine whether the extent of artefact could be reduced by changing the supplier. Images were acquired on a 1.5T scanner using three different brands of stainless steel staples attached to a uniform cylindrical phantom. For the staples currently used at our Trust a large susceptibility artefact was seen in the vicinity of the staples, whereas for the two alternative staples the artefact was minimal.

This information was shared with the neurosurgeon and neuroradiologist to enable them to make an informed choice on which staple would be the most appropriate to use for future patients. This investigation highlights the importance of ensuring good communication between the surgical team and MRI department.

P-094 First seizures: Does computed tomography provide the answer?

Christian Burd; Declan Johnson
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Background: The lifetime risk of a seizure is 8-10%. CT scans for first seizures have been shown to be significantly abnormal in 10%. Common abnormalities include cerebrovascular insults (26%) and tumours (12%). Where CT is negative MRI has been shown to reveal lesions in up to 22%.

Aims: To ascertain the number and types of causative abnormalities detected on CT for first seizures.
To assess the diagnostic yield of CT for first seizures.
To assess the benefit of additional MRI for first seizures.

Method: A retrospective search using the "Soliton" reporting software was undertaken. The inclusion criteria were a CT head performed for an unprovoked first seizure presenting to accident and emergency between 01/05/14 and 31/07/14.
Exclusion criteria were previous seizures, central nervous system disease, cancer, neurosurgery, alcohol excess, trauma and pregnancy.
The reports were reviewed and checked for a subsequent MRI.

Results: 68 patients fulfilling the criteria were identified. CT identified a lesion in 12 (17.6%). 3 unknown primary tumours were identified. The remaining cases comprised vascular abnormalities including a cavernoma, cerebral venous thrombosis and sub-arachnoid haemorrhage. 12 negative CT scans proceeded to MRI which identified 1 new lesion.

Discussion: Our study demonstrates CT in the emergency setting had a high yield in this selected group. Where the initial CT was negative, subsequent MRI provided limited additional information.

We recommend that CT is considered in all unprovoked first seizure admissions to the emergency department. Where CT is negative, subsequent MRI does not merit routine use.

P-095 The utility of MRI for stroke in inpatients

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Purpose: To investigate the commonly held perception in our radiology department that "everyone gets an MRI for stroke, the diagnosis is obviously clinically and the scan does not affect management."

Methods: The radiology reports and images were retrospectively reviewed for inpatients >70 years who had undergone MRI for possible TIA or stroke (infarct), over a 6 month period. Patients were categorized into four groups depending on how suggestive the clinical presentation was of stroke/TIA: 'typical' (unilateral weakness), 'maybe' (dysphasia/dysarthria/sensory/inattention/ataxia), 'other' (collapse/absence/fainting/confusion) and 'TIA' (resolved unilateral weakness). The MRI scans were evaluated for presence/absence of infarct and the infarct pattern. The number of CT scans performed for the same population/indication over the same period, was also recorded.

Findings: There were 80 patients in our study. The ratio of CT to MRI scans performed was 8:1. Number of infarcts seen on MRI per clinical group: typical 22/22, maybe 10/23, other 3/24, TIA 1/11. Of the infarcts: 10 anterior territory (9 cortical/subcortical and 11 deep white matter), 8 posterior territory and 8 mixed territory (either both anterior/posterior or bilateral).

Conclusion: 1) Only a small proportion underwent MRI relative to CT.2) For those with typical symptoms, MRI was not contributory to the diagnosis (100% positive for stroke).3) For those with non-typical symptoms, MRI was helpful in determining diagnosis (28% positive for stroke).4) A significant number of patients (22%) had mixed territory pattern infarcts. In these patients MRI may have a role in prompt investigations to search for an embolic source.

P-096 CT Head in the setting of acute stroke. How are we performing?

Hind Saffar[1]; Alexandra Kraus[2]

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Aim: To assess the local compliance of our radiology department with the NICE guidelines; diagnosis and initial management of acute stroke published in July 2008.

Standards:

1) CT brain should be performed and reported in next scanning slot or at latest within 1 hour in the assessment of acute stroke according to the indications stated by the NICE guidline.
2) For all others CT brain should be performed within 24 hours of onset of symptoms.
Target: 100% compliance with NICE guidelines.

Methodology: Data collected retrospectively using the synaps system.
We collected the data of all the CT Brain performed to excluded stroke between 01.05.14 till 31.05.14.
Total of 223 CT Brain performed between 01.05.14 till 31.05.14.
69 CT brain was performed to exclude stroke.

Result: Out of 69, there were 17 CT Brain needed to be performed and reported within 1 hour. The main indications were, thrombolysis, on anti coagulation and low GCS.
52 out of 69 CT Brain needed to be performed and reported within 24 hour. Main indications were focal neurological symptoms.

Conclusion: We are doing well in terms of doing the scans and reporting them within the time frame. We suggest to indicate on the report that a verbal report was given to the referring clinician prior to generating the report on Radis PACS.

P-097 **10 reasons to look again - important review areas in the interpretation of unenhanced emergency CT head**

Christopher Davies; Raghavendra Kamanahalli; Robin Proctor; Sameer Shamshuddin
Royal Lancaster Infirmary

Aims / Objectives: Unenhanced cranial CT is a robust tool for the diagnosis and triage of various traumatic and non-traumatic neurological emergencies. Although it is an efficient modality to rapidly diagnose serious intracranial pathologies such as infarct and haemorrhage, clinically significant findings can sometimes be subtle and thus overlooked. Often, a lesion can be identified to be present on the original unenhanced CT in retrospect following confirmation on subsequent contrast enhanced CT or MRI. However, a careful pattern based search can reduce perceptual and cognitive errors.

In this pictorial review we present a variety of commonly overlooked and subtle findings on unenhanced CT in a pattern based approach with reference to the clinical presentation and important anatomic review areas. The cases are selected from the anonymised database of 'Learning from Discrepancy Meetings' and the departmental Museum of teaching cases. The main purpose of this review is to educate the readers, particularly trainees and non-specialist Radiologists to develop a logical checklist and avoid potential pitfalls when interpreting emergency CT Heads.

Conclusion: We hope this pictorial review will enhance readers' knowledge and reinforce the significance of a systematic and pattern based approach in reducing diagnostic errors.

P-098 **IAM reporting for the general radiologist- what not to miss!**

Harriet Barber; Philip Cook; Nick Hollings; Benjamin Rock; Simon Thorogood
Royal Cornwall Hospitals NHS Trust

Aims/objectives: To increase knowledge and awareness of the importance of these studies by:

Recapping the anatomy of the IAM (internal auditory meatus), CPA (cerebellopontine angle) and inner ear. Demonstrating the common pathologies and highlight some of the more unusual findings on an MRI IAM study

Key review areas when reporting an MRI IAM study

Content: MRI of the IAM is a commonly requested study by ENT clinicians to investigate sensorineural hearing loss (SNHL), tinnitus and vertigo, and to exclude cerebellopontine angle (CPA) pathology.
It is often reported by general radiologists and is sometimes perceived as a simple and quick study to report. There is however more to review in this area than just the cranial nerves and this poster highlights some of the key areas that require analysis by all radiologists.
The poster will recap the anatomy of the IAM, CPA, and inner ear, demonstrate the common pathologies and some of the more unusual findings on a MRI IAM study as well as key review areas to bear in mind when reporting.

Relevance/impact: With the exception of specialist centres, many radiologists working in District General Hospitals are likely to report MRI IAMs. This poster gives a simple review guide to help improve and streamline the process of IAM reporting.

Outcomes: Greater knowledge and understanding of the relevance and importance of competent, thorough reporting of MRI IAMs.

P-099 **Hiding in plain sight - differentials of the pineal region masses**

Bhavana Lakshmana Das; Menno van Wattingen; John Morlese
UHL NHS Trust

Pineal region comprises of the pineal gland, posterior recess of the third ventricle, thalamus, quadrigeminal plate (tectum) and the splenium of the corpus callosum. Any lesion in this region can present as a pineal region mass.

Pineal gland is an unpaired gland deriving its name from its pinecone-like shape. It is found in the midline with similar intensity to the grey matter, ranging 10-14mm in size. It comprises of pineocytes(95%), astrocytes(5%) and fibrovascular stroma, histologically. Since the gland lacks blood brain barrier, it enhances following contrast. On CT, calcification is common and increases with age.

Pineal region masses are classified in to those arising from the pineal parenchyma, germ cell neoplasms, metastasis and lesions arising from the adjacent structures(astrocytoma, meningioma).Pineal region masses combined comprises 1-3% of all the intracranial masses, occuring more frequently in children, accounting for 3-8% of the intracranial neoplasms in the pediatric population.

Pineocytoma, pineal cysts and the germinomas are most commonly encountered lesions, less commonly pineoblastoma and teratoma. other types include astrocytomas, choriocarcinoma and endodermal sinus tumour. CSF dissemination is a common finding necessitating imaging of the entire craniospinal axis.

Conclusion: Masses in the pineal region have a relatively broad differential, because this region is complex anatomically with a variety of cell types. When the lesion is large, it can make the site of origin obscure and therefore diagnosis difficult. we provide the imaging features which combined with the knowledge of CSF and serum cytology will help narrow the differential diagnosis.

P-100 The use of adjunctive devices in the treatment of acutely ruptured intracranial aneurysms: A review of our experience over 5 years

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Background/purpose: Device-assisted (balloon or stent-assisted) coiling has extended the scope of treatment of intracranial aneurysms. The risks of permanent procedure-related complications are not fully established in the acute setting. We present our experience with these devices when coiling acutely ruptured aneurysms, reviewing the nature and incidence of procedure-related neurological complications.

Methods: The records of 410 patients presenting with ruptured aneursyms from the period 10/2011 to 09/2015 were retrospectively analysed from the local neurointerventional patient database. Of these, the clinical, radiographic and angiographic records of patients treated with device assistance (balloon and/or stent assistance) were reviewed.

Results: 103 patients in this period underwent device assistance during their coiling procedure. Of these, 45 (43.6%) were treated with stent assistance, 50 (48.5%) balloon assistance, 7 (6.8%) both stent and balloon and 2 (1.9%) aneurysms recevied a double catheter technique.
Procedure-related complications occurred in 8.8% (4 of 45) of the procedures with stents versus 4% (2 of 50) in the procedures with balloon, and 14.2% (1 of 7) with both balloon and stent use. These included haemorrhagic and thromboemblic complications. One patient procedure-related death was encountered in a patient who underwent balloon-assisted coiling.

Conclusion: Overall the complication rate related to use of adjunctive devices is comparable to the literature, with the risk slightly higher with stenting versus coiling, although the significance of this may be affected by the overall small numbers having complications. Complications also appear more frequently than when coil embolisation alone is performed. Therefore judicious use of these devices is recommended.

P-101 Renal cell cancer metastases to the thyroid gland: A case report demonstrating a new thyroid ultrasound sign

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Renal cell carcinoma (RCC) is an unpredictable tumour that can metastasise to uncommon sites and is considered one of the more common neoplasms to metastasise to the thyroid gland, with a number of cases described in the literature. Metastatic thyroid tumors may represent the first manifestation of RCC or manifest as synchronous or metachronous metastasis of a known RCC.

We present a case of isolated metastatic RCC to a multinodular thyroid gland that demonstrates a unique thyroid ultrasound (US) appearance which we have termed the 'nodule within a nodule' sign. This ultrasonographic finding characterising renal cell metastases in a multinodular thyroid gland has not previously been described and correlates with histopathological findings.

P-102 No cancer patient should be alone: Supporting thyroid cancer patients

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Background: The use of radioactive iodine after total thyroidectomy includes radiation hazards to patients' contacts and general population. Although there are no reported hazards, 1 safety considerations should be met to follow the principle of radiation exposure of As Low As Reasonably Achievable (ALARA).

A study measuring radiation exposure to families of patients receiving radioactive iodine reported less exposure among contacts that received pre-treatment instructions.2
Patients reported that some health care providers relayed contradicting messages, did not address concerns, and neglected side effects.3,4
Emphasis on not bearing children 1,5 and consuming low iodine diets are adressed.6
We aim to share our experience in pre-treatment counseling.

Methods: Written and verbal counseling were provided with a family member that lives with the patient. Patients' data, occupation, and accommodation were obtained. They were advised about pregnancy and breastfeeding, dietary restrictions, hospital visits, handling wastes, and contact after discharge. They were given leaflets, and a radioactive substances instruction card covering the same issues. They were notified that radiation doses during their stay will be recorded by a radiation safety officer.

Results: 76 patients were candidates for counseling. Three were rejected as they were unable to receive treatment. Of the remaining 73, 16 (22%) received extra counseling: 10 had children below 2 years, 4 were working in medical fields, one was a nursery teacher and the last one lived in one room with the entire family.

Conclusion: Counseling sessions uncovered patients' special situations and directed them to take precautions. They served for radiation safety and optimising care.

P-103 Investigating the utility of stimulated diffusion weighted MRI for reducing radiotherapy induced xerostomia

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Aims: Xerostomia is a major side effect of head and neck radiotherapy treatment, due to radiation damage to the parotid glands. Gland sparing is possible with intensity modulated radiotherapy but which gland? Choosing the better functioning gland using data from stimulated Diffusion Weighted-Magnetic Resonance Imaging (DW-MRI) could reduce xerostomia. We have developed a lemon juice stimulated DW-MRI protocol using the radiotherapy planning set-up. This study aims to investigate the feasibility and utility of stimulated DW-MRI for radiotherapy planning.

Methods: 20 recruited head and neck patients will undergo stimulated DW-MRI during their radiotherapy planning MRI (1.5 T Magnetom Espree, Siemens). The Apparent Diffusion Coefficient (ADC) of each parotid gland before and after stimulation will be measured and the mean resting ADC (ADCrest) and stimulated change in ADC (ΔADCstim) determined. Each patient will undergo stimulated DW-MRI 6 weeks after radiotherapy. A xerostomia questionnaire will be completed at each session. The mean dose to each parotid gland will be determined from the treatment plan.

Results: 15 patients have been recruited so far. The protocol appears feasible, with < 15 minutes added to the scanning session and no compliance issues. The correlation between ADCrest and ΔADCstim and xerostomia score will be assessed. The correlation between the change in and pre- and post-radiotherapy and the mean dose to the parotid gland will be investigated.

Conclusion: Choosing to spare the better functioning gland will potentially reduce xerostomia. Stimulated DW-MRI has the potential to provide a quick and non-invasive method of determining the better functioning gland.

P-104 Pictorial review of craniosynostosis

Georgia Priona[1]; Jessica Watts[2]; Bilal Sethi[1]; Alim Yucel-Finn[1]; Shona Olson[1]
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Cranioniosynostosis refers to premature sutural closure and fusion, resulting in abnormal head shape. We are presenting different examples from the more mild to the most severe forms.

Craniosynostosis can be divided into non-syndromic (85%) and syndromic. Non-syndromic is isolated and classified according to involved suture(s). This includes simple (single, 75-80%) or multiple sutures (20-25%). Consequences are an abnormal head shape however (usually) normal intelligence. It is normally sporadic. The other syndromic type involves multiple anomalies with frequent developmental delay. It is associated with craniofacial, skeletal, nervous system and other anomalies.

In this pictorial review we present different cases of plagiocephaly, scaphocephaly, brachycephaly with Harlequin eyes and sequale of copper beaten skull to the most severe forms such as, turricephaly and Pfiefer Syndrome.

Patients with more pronounced anomalies often present at time of birth. Craniosynostoses itself is an entity that causes concern to parents in early life. The main concern in most cases is the aesthetic appearance, although the most severe forms can be associated with extreme anomalies and developmental delay depending on the genetic background. Early and accurate diagnosis of such anomalies can be important in the management of such patients. Treatment includes cranioplasty.

Traditionally the diagnosis was made by plain radiography but in our institution the use of low dose 3D CT has become a more appropriate tool to establish definitive diagnosis. We reserve MRI for the syndromic cases and ultrasound is used in the pre and post natal period

P-105 Referring criteria for paranasal CBCT scans, imaging protocols and findings

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Cavendish Imaging Ltd

Introduction: Cone Beam Computed Tomography (CBCT) is increasingly being used for ENT diagnostics and surgery planning. This study aims to demonstrate the appropriateness of CBCT to image the paranasal sinuses by retrospectively analysing the referring criteria, imaging protocols and radiological findings.

Methods: Thirty-five paranasal scans were analysed. The Accuitomo F170 (JMorita) CBCT scanner was used. The scanning parameters were 90kV, 5mA, 14x10cm and 17x10cm (diameter x height) cylindrical FOVs. The volumes were reconstructed using 0.250mm voxels and reported using Osirix.

Results: Referring criteria questioned rhinosinusitis, sinus pain and headaches, rhinolaryngoscopy findings, polyp presence and surgical planning. The CBCT scans have provided the radiologist with satisfactory imaging to provide the diagnostic answers to the clinician in all but two cases where further soft tissue imaging was recommended to exclude complications (potential sarcoidosis, fungal colonisation). Opacification within the maxillary antra, reactive sclerosis of the sphenoid sinus walls, polypoidal disease pathologies, inflammations, osteomas and cysts were identified. Non-united fractures, septum deviations, small bony spurs and cartilaginous aspects, ethmoid bulla, Agger nasi cells and accessory ostia to antra walls were also reported. The pathway of virtual rhinolaryngoscopy using Osirix was clear.

Conclusion: The diagnostic questions that were presented in this study could have been addressed with either conventional CT or CBCT imaging. The scanning parameters chosen were adequate for paranasal sinuses reporting with the already established benefit of lower radiation doses to the patient. This work provides additional guidance for best clinical practice to lower the radiation doses delivered to patients.

P-106 Could a pictorial breast screening invitation help to increase uptake to breast screening in a multi ethnic population?

Karen Wren
University Hospitals Coventry and Warwickshire

Study aim: To investigate the viability of a pictorial breast screening invitation producing a higher uptake for breast screening amongst a multi ethnic population when used in conjunction with the national standard invitation. The effectiveness will be judged by the effect it had on previous non-attenders (PNAs).

Design: A non-probability sampling technique with a purposefully selected homogenous population from three preselected GP practices serving multi-ethnic populations.

Need for study: The effectiveness of any screening programme is dependent on high acceptance. Low rates of coverage by certain populations would lead to health inequalities. Studies have established that screening coverage is not uniform across the population and that women from Black Minority Ethnic (BME) communities have lower uptakes to breast screening. Language has been cited as predominate barrier.

Services with populations of diverse culture, may find that translating invitations does not solve the problem. Converted transcripts are often of poor quality, inappropriate for people who cannot read their mother tongue or whereby there is no written form.

Whilst it is acknowledged that language problems may be a diminishing barrier amongst British born BMEs, it may still exist amongst older generations – the targeted population for breast screening.

There have been many worldwide interventions attempting to increase breast screening attendance amongst BMEs but a dearth in current UK studies which given the growing ethnic diversity is a concern.

Please note: This study is ongoing and forms part of the author's master's dissertation. Results will be available March 2016.

P-107 Creating 3D models of breast masses from digital breast tomosynthesis images

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We derive 3D models of breast masses from Digital Breast Tomosynthesis (DBT) images using pixel intensity, location and image texture, with the objective of facilitating 3D mass assessment for disease staging, treatment monitoring and interventional planning.

Anisotropic resolution and out-of-focus artefacts are inherent to DBT. We have thus developed a method which combines segmentation based on pixel intensity and location with the analysis of three texture measures indicative of in-focus structure. We build separate Gaussian mixture models based on intensity, edge strength (Gaussian energy), grey level variance and histogram range. The sum of modelled probabilities, weighted with the pixel locations, constitutes the final breast mass model.

Twenty-eight breast masses were annotated twice by a consultant breast radiologist in an in-focus slice; intra-observer variability was assessed by measuring the overlap between annotations of the same mass (min: 16%, median: 74%, max: 85%). Two masses for which the overlap between annotations was <50% were excluded. Probability-weighted ground truth was constructed from the annotations of the remaining 26 cases. Comparing the model with the ground truth , the median agreement is 60% (min: 21%, max: 76%).

Magnetic Resonance Imaging is often used to evaluate breast masses in 3D; although DBT is less costly and would be a more convenient solution, the complex 3D image properties necessitate advanced image analysis to extract lesion boundaries.

P-108 Iodine-125 breast localisation: Establishing a new service

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Newcastle Hospitals NHS Trust

Aims: To establish a service for localising small impalpable breast tumours by inserting a single Iodine-125 seed under ultrasound guidance and to ensure the safety of the procedure for patients and staff. This is the first UK centre to evaluate and implement this service.

Content: An application was made to ARSAC to allow insertion of Iodine-125 seeds for diagnostic use. This use is 'off licence' therefore the legislation and documentation involved is significant. Loss of a single seed will result in serious consequences to the Trust.
A small core of personnel from each required discipline (Medical Physics, Radiography, Radiology, Surgery, Theatre Staff and Pathology) formed an initial team to establish this service.

Members of the Core Team visited an International Cancer Centre which had been using this technique for several years. Team meetings were held to establish safe procedures and protocols. Then following appropriate training the procedure was cascaded to the remainder of the team.
The whole procedure was initially performed using a phantom with 'dead' seeds, then with a phantom and live seeds. This ensured robustness of the documentation and training for ordering, storage, insertion, retrieval and return of the seed to the manufacturer.

Outcome: After these successful trial runs and with agreed procedures in place, the multi-disciplinary Core Team started with appropriately selected patients. Selection was made at the MDT from patients who had a confirmed impalpable, 5-25mm, single, and ultrasound visible breast cancer.

P-109 Male breast ultrasound and biopsy: Are we doing too many?

Taryn Kalami[1]; Caroline Costello[2]
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Background: Male breast cancer is rare, with around 300 cases diagnosed per year in the UK. Male gynaecomastia is common. Only 1% of all cases of male breast enlargement are diagnosed with cancer. Standardisation of breast imaging reporting was introduced in 2009 by the Royal College of Radiologists (RCR) Breast Group to improve communication, remove ambiguity and prevent mismanagement.

Audit standard: The 2010 best practice national guidelines recommend; (1) Imaging of any unexplained unilateral breast enlargement with results recorded using the RCR classification (U1-5). (2) Imaging if there is clinical uncertainty between true gynaecomastia and fatty breast enlargement. (3) Needle core biopsy of any uncertain or suspicious clinical or radiological findings.

Method: All referrals for breast ultrasound over a 12 month period to our institution and the imaging and histological results were included in this audit. The reason for referral, physical examination (P1-5) findings, ultrasound diagnosis, ultrasound RCR classification (U1-5) and histopathology results were recorded.

Results: 96 male ultrasounds were performed. Of these 71% were diagnosed with gynaecomastia. Only 22% of referrals had a graded physical examination documented. 95% of ultrasound reports included an RCR classification score. 3 patients had radiologically suspicious lesions. 2 patients underwent biopsy and 1 aspiration. 1 patient was diagnosed with breast cancer.

Discussion: The referring clinicians inadequately recorded the physical examination scores. The vast majority of ultrasound scans were normal or diagnosed benign pathology. All radiologically suspicious lesions were biopsied. Based on these audit findings our institution referral guidelines have been adjusted.

P-110 "Sentinel node biopsy positive" in breast cancer patients - reasons explored

Rodwan Husein; Seema Datta; Sumohan Chatterjee; Zahida Saad
SRFT

Self-audit of our practice of SNB over the last 4 years have helped us improve our practice at SRFT. We have manged to bring it down from 22% to 11%. However for last two years, we have failed to improve any further. Various factors were analysed in this retrospective audit, one of them being the multiple number of SN; which has not been previously attributed to.

Content: Retrospective analysis was performed of 280 breast cancers over a period of 23 months (Jan 2014-Nov 2015). Correlation was performed of all 189 operated cancers taking pathology as gold standard.

Outcome: Of the 189 patients, 21 were found to be SNB positive (sensitivity 11%, specificity 100%). Of these 21 patients, 33% were found to have ILC in comparison to 5.4% of SNB negative patients (p=0.03). In addition the SNB positive patients had an average of 3.25 nodes sampled compared to 2.35 nodes in negative patients (p=0.04). Statistical significance was also found for tumour size with SNB positive patients having larger tumour (26mm Vs 20mm, p=0.03), however no statistical significance was found in relation to the multi-focality or grade of tumour (p>0.05).

Discussion: Of all the variables affecting false negative pre-operative assessment of axilla, multiple number of harvested SN has not been reported before. It needs further study for evaluation.

At SRFT, we plan to FNA upto two radiologically suspicious nodes (instead of one uptill now); pre operatively as a change of practice and reaudit our results in one year time.

P-111 Palpable breast mass in lactating women

Bilal Sethi[1]; Georgia Priona[1]; Jessica Watts[2]; Alim Yucel-Finn[1]; Gerald Lip[1]
[1]University of Aberdeen, [2]NHS Grampian

Lactating breast lesions are a common occurrence and can cause anxiety to patients and doctors; we aim to present the sonographic features of different pathologies presented during lactation, including benign and malignant aetiologies.

A wide range of benign and malignant breast problems may be encountered during lactation. In our pictorial review we present and describe sonographic findings of the most common differential diagnosis: milk cyst, fibroadenoma, lactating adenoma, galactocele, abscess and pregnancy associated breast cancer, and their appearances on ultrasound

Breast masses are encountered frequently during lactation and may be a cause of concern and great anxiety. Most findings in lactating patients are benign. The physiological changes during pregnancy and lactation make the clinical and radiological evaluation of these masses challenging. The hypertrophic changes during lactation increase the radiographic density of the breasts reducing the sensitivity of mammography. Taking into account the availability and risks associated with different modalities, ultrasound is the diagnostic tool of choice to characterize the nature of the mass. It has high sensitivity, is readily available and is reproducible. In majority of cases tissue sampling is usually warranted for a definite diagnosis. There is a limited role for breast MRI.

Radiologists commonly come across palpable breast masses in lactating women. Changes occurring in the breast during pregnancy and lactation makes evaluation challenging. A good understanding of the potential differential diagnosis and the use of appropriate imaging modalities and available investigations can help the radiologist make the diagnosis.

Chest, lung and heart

P-112 Experience of using active breathing co-ordinator (ABC) to manage tumour motion

Suzanne Jordan; Ruth Smith
Nottingham University Hospitals NHS Trust

The Nottingham Cancer Centre was accepted as one of the 17 sites to take part in the Stereotactic Ablative Body Radiotherapy Commissioning through Evaluation scheme (SABR CTE). In October 2015 the first patient to be entered in to the scheme presented with a metastasis in his left lung from a colorectal primary.

A 4D planning CT scan was acquired and exported to MIMvista version 6.5.5 where the maximum intensity projection (MIP) demonstrated a large degree of tumour motion. This motion made the patient unsuitable for SABR in free breathing as the internal target volume (ITV) would be too large.

Using the Elekta Active Breathing Co-ordinator the motion of the tumour was successfully managed reducing the ITV to half that of the free breathing volume. This involved coaching the patient to be able to hold their breath comfortably for 20 seconds at a measured volume of air. By having a set volume of air the tumour was kept in a

reproducible position at every breath hold. Each CBCT scan took approximately 6-8 breath holds, depending on the scan pre-set, and the treatment required 5-6 breath holds, the patient tolerated the procedure very well.

The outcome of the process enabled sufficient tumour immobilisation allowing the patient to undergo SABR treatment and the resultant imaging demonstrates this effectively. The success of this is very relevant as more mobile tumours may present to the department via the CTE programme. These may include liver tumours for which the guidelines suggest using breathing control techniques.

P-113 Imaging findings in pulmonary Sjögren syndrome

Karen Litton[1]; Nicholas Ridley[1]; Elizabeth Price[2]
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Aims: The poster aims to give some background on the clinical features and pathogenesis of Sjögren syndrome and then looks at the known pulmonary manifestations associated with this condition.

Examples from a collection of cases will demonstrate the radiological features associated with pulmonary Sjögren syndrome.

Content: Significant lung disease in Sjögren syndrome is rare but many patients complain of a chronic cough related to drying of the mucous membranes.
One study found plain radiograph abnormalities in 14% and abnormalities on HRCT in 34% but there is poor correlation between symptoms, clinical signs and radiological findings. Pathology may precede the appearance of symptoms by a number of years.
HRCT helps categorize the pulmonary involvement into that affecting the airways (bronchiectasis, bronchial wall thickening and follicular bronchiolitis) and that of an interstitial pneumonia (NSIP, UIP or organizing pneumonia) Occasionally patients present acutely with lymphocytic interstitial pneumonitis (LIP). Clinical manifestations include fever, cough, and dyspnoea, with bibasilar pulmonary infiltrates consisting of dense interstitial accumulations of lymphocytes and plasma cells
Patients with Sjögren syndrome have an increased risk of Lymphoma and the radiologist should raise suspicion if there is evidence of mediastinal lymphadenopathy or a pulmonary mass.

Relevance: This poster will be relevant for general radiologists and radiologists in training.

Outcomes: The reader will be able to recognise the pulmonary features of Sjögren syndrome on CT and know what rare but malignant conditions should not be missed.

P-114 Quality of CT pulmonary angiography in suspected pulmonary embolism in pregnancy

Taryn Kalami; Damian Tolan
Leeds Teaching Hospitals

Background: Pulmonary embolism (PE) is the leading preventable cause of maternal death during pregnancy. A diagnosis of pulmonary embolism in pregnancy has important clinical implications. It is of utmost importance to minimise radiation exposure to both the mother and foetus whilst acquiring high quality, diagnostic imaging.

Audit standards: RCR audit standards; (1) 90% CT pulmonary angiography (CT PA) should be optimal (210 HU of the central pulmonary artery). (2) 100% patients should have a chest radiograph prior to a CT PA.

Method: Retrospective analysis of all pregnant patients that had a CT PA between 2013 to 2015 performed in our Trust. The imaging was then reviewed by the departmental CT lead consultant radiologist and categorised as; (1) Good, diagnostic. (2) Suboptimal (due to contrast), diagnostic. (3) Suboptimal (due to patient factors), diagnostic. (4) Suboptimal, not diagnostic.

Results: The sample consisted of 19 patients. 100% had a chest radiograph prior to CT PA. 90% scans had optimal central contrast. 11% scans were not diagnostic. Cardiac and respiratory motion reduced the diagnostic accuracy in the majority of cases. The 2 scans that were bolus tracked were not diagnostic.

Conclusion: Our institution met the RCR audit standards for quality of pulmonary angiography in suspected pulmonary embolism in pregnancy. Bolus tracking increased patient dose and did not improve diagnostic accuracy.

The limitations of this audit are the results are based on a small number of patients but the outcomes of this audit reinforced not using bolus tracking in our routine CT protocol.

P-115 Central venous catheter (CVC) tip position on chest radiographs for administration of chemotherapy treatment

Susan Bird; Susan Todd; Fenella Wong; Claire Barker
The Christie NHS Foundation Trust

Aims & content: This poster demonstrates the preferred position of central venous catheter tips as used at an oncology centre primarily for administering chemotherapy treatments. Correct and common incorrectly sited catheter tips requiring repositioning are illustrated. Radiographs with internal jugular vein catheters, portacatheters and peripherally inserted central catheters (PICC) are presented along with examples of complications.

Discussion: In general hospitals the CVC tip placement is often higher in the SVC as the drugs being administered via the central catheter are less toxic, e.g. antibiotics. Additionally, the lines for non-chemotherapy use are in situ for a shorter period of time. For chemotherapy agents, the preferred line tip position is at the atrio-caval junction/upper third right atrium enabling chemotherapy agents to enter with optimal blood flow rates reducing tip thrombus, fibrin sheath development and venous stenosis. The tip should not abut the vessel/atrial wall as persistent bombardment by chemotherapy agents and friction from the line tip may cause erosion.

P-116 Mobile chest xrays are they good enough?

Connor Gallagher
Warrington and Halton Hospital NHS Foundation Trust

The audit aimed to assess the image quality of digital radiography (DR) as compared with computed radiography (CR) chest radiographs.

An audit was undertaken to determine the quality of mobile CXRs and to highlight areas of improvement. It is vital these images are of high diagnostic quality and adhere to IR(ME)R regualtions.

100 DR images and 100 CR images were scored subjectively using an image quality template. Assessment of image quality included rotation, inspiration, aspect marker visible, patient positioning and artefacts.

CR mobile CXRs had an average image quality score of 13.2. Marks were mainly lost due to the lack of an aspect marker, patient positioning and artefacts. 16% of the images did not include the full area of interest. In comparison, DR images had an image quality score of 15.6 which is a substantial improvement. Importantly, 100% of the images included the full area of interest.

Areas that needed improvement included inspiration, artefacts and visualisation of the costophrenic angles. It is imperative to utilise clinical skills, clear communication, correct radiographic technique and teamwork when considering mobile chest radiography on the critically ill patient.

P-117 What not to miss on CTPA

Ayesha Imran[1,2]; Devinda Karunaratne[1]
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Aims/objectives: Computed tomography pulmonary angiograms (CTPA) has become part and parcel in investigation of the patients presenting with acute shortness of breath and one of the most frequently requested CT investigations.
As radiologist, we are very well trained at excluding pulmonary embolisms. But there are other treatable conditions that can account for patient symptoms.
I would like to highlight partial anomalous pulmonary venous drainage (PAPVD). PAPVD is one of the commonest treatable causes of pulmonary hypertension, if remained unidentified can progress to irreversible pulmonary hypertension. Even in the hands of an experienced echocardiographer, this diagnosis can be missed. Cross sectional imaging remains gold standard.

Contents: A few cases would be presented with PAPVD, showing signs of right heart strain.

Relevance: With ever increasing demand of CTPAs as a first line investigation for acute shortness of breath and dyspnea, radiologists need to be aware of alternative pulmonary differentials and actively exclude them on CTPAs.

Outcome: To raise awareness amongst reporting Radiologists to actively sought alternative diagnosis on CTPAs other than thromboembolic disease especially when there are signs of right heart strain.

Discussion: PAPVD is a congenital cardiovascular condition estimated to involve 0.7 % of population, in which some of the pulmonary veins drain into the systemic circulation rather than the left atrium causing left to right shunting.

P-118 Mediastinal lymph node stations: A pictorial review

Selina Lam; James Shambrook; Stephen Harden
Dept of Cardiothoracic Radiology, University Hospital Southampton

We present an educational poster explaining the anatomical descriptions of hilar and mediastinal lymph node stations as recommended by the International Association for the Study of Lung Cancer (IASLC)1. Radiologists are familiar with describing hilar and mediastinal lymph nodes according to the TNM classification, where the staging ranges from N0 to N3. This newer classification subdivides these nodes into 14 nodal stations. Clinicians of different subspecialties in the multidisciplinary team (MDT) use this newer terminology for correlating accessible lymph nodes, for example chest physicians undertaking endobronchial ultrasound and trans-bronchial needle aspiration (EBUS-TBNA), and thoracic surgeons planning nodal resection or mediastinoscopy. Computed tomography (CT) and positron emission tomography (PET) play important roles in staging lung cancers according to the TNM system2 but increasingly we should be identifying and reporting nodal groups according to the IASLC classification and presenting these to the MDT. This poster will provide imaging examples from everyday routine radiology practice and translate the illustrations into a more practical format for radiologists through the use of colour-coded CT image maps.

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P-119 Bronchoscopic lung volume reduction techniques – what a radiologist needs to know

Joe Mercer; Susan Kearney
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Lung volume reduction techniques are offered to suitable patients who continue to experience dyspnoea from chronic obstructive pulmonary disease (COPD) despite best medical management.

There is increasing prevalence of bronchoscopic lung volume reduction (BLVR) techniques, usually by means of coils or valves to prevent ventilation of the most emphysematous areas of lung. These methods are less invasive than traditional operative approaches and may also be offered to patients otherwise not fit for surgery.

Bronchoscopically inserted coils and endobronchial valves can be readily identified on plain radiographs or cross-sectional imaging and as such it is desirable for all radiologists to be familiar with their appearances. In addition, the radiologist plays an essential role in determining which procedure may offer most benefit and can identifying patients with specific contraindications.

Particular criteria such as a pattern and distribution of emphysema, presence of airway abnormality, pulmonary perfusion characteristics and fissure integrity are all factors that must first be evaluated with imaging studies before lung volume reduction is attempted.

Including images from CT, nuclear medicine, plain film and bronchoscopic studies from our hospital, this poster reviews the imaging findings associated with these devices and the key role of imaging in the pre-procedure work-up. Normal post-lung volume reduction appearances are also discussed.

P-120 An audit of percutaneous lung biopsy – safety and diagnostic adequacy

Mohamed Shawgi; Muhammad Imran; Richard Hartley
The James Cook University Hospital

Aim: CT-guided lung biopsy is a commonly performed interventional procedure for the investigation of suspicious lung findings. This is the 4th cycle of a retrospective audit of CT-guided lung biopsies performed at James Cook University Hospital against standards provided by British Thoracic Society guidelines for radiologically-guided lung biopsy (2003), National Institute for Health and Care Excellence (NICE) Lung Cancer guidance (2011) and QS17 Quality Standards (2012).

Methods: All patients undergoing CT-guided lung biopsy performed between January 2011 to December 2011 (12 months) were included. Data were obtained from PACS, WebIce and RIS. The complication rate and sampling accuracy rate/sensitivity were recorded. Correlation was made with concurrent PET-CT, when available, and the histology results. Follow up imaging scans of the "benign" biopsises over 24 months post biopsy were also reviewed.

Results: 169 patients (79 males , 90 females) were identified. Adequate samples for diagnosis were obtained in 163 patients (96.4%). 26 patients (15.3%) had pneumothorax, none requiring chest drainage. Haemoptysis was observed in 20 patients (11.8%), none needing medical management or intervention. There were no fatalities. The false positive rate was 0. The false negative rate was related to the size/location of the lesion and number of cores taken.

Conclusions: CT–guided biopsies at our institution are largely within standards set by BTS and NICE guidelines. The use of PET-CT, if available, to target biopsy sites increases the sampling accuracy.

Cardiac and vascular intervention

P-121 Cardiac CT: Calcium score, scan range and image quality on dual source CT

Lisa Andrews; Sylvia Worthy; Anna Beattie
Newcastle Upon Tyne Hospitals Foundation Trust

Aims/objectives: To optimise scan range in cardiac CT on a dual source scanner using the calcium score

Method: A retrospective RIS search identified consecutive patients undergoing cardiac CT between April and October 2015. Scan indications other than ischaemic heart disease were excluded. Patients with a coronary calcium score prior to angiogram were included. All scans were analysed for the most superior slice position demonstrating the coronaries and compared with the starting slice position of the CTCA.

Results: 60 patients were scanned. The average difference in distance between the calcium score and the angiogram was 4.2mm (range 0-14.5). The average difference in distance between the start of the CTCA and top slice of the angiogram was 29mm (range 6.5 - 52.8mm).

Relevance: Scanning in a single heartbeat minimises radiation dose. However, on a dual source system, the time to acquire the scan is proportional to scan distance. Therefore, starting the scan as close to the coronaries as possible reduces the chance of artefacts, although allowance needs to be made for varying degrees of inspiration.

Outcomes: This audit demonstrated a potenital for reduction in scan range.

Discussion: On a dual source scanner, limitation of the scan range can help give the best quality scan for the lowest radiation dose (FLASH mode). This can be achieved by using the calcium score as a guide. We plan to implement education of radiographers and re-audit.

P-122 Role of platelet level in interventional radiology

Bella Huasen; Damian Mullan
Christie NHS Trust

Throughout NHS trusts, various levels of platelet count are used as a cut-off point to which platelet transfusion are required prior to interventional procedures. This, at present, is not based on conclusive research.

In this poster we discuss the role of platelets in haemostasis, common associated disorders, accurate testing and understanding replacement therapy available. More importantly we will summarise the present literature on platelets levels and current guidelines being used.

We hope to conclude, that with lack of significant evidence the use of platelet level alone should not stop an interventionist performing a procedure. Aspects such as, they type of procedure risk, the cause of the low platelets and the safety of giving platelet transfusion should also be considered.

P-123 Vascular access site complications in an interventional radiology daycase unit

Hiten Joshi; Vivek Shrivastava
Hull & East Yorkshire NHS Trust

Background: Our interventional radiology daycase unit (IRDU) has been in service since 2012 and has reduced hospital stay and angioplasty waiting times. Our initial protocol kept patients for 4-6h post arterial puncture regardless of haemostasis method used to prevent emergency readmissions in the early stages. Vascular closure devices (VCD's) are an established alternative to manual compression, reducing the time to haemostasis and enabling early ambulation.

Aim: To assess access site complications with aim to reduce time to ambulation following arterial puncture.

Method: Patients who underwent femoral artery puncture over 12 months were identified and all cases were reviewed for procedure, haemostasis method and complications encountered. All patients were contacted by telephone 48-72hrs post-procedure to identify any further complications. Patients were re-reviewed if any concerns were identified during the telephone consult

Results: 143 punctures were performed in 122 patients with 199 procedures performed. Patients were divided into two groups. Group A had haemostasis achieved by manual compression (51%) whilst Group B had haemostasis achieved by VCD's (49%). Group B was sub-divided into Group I (53% Exoseal™) and II (47% Angioseal™). Immediate complications were observed in 1 patient only and closure method was Angioseal™. Delayed complication rate overall was 4% and 0% in Group A and B respectively.

Conclusion: VCD's are safe for achieving haemostasis with a tendency to fewer delayed complications. This data will be used to shorten the IRDU patient stay in patients in whom VCDs have been used and to perform a re-audit to assess the cost savings.

P-124 An audit into peripheral MRA image

Kate Davis; Darren Hudson
InHealth Group

Aim: High quality magnetic resonance angiography studies provide vascular surgeons with a surgical map to aid diagnosis, patient management and planning of surgical procedures. Following feedback from vascular surgeons regarding variability in image quality of peripheral magnetic resonance angiography studies, an audit was conducted to establish a baseline of current quality and look at strategies that could be employed to improve it.

Content: Images were assessed for image quality and artefacts using a 5 point score. This showed image quality had reduced between periods 1 & 2, that there was a variance in the sequences sent to PACS, lack of composed images available on PACS, MRI artefacts on one of the scanners, some practical and technical teaching points, and that radiographer comments on RIS are vital.

Outcomes: Following assessment of the audit results and issues raised, a revised protocol for patient positioning was implemented, along with use of breath-hold whilst acquiring the upper station to improve subtraction, the importance of required anatomical review of vessel coverage stressed to staff, revision of manual subtraction technique and the need to use a revised and standardized scanning protocol. A follow up audit is planned to complete the cycle of continuous quality improvement

P-125 Transarterial chemoembolisation using drug-eluting beads: The West of Scotland experience

Peter Douglas; Ram Kasthuri
NHS Greater Glasgow & Clyde

Transarterial chemoembolisation (TACE) for hepatocellular carcinoma (HCC) is carried out in a single tertiary referral centre in our region. We identified all patients undergoing TACE from 2009 to 2014.

Survival figures were calculated from the date of diagnosis, and in addition demographics, aetiology, Childs-Pugh score and multiplicity of lesions were also recorded. 148 patients underwent 333 TACE procedures for HCC (mean 2.25, median 2).

The most common underlying aetiologies were alcoholic liver disease (33.8%), Hepatitis C (13.5%) and non-alcoholic fatty liver disease (12.1%). The 1 year survival was 63% (n=101), 2 year survival was 35% (n=50) and 3 year survival 29% (n=23). The median follow up was 25 months.

Survival was inversely correlated with Childs-Pugh score and multiplicity of lesions, while men and older patients (>70) had a better prognosis. Local survival was comparable to that quoted in published trials. This information will be used in the consent process for TACE locally and our aim is to use this as the basis of a national registry; this would serve as an audit tool as well as hypothesis generating for new trials.

P-126 Intravenous contrast use (Prevention of contrast induced nephropathy)

Abeeku Hammond; Khalid Bashaeb
The Royal Oldham Hospital

Background: The incidence of contrast induced nephropathy is low worldwide; however it's still the third commonest cause of hospital acquired acute kidney injury. Despite the absence of national guidelines, local guidelines exist for most trust or hospitals in UK. This audit aimed to find out whether clinicians follow the trust guidelines to prevent contrast induced nephropathy.

Methods: Patients who had CT angiograms between 01/01/2014 – 30/06/2015 with EGFR ≤ 60 were selected from GM-CRIS-Live and followed up to see if clinicians followed trust guidelines to prevent contrast induced nephropathy.

Results: Total number of 96 patients was selected with a mean and median age of 71 which was not statistically different from the total number of patients within the time frame (mean and median age 86 years). 77.10% of the patients were seventy years and above. CALLB was the highest procedure done (79.2%). 87.50% of patients had moderate risk and 12.50% had high risk factors. 60.20% were day cases and 39.80% were in-patients. 10.60% of the patients had their EGFR rechecked within 72 hours and 89.40% had theirs not rechecked. 77.10% had no feedback from the clinicians with respect to hydration. Less than 20% of the inpatients had no EGFR recheck or feedback from clinicians.

Conclusion: Contrast induced nephropathy is a highly preventable case; simple following of TRUST policies or protocols will prevent contrast induced nephropathy. Majority of clinicians within the Trust didn't follow Trust policy to prevent contrast induced nephropathy, thus exposing patients to contrast induced nephropathy.

P-127 Is haemodynamic status a good predictor of angiographic outcome in patients with major gastrointestinal bleeding?

Kalim Khan; Hazem Alaaraj; Raghuram Lakshminarayan
Hull & East Yorkshire NHS Trust

Purpose: To determine whether haemodynamic status is a good predictor of angiographic outcome in patients with major Gastrointestinal bleeding

Method: Data was retrospectively collected for consecutive patients who had catheter angiography for major GI haemorrhage presenting to A&E from October 2009 to December 2012 (n =69).

The total number of cases were then divided into two main groups according to haemodynamic status: Those that were shocked (group 1, n = 24), and those that were not shocked (group 2, n = 45). These groups were then further divided into those who demonstrated a site of haemorrhage on catheter angiography and hence were embolised and those where a site of haemorrhage was not identified.

Results: In group 1, out of 24 patients that were shocked 13 patients (54%) did not demonstrate a site of haemorrhage on angiography. In 8 of these patients (62%) the bleeding settled with conservative management. The remaining 5 patients (38%) had surgery or endoscopic intervention. Similarly in group 2, 34 out of 45 patients (75%) had negative angiography. In 25 patients (74%) the bleeding settled with conservative management. 7 patients (21%) needed surgery and 2 patients (6%) needed Endoscopic intervention.

Conclusion: Haemodynamic status in itself is not a reliable predictor of angiographic outcome in patients with major GI haemorrhage. Conservative management appears to be an effective option in patients where a bleeding point cannot be identified on catheter angiography.

P-128 A review of linograms in central venous catheters

Kalim Khan; Keith Chiu; James Cast
Hull & East Yorkshire NHS Trust

Background: Patients who need long term venous access or are on long term IV therapy e.g. oncology or haematology patients often have Central venous Catheters (CVC) inserted. These lines are often associated with complications such as blockage, thrombosis and misplacement. Inability to Flush or aspirate blood raises the possibility of line complication hence a CXR and linogram is often requested to check patency and position of the line.

Pupose:
1. To evaluate compliance with the Yorkshire and Humber Cancer Network (YHCN) i.e. How many patients had CXR prior to linogram?
2. To asses if there is a predictor for a blocked line?

Method: We retrospectively identified patients who had a linogram done over a two year period between 2010 and 2012 via the hospital electronic system.

Results: 78 patients were identified in total. The majority of them were oncology patients with a hickman line in situ. 7 patients (9%) had a blocked line, 3 patients (4%) had a leak, 3 patients (4%) had an incorrectly positioned line. 2 patients (3%) demonstrated a line thrombus and 2 patients (3%) had a broken line. 50% of the patients complied with the YHCN guidelines by having and CXR. The best predictor of a blocked was inability to flush (6/7 patients) the line.

Conclusion: Blockage was the most common complication of CVC with 50% compliance with the YHCN guidelines. Inability to flush rather than aspirate was the best predictor of line blockage. The secondary predictor of line complication was pain.

P-129 Managing the risks of high radiation skin doses in intervention

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Aim: Complex fluoroscopic procedures are resulting in greater patient skin doses and increased risk of tissue damage. The purpose of this study was to quantify typical skin doses indicated for a range of interventional procedures and identify the proportion of patients requiring follow-up when dose thresholds are exceeded.

Method: Dose-area-product, screening time, cumulative skin dose, BMI and procedure type were prospectively recorded for all patients in cardiology and interventional radiology departments in a large acute hospital over 9 days. Retrospective data (without BMI) was also collected from interventional radiology for all patients for a two-year period.

Outcomes: In the prospective data 17/70 cardiology patients received a skin dose >1Gy (24%); 7 of those 17 received a skin dose >2Gy (10%) and 4 >3Gy (6%). 6/70 patients had a screening time >20 minutes. In IRU 4/50 patients received a skin dose >1Gy (8%) and one >3Gy (2%). 7/50 patients' procedures had a screening time >20 minutes (14%). Correlation between skin dose and BMI was weak.

In the retrospective data 150/4,198 (6%) cases received a cumulative skin dose greater than 1Gy. Of these, 101/150 patients had screening times greater than 20 minutes. Typical skin doses for a range of procedures have been determined.

Conclusion: Fewer than 1/10 procedures are expected to lead to skin doses >2Gy. These patients are informed and receive an information leaflet on skin effects and skin care. The patient's family doctor is also sent an information sheet.

P-130 Management of persistent type 2 endoleaks with sac expansion post-EVAR

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Royal Stoke University Hospital, University Hospitals of North Midlands NHS Trust

Aims/objectives: A retrospective audit to evaluate the success of intervention in patients with persistent Type 2 Endoleak (ELT2) and sac expansion following Endovascular repair of Abdominal Aortic Aneurysm (EVAR).

Content: The radiology information system and interventional radiology database of 463 EVAR procedures performed over 10 years at our tertiary vascular institute was reviewed. Post-EVAR sac size progression and ELT2 existence was determined on serial CT imaging. Significant sac expansion was defined as greater than 5mm diameter increase and were treated by secondary interventions.

Relevance/impact: ELT2s have been reported in 9-30% cases following EVAR. ELT2 occurs when retrograde flow through branch vessels continues to fill the aneurysm sac. ELT2s often self-resolve, however embolisation of the branch vessel is indicated when associated with significant sac expansion on follow up imaging. Recent literature states that technical and clinical success for ELT2 embolisation is 70%.

Outcomes: 49/463 (11%) patients had persistent ELT2, of which 17/49 (34%) demonstrated significant sac expansion. 9 patients were appropriate for secondary intervention, with 5 by transarterial embolisation; 3 by direct sac puncture embolisation and 1 laparoscopic clipping. Mean duration of follow up post-secondary intervention was 29 months. Immediate technical success was seen in 86% patients, but clinical success in 36% patients, although 1 awaits follow-up imaging.

Discussion: The findings suggest that technical success of secondary interventions for significant ELT2s is consistent with the literature, however fails to meet with clinical success standards.

P-131 Endurant EVAR program comparison with the Engage register

David Wells
University Hospital North Midlands

A comparison between the first 100 endurant EVAR elective grafts in our institution compared with the European Engage registry.
UHMN is a high volume Interventional Radiology EVAR vascular hub with >100 Grafts implanted per year.
The Engage registry is a multicentre real world european registry of Medtronic endurant stent grafts for endovascular repair of the aorta.
The prospective UHMN database for first 100 elective endurant cases was interogated and compared with the registry looking at graft migration rates, all cause mortality, aneurysm related mortality 30 day mortality and re intervention.
The sub group of secondary reintervention for endoleaks was interogated forther.
EVAR surviellance strategy at UHNM is described along with images and desciptions of endoleaks and treatment stragesies including contrast USS and use of onyx.

P-132 A completed audit cycle investigating patient satisfaction and QoL outcomes following venous sclerotherapy procedures in the management of venous malformations at Barnet General Hospital

Jordan Green; Christopher Tang; Sara Zafar; Kevin Lotzof
NHS

Purpose: Sclerotherapy is a management option for patients with symptomatic venous malformations, who have failed conservative management. We completed an audit cycle investigating the local venous malformation sclerotherapy service provided by the Interventional Radiology department at Barnet General Hospital, from 2010 to 2014. We investigated both patient satisfaction and quality of life (QoL) improvement, and examined whether there was improvement in these outcomes, following changes in patient education and clinical practice.

Materials/methods: Patients undergoing venous sclerotherapy from 2010 to 2014 were identified using departmental records. Patients were contacted via telephone, and QoL and patient satisfaction were assessed using a modified QoL questionnaire. The first audit cycle included patients from 2010-2012, with the re-audit cycle covering patients from 2012-2014. Changes implemented between the cycles included improved patient education regarding procedure expectations, as well as more aggressive treatment and closer follow-up post-procedure.

Results: A total of sixteen patients were contacted during the first audit cycle, and of these ten patients (62.5%) felt satisfied after the procedure. Eleven patients (68.8%) noted an improved QoL post-procedure, with four patients (25%) experiencing worse QoL. On re-audit, seventeen patients were contacted, with fourteen patients (82.4%)

feeling that their expectations had been met. In addition, fourteen patients (82.4%) had improved QoL post-procedure, with two (11.8%) experiencing worse QoL.

Conclusions: This audit cycle has demonstrated improvements in patient satisfaction and QoL post-sclerotherapy, following concerted changes in clinical practice, both in terms of improved patient education, as well as more aggressive treatment and careful follow-up of patients.

GI and hepatobiliary

P-133 Pictorial review of ciliated foregut cyst of the liver

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Objective: Pictorial review of ciliated foregut cysts of the liver

Content: Ciliated hepatic foregut cysts are rare congenital cysts of the liver. These are commonly asymptomatic and are found incidentally(45%). Sometimes these can cause vague upper abdominal discomfort. These are usually located in median segments of the liver in segments, IV, V and VIII. These have variable imaging appearances depending on their content. Usually high on T2 and mild to variable on T1. These do not show enhancement. Possibility of maligant transformation and diagnostic difficulty makes them important and challenging.

Relevance/impact: Since these are incidental, they can pose challenge when the imaging is performed for staging of various malignancies. Typical location of these cysts in the superficial part of segment IV of the liver, lack of enhancement and variable signal on T1 can make them identifiable and differentiate from sinister cystic lesions.

Outcome: We would like to present the four cases we came across in our practice during the last five years. These were challenging initially but with the knowledge of their typical imaging appearnces we could differentiate them from metastases or other sinister liver lesions.

Conclusion: Since the ciliated foregut cysts of the liver could potentially harbor squamous cell carcinoma(4.4%) these should be recognised from other cystic lesions. Their typical location and imaging features could help in suspecting and identifying them.

P-134 Diagnostic accuracy and complementary role of barium swallows in the workup for oesophageal cancer

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Aims/objectives: The incidence of oesophageal cancer is on the rise and endoscopy is the preferred first line investigation. However, for patients presenting with non-specific upper oesophageal symptoms barium swallows are frequently performed to exclude malignancy. There are no current updates on the diagnostic accuracy of oesophageal cancer detection at barium swallow. This study evaluates the diagnostic accuracy of barium swallows in detecting oesophageal cancer, and its complementary role in the workup for suspected malignancy.

Content:A presentation of findings of 200 consecutive barium swallows with clinical suspicion of oesophageal cancer. Further discussion of diagnostic accuracy of cancer detection & aid to CT.

Relevance/impact: To provide an update of the diagnostic accuracy and contribution of barium swallow in the detection of oesophageal malignancy in modern radiology.

Outcomes: 22 (11%) cases of cancer were identified at barium swallow. 1 case was false positive. This resulted in a diagnostic accuracy and diagnostic yield of 95.4% (21/22) and 10.5% (21/200) respectively. 25.5% (51/200) were normal and 63.5% (127/200) benign pathology. Majority of the benign cases (97 cases, 48.5%) were oesophageal dysmotility. Oesophageal web, hiatus hernia, pouch, achalasia and Schatzki ring were also noted.

Discussion: Barium swallows showed high diagnostic accuracy but low diagnostic yield, which could reflect that moderate to high risk patients have been referred for endoscopy as their first-line investigation. From the 21 positive cases, barium swallows played important part in the diagnosis and specific cases will be further discussed.

P-135 Percutanous transperitoneal insertion of a colonic stent

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Maidstone and Tunbridge Wells NHS Trust

Principles: Colonic stenting is a widely accepted procedure both for palliation and temporising of obstructing colonic neoplasms. Proximal colonic lesions are technically harder to treat, particularly by radiologists. Here we demonstrate the feasibility and safety of a percutaneous transperitoneal approach to colonic stenting along with a pictorial illustration of the technique.

A 92 year old man with an partially obstructing left transverse colonic tumour was admitted. He was reasonably fit but had declined both an attempt at curative surgery and a colostomy as well as conventional transanal stent placement.

After appropriate consent and a planning CT scan, the procedure was performed in the fluoroscopy suite. The transverse colon was fixed to the anterior abdominal wall with a three point colopexy using gastropexy suture anchors, securing access to the colon 10cm proximal to the malignant stricture. A 7Fr vascular sheath was placed in the centre of the triangle. The tumour was then crossed with a catheter/wire combination and a colonic stent deployed via an 11Fr vascular sheath.

The procedure was straightforward and uncomplicated. The procedure time was 30 minutes. The sheath was removed and the colopexy sutures cut at 7 days. He remains well at home and symptom free 3 months post procedure.

Educational value: Here we report a technically successful percutaneous transperitoneal placement of a colonic stent. We feel that this technique is safe and easy and may expand the cohort of patients in whom conventional transanal stenting has failed or deemed anatomically unsuitable.

P-136 A pictorial exhibit demonstrating diagnostic value of using high iodine density, oral contrast material for computed tomography of the abdomen and pelvis

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Hull & East Yorkshire NHS Trust

Aim: To demonstrate incremental diagnostic value of using high iodine density(HD) oral contrast material for Computed Tomography(CT) of the abdomen and pelvis particularly in the post-operative setting and in selected cases of abdominopelvic trauma or suspected perforation.

Contents: With the aid of high quality images from selected cases, we endeavour to show the increase in diagnostic efficacy of CT using HD oral contrast material (Iopamidol 300 mg iodine/ml, 100ml diluted in 400mls of water) in comparison to conventional regimen (Urograffin 146 mg iodine/ml, 30 mls in 800 mls of water) and will reflect on how this technique significantly affected patient management.

Relevance/impact: Our presentation seeks to strengthen evidence that this regimen is technically feasible and enables confident interpretation of scans in selected cases.

Outcomes/discussion: Oral contrast at dilutions of 2-5% is traditionally used to outline the alimentary tract in abdominal CT scans. In this concentration, it is sometimes not dense enough to enable confident localisation outside the lumen, particularly in the post-operative setting where radio-opaque surgical material and presence of free fluid may hamper assessment. In our cohort of patients, HD contrast significantly contributed to correct diagnosis, for example confirming post-operative enteral leaks not visible on prior studies and demonstrating transmucosal tear in the duodenum in a patient with blunt abdominal trauma. We did not notice any detrimental features with HD contrast, for example there was no significant beam hardening artefact in any case. We hope that this exhibit will contribute to more widespread acceptability of this technique.

P-137 Using ultrasound to detect a dilated biliary tree - how good are we?

David Gent; Sonali Limdi
The Pennine Acute Trust

Aims/objectives: We assessed the quality of abdominal ultrasonography for detecting a dilated extra hepatic biliary tree in patients presenting to a DGH with various abdominal complaints. Magnetic Resonance

Cholangiopancreatography (MRCP) was used as the gold standard investigation of biliary tract dilatation. The results were audited against the Royal College of Radiologists standards.

Content: Through identifying MRCP reports of abnormally dilated biliary trees with accompanying abdominal ultrasound reports we were able to assess the positive predictive value of abdominal ultrasound. We present the results here.

Relevance/impact: Compared to MRCP, abdominal ultrasound is a cheaper and less invasive investigation. It is important for abdominal ultrasound to be accurate as this determines the course of further imaging and interventions for the patient.

Outcomes: We identified 102 MRCP reports of an abnormally dilated biliary tree with an accompanying abdominal ultrasound report over a 12 month period. Only 73% (n=74) of dilated biliary trees were identified on ultrasound prior to MRCP, 85% (n=87) of ultrasound reports had a specific comment pertaining to the presence or absence of a dilated biliary tree and only 45% (n=33) of reports recommended further imaging where the ultrasound was equivocal.

Discussion:A number of factors may have contributed to the poor results including patient obesity making it difficult to identify the biliary tree and lack of clinical information, such as whether the patient has obstructive liver function tests, making it difficult to recommend further imaging.

P-138 Audit on the validity of MRCP requests (May-June 2015)

Abeeku Hammond; Madhu Dutta; Eilis Macloughlin
Royal Oldham Hospital

Introduction: Gall stones and common bile duct pathologies although mostly asymptomatic accounts for a huge chunk of NHS expenditures. About 10-15% adult population in UK have gall stones. This re-audit aimed at finding out whether MRCP requests criteria met the 100% recommendation made by the initial audit and also to find out if the other recommendations were adhered to.

Methods: Retrospectively, MRCP request between the months of 1st May 2015 and 30th June 2015 was collected and various means was used to validate the data. Data was analysed using Microsoft excel. Patient's details anonymised to ensure confidentiality.

Results: MRCP request has seen a step ladder rise at Pennine Acute Hospital Trust since 2011. Total number of 143 patients formed the cohort, and the median and mean age was 59 for the cohort. Rochdale Infirmary had the highest referral in 2015 (40%) as compared to 2014 where they had the least (10%). North Manchester General hospital had the second highest referral (36%). 44% of the request was invalid as compared to 2014 (6.67%). Abnormal LFT's was the main reason for MRCP request in both 2014 (31.67%) and 2015 (41%). Rochdale Infirmary (46%) had the highest number of Invalid request followed by North Manchester (29%) and Royal Oldham (25%).

Conclusion: Although MRCP is an essential tool in diagnosing gall stones and common bile duct pathologies, excessive request without proper clinical bases depletes already the scarce resources of NHS.

P-139 3T MRI for demonstrating hepatobiliary changes in opisthorchiasis and cholangiocarcinoma: A longitudinal study in a hamster model

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Introduction: Opisthorchiasis caused by Opisthorchis viverrini remains a major public health problem in Thailand and neighboring countries. Most people with opisthorchiasis show no symptoms in an early stage.

Objective: To compare the hepatobiliary changes between opisthorchiasis and cholangiocarcinoma for a long-term study using 3T MRI in a hamster model.

Methods: Four groups of hamsters were normal control (n=5), Opisthorchis viverrini (OV) (n=10), N-nitrosodimethylamine (NN) (n=10) and O. viverrini combined with NDMA (ON) (n=10). Each hamster underwent MRI scan during the 1th to 8th month. In the 8th month, all animals were scanned and euthanized for histological study.

Results: In the normal control group, the liver's architecture was no mass or bile duct dilatation. Liver tumors were found in 2 of 10 hamsters in the NN group with no fibrosis or bile duct dilatation. The OV and ON group showed the degree of inflammation, fibrosis, and dilatation of intra- and extra-hepatic ducts increasing with time in the bile ducts of the liver in T2 weighted with fat suppression images. there was no detectable cholangiocarcinoma (CCA) in the OV group. For ON group, there was not only amounts of intrahepatic bile duct fibrosis and dilatation, extra-hepatic duct increase found but also some hepatobiliary pathological changes such as cysts, abscesses, and CCA (3 of 10).

Conclusions: The advantages of MRI provide multi planar scan, high resolution and ability to detect pathological changes. The applications in animal model with MRI can help to detect the pathological changes, follow up and the treatment without sacrificing animals.

P-140 Diffusion weighted imaging as a screening tool in the detection of pancreatic neuroendocrine tumours in patients with cancer syndromes

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Cardiff and Vale NHS Trust

Aims/objectives: Using cases from our tertiary referral centre:
- To illustrate the MRI features of early neuroendocrine tumours with a focus on DWI
- To explore the possibility of using DWI as the primary sequence in the surveillance of patients with familial cancer syndromes.
- To address the clinical implications of very early (<2cm) tumour detection; surveillance vs. surgery a shortcoming in the guidelines

Content/organisation: Pancreatic neuroendocrine tumours and their predisposing syndromes
A brief review of sequences and techniques
Imaging feature of early tumours with a focus on DWI
Relevant literature review will be provided, where necessary

Conclusion: Improved scanning techniques have led to the detection of very early neuroendocrine tumours. This poses a clinical dilemma in the management of this particular cohort of patients; a consensus needs to be reached as how best to deal with this conundrum. DWI could be used as the primary rather than a complementary sequence in the surveillance of patients with familial cancer syndromes. This would lead to reduced scanning time and cost.

P-141 Missed rates of colorectal cancer

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Aim: To find the number of colorectal cancers missed at initial investigation amongst patients subsequently diagnosed with colorectal cancer in 2014.

Background: Colonoscopy is the gold standard test for colorectal cancer but increasing numbers of computed tomography colonography (CTC) are carried out as an alternative.

Method: We identified all colorectal cancers diagnosed in 2014 and reviewed records to look for any endoscopic investigations or cross sectional imaging in the previous 2 years, any CT imaging was reviewed by a consultant gastrointestinal radiologist.

Results: 226 patients were included.
27 cancers were identified by CTC. No interval cancers were found in patients who had a CTC in the previous two years.
1.3% (3) of patients who had a colonoscopy within 2 years of their diagnosis went on to develop an interval cancer compared to 4.8% (11) of patients who underwent other cross-sectional imaging.

Discussion: There are multiple reasons why colonoscopy may have missed cancers which will be discussed.
There were no patients who developed an interval cancer following a CTC which could suggest that CTC is a more sensitive test for colorectal cancer however there are multiple confounding factors to be discussed.

Several of the CTs were performed to follow up other malignancies, confirming that CT is an inappropriate test for colorectal cancer.

P-142 Abdominal moans and groans: Radiological and surgical atlas of the pearls and pitfalls of Crohn's Disease

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Aims/objectives: To emphasise in pictorial fashion, the pearls and pitfalls in imaging, diagnostic and surgical challenges faced in Crohn's Disease.

To illustrate the characteristic findings of Crohn's Disease including active and chronic bowel disease as well as its complications relevant to disease activity.

Content: Crohn's Disease is an inflammatory bowel disease characterized by skip lesions usually with extra-intestinal manifestations. It can affect any part of the gastrointestinal tract and can prove to be a diagnostic conundrum for the Radiologist and Surgeon.

Through this pictorial journey we highlight a comprehensive review of the imaging and surgical findings in the diagnosis and subsequent management of Crohn's Disease.

Relevance/impact: Crohn's Disease is common in North Europe and North America showing no gender predilection and typically starts in the teens to twenties. It can lead to poor quality of life and disabling complications. Early recognition using cross-sectional imaging, followed by appropriate timely treatment can reduce the risk of complications.

Outcomes: We hope to avail the reader in recognising common and important radiological presentations of Crohn's Disease using different imaging modalities, hence allowing appropriate surgical treatment to be subsequently carried out in those required cases.

The purpose of this exhibit is also to illustrate the value of joint Radiological and Surgical management imperative for high quality patient care.

Discussion: Through our imaging bank and surgical management review, we aim to have explained the pertinent facts of Crohn's Disease, particularly important in the clinical context of the patient to help avoid misdiagnosis and mismanagement.

P-143 Our experience of ultrasound guided peritoneal biopsy

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Sheffield Teaching Hospitals NHS Trust

Introduction: The differential diagnosis of ascites/peritoneal lesion includes malignancy, infection or inflammatory pathology. When patients with a known cancer are found to have a new peritoneal lesion the possibility of recurrence versus new malignancy needs to be investigated.

Aim: Can ultrasound guided peritoneal biopsy aid histopathological diagnosis in healthy and cancer patients when the origin of ascites and peritoneal lesion is unclear?

Method: A retrospective review of CT/US abdomen/pelvis, pathological report of US guided peritoneal biopsy sample and patient discharge summary.

Results: Patients referred for biopsy with ascites (52/58) or incidental peritoneal lesion on CT. Histopathological diagnostic; accuracy rate, sensitivity, specificity, PPV and NPV are 97%, 96%, 50%, 98% and 67%. When the diagnosis is ovarian cancer or primary peritoneal cancer, pre-biopsy CT accuracy is 78.57% and 0/11 respectively. Ten patients with a known malignancy underwent US guided biopsy of a new peritoneal lesion. 7 were diagnosed with a second malignancy.

Discussion: We found ovarian and primary peritoneal cancer have non-specific, but similar clinical and CT features. Histopathological analysis of a peritoneal lesion can aid diagnosis of ovarian and primary peritoneal cancer. This is important as the prognosis differs.

CT features of a lone peritoneal lesion are inaccurate on their own to rule out diagnosis of a new malignancy in those patients with a known cancer. Tissue diagnosis is vital to differentiate benign pathology, recurrence or a new malignancy.

Conclusion: US guided biopsy of peritoneal lesion is accurate and safe (1 minor complication).

Uroradiology, gynaecology and obstetrics

P-144 Influencing factors for false negative rate of renal calculi detection on US vs CTKUB

Rumman Ahmed; Carla Goncalves; Ali Zaman; Sana Ihsan; Alan Tan; Peter Pietrzak; Peter Acher; Sidath Liyanage
Southend University Hospital NHS foundation Trust

Objectives: Evaluate factors associated with false negatives (FNs) in detecting renal calculi on ultrasound (US) compared with non-enhanced CT KUB to suggest possible ways of technique optimisation.

Content: Retrospective study of all US studies conducted between 01/01/2014 and 31/03/2015 with subsequent non-enhanced CTKUB (reference standard) within a year at our institution.

Outcomes: 220 patients were identified in total, 126 of which had calculi reported on CTKUB. Of these 126, renal calculi were missed on US in 32 patients (25%, False Negative Rate). The majority (75%) of calculi missed on US had a reported size of less than 10 mm (p-value = 0.0047). Operator (Sonographers vs Radiology Consultants vs Radiology Registrars), patient's age, patient's gender, and time between US and CTKUB were not statistically significant contributors to FNs.

Discussion: Our results show that US is suboptimal for identifying renal calculi, particularly those below 10mm in size. However, this should be weighed up against the radiation burden from CTKUB, especially when investigating young patients. Our data demonstrates that all operators may benefit in being made aware of potential limitations of US and potential pitfalls such as high echogenicity of renal sinus fat masking renal calculi.

Careful and thorough ultrasound imaging looking for features such as posterior acoustic shadowing and 'twinkling' artefact may be helpful. Other potential contributing factors to FNs not included in this study are patient's body habitus or cooperation, which could serve as an indicator for when CTKUB could be more appropriate.

P-145 Saving the graft: Ultrasonography appearances of renal transplant complications

Kelsey Watt; Yaman Adi; Sean Tenant; Peter Cantin
Plymouth Hospitals NHS Trust

Aims: To review the ultrasonographic appearances of early and late renal transplantation complications.

Relevance: Renal transplantation is increasingly used as the primary therapy for end-stage renal disease. Due to its increasing frequency, increased survival rates, and associated complications, renal transplant ultrasound examinations make up an increasing part of on-call work. Timely management of complications is essential; radiologists performing the examination therefore require a thorough understanding of the associated anatomy, normal surgical sequelae and ultrasonographic appearances of these complications.

Content: In this pictorial review we present the anatomy of a healthy renal graft, review the normal post-surgical sequelae, and present ultrasonographic features of complications. We have reviewed all ultrasound examinations of renal transplants in the period November 2013 to November 2015 inclusive in a single tertiary referral centre. In current literature, complications may be considered within five categories: Perinephric fluid collections, including haematomas, seromas, urinomas, lymphocoeles or abscesses; diminished renal function due to acute tubular necrosis or rejection; vascular complications including arteriovenous fistulas, pseudoaneurysms and thrombosis or stenosis of renal arteries and veins; abnormalities of the collecting system; abnormalities of the renal parenchyma. Many patients within this cohort had repeat scans documenting the development of complications within a matter of only hours or days between examinations.

Discussion: Ultrasound is a non-invasive, readily available examination, which plays a critical role in the follow-up of renal transplantation. Recognising the appearances of complications allows early communication with clinical teams and ensures prompt intervention to ensure graft success.

P-146 Complications following renal transplant: Experience from a specialist transplant centre

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Central Manchester University Hospitals

Aims: To provide a pictorial review of the complications occurring post renal transplantation and to discuss the role of the Radiologist in imaging kidney transplants and managing complications.

Content: 166 kidney transplants have been performed at our centre this year. A multi-disciplinary approach is required to image and manage complications. This involves radiologists, sonographers, nuclear medicine physicians, transplant surgeons and renal physicians. The imaging modalities include renal scintigraphy (99m-Tc MAG3) which allows assessment of both perfusion and function, and ultrasound.

Relevance: Imaging of the transplanted kidney takes place if the transplant team have any concerns about the surgery or post-operative recovery and function of the graft. It is important the Radiologist is aware of the potential complications which can be divided into immediate (within the first three days), early (between three days and two months) and late (after two months).

Outcomes: 140 out of 166 patients had imaging assessment of the graft within the first three days. This consisted of 112 renal scintigraphy studies only, 28 ultrasound scans only and 23 patients having both scans. 79 patients overall (48%) developed complications (28 immediate, 42 early and 9 late). Acute tubular necrosis was the most common early complication. Complications were more common in deceased donor kidneys.

Discussion: The role of the Radiologist following renal transplantation can be divided into three parts: (1) recommendation of the correct imaging modality, (2) accurate interpretation and performing of imaging and (3) managing complications where appropriate.

P-147 Bosniak classification of renal cysts - a reminder

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Aims/objectives: Renal cysts are seen as fluid filled lesions which vary in their complexity ranging from simple to complex. The Bosniak renal cyst classification was initially described in 1986 using CT scan findings. Whilst other imaging modalities are commonly used in the evaluation of renal masses, namely ultra sound and magnetic resonance imaging (MRI), CT (with and without contrast) remains the key diagnostic technique.

Content: Axial CT images accompanying each of the Bosniak classification categories:

Type 1:- Homogenous water content, no calcification, enhancement or wall-thickening.
Type 2:- Fine wall or septal calcifications. Hyper-dense cysts > +20 HU.
Type 2F:- Slightly thick wall, septae thicker than hairline, calcification which may be thick, no contrast enhancement.
Type 3:- Wall thickening/nodularity. Thick/irregular calcification. Contrast enhancement.
Type 4:- Irregular margins, prominent nodules, solid enhancing components.

Relevance/impact: The Bosniak renal cyst classification is a vital tool in helping the Radiologist come to the correct conclusion when faced with a renal cyst be it a simple one or more complex one. Whilst determining what constitutes a simple cyst or an obviously malignant one may appear somewhat straight forward, the challenge lies in those that are deemed more indeterminate i.e. the type 2F and 3 lesions. In depth knowledge of this classification system is of paramount importance for those who are involved in the routine reporting of renal lesions.

P-148 Multiparametric prostate MRI- A district general hospital experience

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Currently the NICE guidelines state that Multiparametric MRI (mpMRI) should be performed in individuals under active surveillance for prostate cancer. It is also indicated in individuals with a negative 10-12 core biopsy
According to the NICE guidelines, if a multiparametric MRI is negative there is no need for further biopsy, unless:
- the biopsy showed high-grade prostatic intra-epithelial neoplasia (HGPIN)
- the biopsy showed atypical small acinar proliferation (ASAP)

- abnormal digital rectal examination

We performed the audit to assess if multiparametric MRI was sensitive and specific enough to exclude the need for further biopsy.

The aims audit were to:
a) Assess if we exclude cancer with Multiparametric MRI
b) If positive on muptiparametric MRI, do we correctly predict and localize the cancer.

Incusion criteria:
A) mpMRI
b) post mpMRI biopsy
Data: Over a two year period, 131 patients were imaged and 48 had prostate biopsies and mpMRI.

Results:
a) MRI and Biopsy concordance:
1) Cancer diagnosis (not location)= 6
2) Cancer diagnosis + location= 28
b) MRI and TRUS biopsy Discordance:
1) +ve mpMRI, -ve TRUS biopsy= 9
2) -ve mpMRI, +ve TRUS biopsy= 5
Our sensitivity for detecting malignancy on mpMRI was 83.9
Our Specificity for detecting malignancy on mpMRI was 47.1
The positive predictive vaule was 76.5
The negative predictive vaule was 61.5

Discussion: At our institution we were reporting mpMRI to a required national standard. However, negative mpMRI does not exclude the need for sextant biopsy.

P-149 Targeted prostate biopsies using MRI-ultrasound fusion technique

Ciara O'Brien; Elisabeth O'Dwyer; Maeve O'Sullivan; Emily Ward; Ronan Browne; William Torreggiani
Tallaght Hospital, Dublin

Purpose, materials and methods: The purpose of this review poster is to discuss and review the role of MRI-Ultrasound fusion biopsy techniques in targeting lesions suspicious for prostate cancer.

Background: MRI has now become the main imaging modality in staging of prostate cancer. The advent of the widespread use of PI-RADS 1 and 2 has made triaging of patients for biopsy an intrinsic part of assessing patients with prostate cancer.

Traditionally non-targeted multiple core biopsies are performed when the patient has a suspicious lesion on MRI and/or significantly elevated PSA. However, when these biopsies are negative and there is a high PI-RADS 2 score on MRI, a targeted biopsy is becoming an essential tool to further assesses patients.

Fusion of MRI and ultrasound images has opened a new avenue in targeting tumours and will undoubtedly become more widespread in the future.

In this educational exhibit we discuss the role of MRI-Ultrasound fusion biopsy using cases as examples that we have had in our institution.

Teaching point of poster:

To discuss lesions that are appropriate for fusion biopsy.
To depict the technique of fusion biopsy including risks and complications.
To predict the expanding role that MRI Fusion techniques will have in the future, particularly with the adoption of PI-RADS 2 into the routine assessment of prostate cancer.

P-150 Hiding places of prostate cancer in multiparametric MRI (mpMRI)

Rumman Ahmed; Jay Joshi; Su-Min Lee; Konrad Wolfe; Peter Acher; Sidath Liyanage
Southend University Hospital NHS foundation Trust

Objectives: Using our experience of over 500 patients who have undergone pre-biopsy mpMRI (T2, DWI +/- DCE) and subsequent transperineal saturation prostate biopsy, we aim to:

Illustrate the commonly overlooked areas in diagnosing prostate cancer with mpMRI.
Emphasise technical factors that can contribute to suboptimal image interpretation.
Demonstrate the use of mpMRI to direct further management.

Content: mpMRI can be used to determine the type of prostate biopsy to be undertaken (targeted vs. transperineal vs. transrectal), and predict biopsy outcome to the extent that biopsies may be avoided altogether. Tumour localisation within the prostate gland aids targeted biopsy and influences treatment (e.g. assessing suitability for nerve sparing surgery or radiation dose escalation).

Tumours with unusual appearances and those in uncommon sites hinder MRI interpretation, potentially leading to false-negative or – positive findings. Regions of the prostate which require careful scrutiny include the apex, anterior sectors and the central zone, particularly the peri-urethral zone. Infiltrating tumours or those within areas of inflamed prostate also pose a diagnostic dilemma.

It is also important to recognise that mpMRI has limitations. Technical challenges regarding DWI may lower tumour sensitivity due to anatomical distortion, inadequate suppression of benign prostate tissue and suboptimal ADC map windowing.

Impact: It is vital that radiologists are aware of the commonly missed locations of prostate cancer and the limitations of mpMRI, particularly in the context of a multidisciplinary team setting. This would serve to improve diagnostic accuracy, target areas for biopsy more precisely and direct appropriate management.

P-151 Multiparametric MRI prostate in the diagnosis and surveillance of prostate cancer in a district general hospital. Comparisons with histology results and outcomes over a 36 month period

Lucie Spooner; Jamal Abdulkarim; Philip Polson
George Eliot Hospital

Aims: To assess the value of Multiparametric MRI (MPMRI) Prostate in the diagnosis and surveillance of prostate cancer.

Content: Outcomes of every MPMRI Prostate performed in a district general hospital over 36 months was reviewed against histology results. We analysed for true negatives and positives, false negatives and positives and reviewed all follow up information for the patients. We also reported in with parameter the abnormality was noted (T2, Dynamic or Diffusion weighted images).

Outcomes: Total number analysed: 92 -six month period. (207 MRIs still to be reviewed to cover 3 years)

Data to date:
Number of participants not referred for a biopsy after MRI: 25
True positives: 31
True negatives: 11
Number of false negatives: 12
Average Gleason score of false negatives: 6
Number of false positives: 13
True positives in which parameter: T2: 26/31, Diffusion: 20/31, Dynamic: 11/31

Discussion: True positives were the most common outcome of the data analysed, giving promising results. Of the MRI results recorded as 'no obvious malignancy seen', 52% were in fact proven malignancies on biopsy. If the remainder of the data analysed (36 months) reflects this pattern, then there may be an indication for either repeat MRI, or a TRUS biopsy regardless of MRI result.

Further analysis including comparisons of biopsy mode (TRUS vs Template Biopsy) and patient outcome will be completed for all 36 months' worth of data. Comparing the reports of MRI Prostates with the opinion of our urology specialist radiologist may also show reporter error to be an issue.

P-152 Investigating the use of bilateral lower limb dopplers in pregnant patients with clinical suspicion of a pulmonary embolism

Ahmed Ali; Shahid Hussain
Heart of England NHS Foundation Trust

The use of bilateral USS dopplers in pregnant patients with suspected PE was investigated in a UK based trust. The current local guidelines advise that all pregnant patients with a suspected PE should first have bilateral lower limb dopplers to check for a DVT. The rationale being that the presence of a DVT would then obviate the need for a CTPA which is associated with a radiation dose to mother and foetus.

Data of pregnant patients who underwent bilateral leg dopplers with a suspected PE over a 2 year period, was collected. 150 patients were identified. 103 patients had both USS and chest scanning (CTPA and/ or VQ scan).

Only 1 patient had a DVT reported on USS out of a total 150 (0.67 %) and this patient was not further imaged. 86 patients had a CTPA, 20 had V/Q scans. 3 were imaged twice due to an inconclusive initial CTPA. There were 6 PEs reported. None of these patients had positive USS dopplers for a DVT (5.8%).

Rates of DVT picked up on USS Doppler in pregnant patients with a suspected PE are low (<1%). The increase in workload and cost is therefore not justifiable. These findings correlate with the RCOG guidelines which only recommend bilateral USS dopplers for use in pregnant patients with symptoms of a PE, who also have signs of a DVT. We recommend these guidelines are implemented into the trust.

P-153 VMAT with SIB vs brachytherapy for gynaecological radiotherapy

Elaine Buck; Norma Simpson; John McGrane; Ian Fraser; Robin Laney
Royal Cornwall Hospitals NHS Trust

Objective: Radiotherapy for gynaecological cancers involves external beam irradiation to the whole pelvis followed by a brachytherapy boost. The purpose of this study was to assess dose reduction to OARs using a VMAT solution compared to four-field brick including a boost using either sequential VMAT boost or simultaneous integrated boost.

Methods: Ten patients previously treated using for cervical cancer were identified. Four plans were retrospectively produced for each patient (four field brick, VMAT phase one, VMAT boost, SIB) providing a phase one dose of 50.4Gy over 28 fractions. The sequential boost dose varied between patients. An averaged boost dose of 31Gy over 32 fractions was used for all SIB plans.

Results: Results demonstrated significantly improved dose homogeneity between the VMAT and four field phase one techniques ($p<0.01$) but failed to find significant reductions to the bladder and rectum. Dose to the bowel was reduced at all dose points ($p<0.01$. Comparing the VMAT and brachytherapy boost, significantly increased doses to OARs were identified in the VMAT boost (bladder $p<0.05$; rectum $p<0.01$; bowel $p<0.01$). Dose homogeneity was decreased using an SIB but OAR doses were also decreased ($p<0.05$).

Conclusions: VMAT improved dose homogeneity with overall reductions in doses to OARs. Comparing the feasibility of SIB or sequential EBRT boost instead of brachytherapy the SIB plan produced a better solution with respect to OAR doses. Whilst cervical surface doses with SIB to the high-risk CTV will not match brachytherapy a SIB may offer an alternative option for those patients who refuse/cannot access brachytherapy.

P-154 How accurate is MRI in identifying endometriosis and its extent?

Danielle Nimmons; L Sandu Aana; P Byrne; G Ahmad; L Limdi
Pennine Acute Hospitals NHS Trust

Aims: MRI has been shown to be an accurate and cost-effective tool for the preoperative staging of deeply infiltrating endometriosis (DIE). At a recognised endometriosis centre an MDT was established in March 2014 to aid management of the condition. This MDT includes gynaecologists, radiologists, urologists, and colorectal surgeons. The severity of disease can be assessed on diagnostic laparoscopy. However MRI is a non -invasive tool that can help women in making a choice of different treatment options. The aim of our retrospective quality improvement project was to compare preoperative MRI findings and diagnostic laparoscopic results.

Content: Forty-five patients were included in this MDT between 07/04/14 and 03/01/15. Thirty-six patients who had DIE on MRI were included in the study. MRI findings, MDT results, histology and laparoscopic findings were collected for these patients. These were tabulated and analysed using Microsoft Excel.

Impact/relevance: MDT discussion of MRI and laparoscopic findings is vital to formulate management plan.

Outcomes: Twenty-five out of the 36 patients had surgery, 6 chose medical treatment and 5 are awaiting surgery. Due to the MDT a patient was identified as having diverticular disease and not endometriosis. Overall, approximately 80% of MRI findings correlated with laparoscopic findings. This was 92% for bladder endometriosis, 76% for recto-vaginal, 64% for rectal, 80% each for left and right endometrioma; and 83% for bilateral endometriomas.

Discussion: MRI is beneficial for localising and mapping DIE. It helps plan MDT approaches to surgical management and helps women to make an informed choice.

P-155 Atypical adnexal lesions

C.A. Johnson[1]; S.J.L. Johnson[2]
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Pelvic lesions can be difficult to interpret by the registrar or non- GU radiologist. Some lesions have classic imaging characteristics which can help make a diagnosis but others are more complex. This poster review tackles the atypical benign and malignant lesions seen in the pelvis with helpful pearls and pitfalls to make an accurate diagnosis. Cases will be illustrated by MRI, PET-CT, CT and US from a large hospital trust and the poster will be produced by a dedicated gynaecological consultant radiologist.

P-156 SCAR pregnancy

Georgia Priona[1]; Jessica Watts[2]; Bilal Sethi[1]; Alim Yucel-Finn[1]; Emma Ramage[1]
[1]University of Aberdeen, [2]NHS Grampian

Aim: Caesarean ectopic pregnancy is the rarest type of ectopic pregnancy estimated to occur in ~1:1800-2200. We are presenting MRI and ultrasound findings of 3 cases.

Content: Implantation takes place within the scar of a prior cesarean section, separate from the endometrial cavity. Within the scar, the blastocyst is surrounded by myometrium and fibrous tissue.The clinical presentation is varied and vaginal bleeding can present at any stage.
Complications include rupture resulting in severe haemodynamic compromise or infection secondary to retained products.
Our three cases represent imaging of different gestational ages of scar pregnancy.
One of these cases also demonstrates a late complication of retained products.

Relevance impact: The gestational sac is usually visualized within the anterior wall of the lower uterine segment. The diagnosis can be made by visualizing enlargement of the cesarean scar and a mixed mass or clear gestational sac at the site. A very thin layer of myometrium separates the maternal urinary bladder wall and the gestational sac; best seen on MRI. Prominent peritrophoblastic flow around the gestation is best appreciated on Doppler sonography.

Outcomes: Implantation and trophoblastic invasion into caesarean scar tissue may result in uterine rupture and hemorrhage, which can be life threatening.

Discussion: Although successful births have been described in literature, many recommend interruption of the pregnancy when the diagnosis is certain because of the significant risk of emergency hysterectomy associated with expectant management of a viable cesarean section scar pregnancy.

P-157 Assessing the quality of the hysterosalpingogram (HSG) service of Pennine Acute Hospitals Trust

Mariyah Selmi; Thomas Rogers; Madhu Dutta
The Royal Oldham Hospital

Aims: To assess the quality of the HSG service across the Pennine Acute Trust compared to reference limits from the Health Protection Agency.

Background and targets: According to NICE guidelines HSG is the first line investigation for tubal patency in women with no comorbidities. The Health Protection Agency has strict criteria to reduce unnecessary radiation doses in women of child baring age.

Current targets are set at 100% for: Radiation dose (DAP) must not exceed 4 Gycm2, fluoroscopy time should not exceed 60s, 4 key images should be obtained (early uterine filling, late uterine/early tubal filling, late tubal filling, and free intra-peritoneal spill of contrast) and examinations should be reported within 7 days.

Method: A retrospective study was conducted of Trust wide HSG's over 2014. The above targets were analysed to determine if examinations were within National guideline limits.

Results: 307 patients analysed. 97% were within the dose limit of 4 Gycm2. 94% had an exposure time of equal or less than 60 seconds, of the remainder of cases 94% had over 4 images taken accounting for increased exposure time. 95% had at least 4 keys images and 97% of examinations were reported within 7 days of the investigation.

Outcome: These results are very promising and show an effective and efficient service. This will be fed back to the radiology department. To insure that all targets are met (100%), radiographers will be asked to note any cases which exceed limits for further analysis and re-audited next year.

Paediatrics

P-158 Renal scintigraphy in children – is the posterior view sufficient for accurate interpretation?

Siddique Ahmed; Mohamed Shawgi; Henk Jongschaap
James Cook University Hospital, Middlesbrough

Introduction: Renal scintigraphy using DMSA is commonly used for detection of renal cortical abnormalities related to urinary tract infections in children. Current guidelines recommend posterior and posterior oblique views for image acquisition. However, performing renal scintigraphy on restless children can be challenging and is a practical problem for our nuclear medicine technicians. The purpose of this study was to evaluate the usefulness of posterior oblique views in image interpretation.

Method: Retrospective analysis of all paediatric DMSA renal studies performed during a 6-month period. All abnromal studies were evaluated by two experienced observers who recorded whether two views were required to make an accurate interpretation or whether a single posterior view would have been sufficient.

Results: Although 41 abnormal studies were identified on PACS, images were available for only 35. Both observers agreed that the second view (posterior oblique) was not required in any of the 35 patients.

Conclusion: Despite the small number of patients, our results indicate that a single posterior view is sufficient for accurate interpretation of renal DMSA studies in children. Obtaining two good quality views in restless children can sometimes be difficult and stressful for the patient, parents and staff involved. The results of our study suggest that all efforts should be made to obtain good posterior views even if the posterior oblique views cannot be obtained. This however, does not mean that posterior views should not be obtained when possible.

P-159 Paediatric renal cortical (DMSA) scans: Quality vs quantity?

Peter Strouhal; Arash Bakhtyari; Helen Balmforth; Fiona Whittingham; Peter Turner
Royal Wolverhampton Hospitals Trust

Aims: Evaluate local paediatric DMSA scan quality/protocol.

Content: Audit of our DMSA renograms against those from other sites using same protocol apart from dose, to evaluate local scan quality, scan times and assess if current ARSAC doses are too high.

Relevance: A recent CQC audit highlighted local DMSA injected doses for paediatric population DMSA renograms at our institution were lower than ARSAC recommendations. Although our doses were in line with ARSAC 1999 guidance and manufacturer summary of product characteristics, the CQC suggested these doses may produce inferior quality scans with increased scan times and increased patient discomfort levels. We were prompted to undertake a formal review of our procedures including scan protocol, injected doses and image quality and compared these with DMSA renograms from other sites.

Procedure and outcomes: 30 local and 30 external imported scans audited. Scan times and injected doses were looked at. The image quality was graded against a 4-level image quality template taken from previous IAEA/IPEM project. 2 radiologists and 3 radiographers independently reviewed non-blinded images.

Discussion: Obvious bias of knowing source of the images could not be avoided for technical reasons. There was good scan quality correlation between our lower dose protocol and those using higher/ARSAC recommendations. We were able to cease acquiring anterior (as well as posterior) images for DMSA scans as a way to reduce scan times following this audit. It never-the-less still suggests, using ALARP principle, that current ARSAC doses could be reduced back to 1999 levels.

P-160 Where has my kidney gone to? - A rare case of solitary pseudo-crossed renal ectopia

Keisha Kamalanathan; Sunil Reddy
Royal Gwent Hospital, Aneurin Bevan University Health Board

Renal ectopia is a rare anomaly of the urinary tract, usually presenting after infancy. It is often diagnosed during an autopsy or incidentally with evaluation for other associated abnormalities. Pseudo-crossed renal ectopia is an exceptionally rare entity where an initially normal positioned kidney is found to be displaced to an abnormal location in subsequent radiological investigations. Causative factor tends to point towards mass effect, congenital diaphragmatic hernia or more commonly, ureteropelvic junction obstruction with varying levels of vesicoureteric reflux. We report a case of solitary pseudo-crossed renal ectopia diagnosed in infancy without an apparent secondary cause.

It was red-flagged to the department that a routine antenatal anomaly scan showed a dilated upper portion of the right kidney. The newborn baby check, done in January confirmed no gross abnormalities. An organised post-natal KUB USS in February that showed a duplex right kidney and a normal left kidney in acceptable positions. A follow up scan in May exhibited a normally positioned left kidney with migration of the right kidney; lying behind the liver, no longer duplex in nature. An MRI was organised, showing the same presentation without additional surrounding abnormalities. A diagnosis of congenital diaphragmatic hernia was queried and the case referred to the tertiary renal unit for further discussion and management.

Mechanism of migration is still unknown. The kidney albiet abnormal in position, has normal function demonstrated by the ensuing DMSA scan. The infant continues to thrive, yet documentation should be available for future reference.

P-161 Intussusception; ultrasound diagnosis and management of small vs large bowel

Noman Qayyum; Muhammad Umair Majeed; Nadir Khan
University Hospital of North Midlands

Intussusception is defined as the telescoping of one segment of the bowel into an adjacent one. These occur in children of 3 months to 3 years of age with male dominance. A classic triad of acute abdominal pain, currant-jelly stools or haematochezia and a palpable abdominal mass is present in less than 50% of children with intussusception. Ultrasound is the best imaging tool to diagnose their location and extent. Intussusception can occur both in small and large bowel, more common in later which is usually an ileo-cecal rather than a large into large bowel. Ultrasound is the best imaging tool for its diagnosis, can give the extent of involvement and be able to differ between small and large bowel. This is important as the management of both is different. We present the imaging appearance of small and large bowel intussusception, technique of ultrasound examination and its management.

P-162 Evaluation of the SpineAnalyser software programme on radiographic images for children

Fawaz Alqahtani; Amaka Offiah
Department of Oncology and Metabolism, Academic Unit of Child Health, Sheffield Children's NHS Foundation

Purpose: There is significant inter and intraobserver variability in diagnosing vertebral fractures (VF) in children, with a need to develop more objective methods. Semi-automatic software programmes such as SpineAnalyser may be the solution.

Methods: VF diagnosis was performed independently by five observers using the SpineAnalyser software from T4 through to L4 from the lateral spine radiographs of 137 children and adolescents with a median age of 12 years

(range 5-15). A previous consensus read by 3 paediatric radiologists using a simplified ABQ technique (i.e. no software involved) served as the reference standard.

Results: Of a total of 1781 vertebrae, 1187 (66.64%) were adequately visualised by 3 or more observers. T5 was the most unreadable level 37.22% (51/137) and the two highest visualised levels were L2 and L4 (82.48%, 113/137 and 81.02% 111/137 respectively). Diagnostic accuracy (sensitivity, specificity and 95% confidence intervals) and inter observer reliability (Cohen's kappa) calculations of SpineAnalyser are on-going.

Conclusion: There was relatively good readability of vertebral bodies of mid thoracic and lumbar spine. However visibility was somewhat limited in the upper thoracic spine. Reasons included the summation caused by intrathoracic tissues and shoulders; poor image quality; and patient positioning. Once data analysis has been completed, we will present sensitivity, specificity and observer reliability of a software tool compared to routine qualitative radiographic analysis for VF diagnosis in children.

P-163 Imaging evaluation of the limping child

Alan White[1,2]; Kate Kingston[1]; Julie Cooper[1]; Anna Murphy[1]
[1]York Teaching Hospitals NHS Foundation Trust; [2]Leeds Radiology Academy

Aims: To illustrate the wide spectrum of causes of childhood limp, discussing the role of imaging in establishing diagnosis.

Content: We present a pictorial essay illustrating the varied causes of childhood limp. Including: trauma; transient synovitis; sacro-ileitis: bone, joint and soft tissue infections; slipped upper femoral epiphysis (SUFE); Perthes disease; developmental dysplasia of the hip and rare conditions including tumours and idiopathic chondrolysis.

Relevence: A limping child is a common clinical presentation, 1.5-3.6/1000, usually a mild, self-limiting event. However, it can indicate significant, even life-threatening illness. York Hospital catchment population is 350, 000 with 56, 000 <16 years. Sepsis is most important atraumatic cause to diagnose promptly as delayed treatment can cause devastating long term consequences. Imaging evaluation is common, the diagnostic challenge to establish causality and ensure prompt diagnosis.

Outcomes: Plain radiography and ultrasound are the main imaging techniques with MRI and CT used on a selective basis. Combined with clinical evaluation and laboratory tests these imaging techniques can ensure a prompt diagnosis is reached. We present our imaging strategy for investigation of the limping child.

Discussion: Imaging is important in the diagnosis of a limping child. The limp is a symptom, the diagnostic challenge to establish causality and to ensure prompt diagnosis of sepsis and other conditions with significant long term and potentially devastating consequences.

P-164 Evaluating primary care referrals for ultrasound of soft tissue lumps in children and young adults. How does it correlate with NICE guidelines?

Ian Russell; Teik Chooi Oh; Syed Ali; Simon Beardmore; Vinay Parmar
Lancashire Teaching Hospitals NHS Foundation Trust

Following the updated 2015 NICE guidance for the investigation of suspected soft tissue sarcoma in children and young adults, we reviewed our service for Primary care ultrasound (US) referrals for investigation of soft tissue lumps. We collected data from the preceding 12 months, looking at paediatric and young adult referrals; which under new guidance should have ultrasound imaging within 48 hours for suspected soft tissue sarcoma. In our review, we found 99 patients were referred for US investigation of soft tissue lumps, of which 8 requests were marked urgent. Most of the patients were in their late teens (mean 16.0 years old, IQR 11-22 years old). The average time from referral to scan was 25 days, with a maximum wait of 60 days. There was 1 case of lymphoma; otherwise all scans were normal or showed benign pathology. Only 2% of patients were scanned within 48 hours; however 96% were scanned within locally agreed time limits. 8 patients required referral to other services and 3 patients needed additional scanning. Serious pathology was detected in only 1 of the 99 patients, with no cases of sarcoma detected. The 2015 NICE guidance is vague about what constitutes a suspected sarcoma (unexplained lump that is increasing in size). From our experience, we suggest that recommendation for a scan within 48 hours would only be appropriate for individually discussed patients in whom there was a very high level of clinician concern, as we have confirmed that most lumps are benign.

P-165 Pre gestational and paediatric mobile chest imaging

Jenna Knowles; Kirsty Livesley
Warrington and Halton Hospitals NHS Foundation Trust

Throughout the UK, most of the neonatal chest X-rays are performed in non-specialist hospitals. Within our district general hospital we have performed on average around 227 portable neonatal chest X-rays each year on the Neonatal Unit (NNU). The quality of these X-rays has been an international issue for over 20 years. Most are performed AP Supine with a small percentage being performed decubitus or prone. There is very little guidance aimed at radiographers who undertake these examinations.

An audit was undertaken within our Trust that looked at pre-gestational chest imaging. This looked at the previous 12 months chest images performed and the quality of these X-rays. When assessing quality the positioning, use of lead protection, collimation, radiation dose and exposure will all be evaluated.

As a result, this poster aims to assist the radiographers when undertaking these examinations and ways to improve their technique which in turn will improve image quality.

P-166 Imaging patterns of hypoxic ischemic encephalopathy (hie)

Muhammad Umair Majeed; Noman Qayyum; Nadir Khan
University Hospital of North Midlands

Neonatal encephalopathy when caused by diffuse hypoxic-ischemic brain injury is called hypoxic-ischemic encephalopathy (HIE).

Severe HIE to the premature brain typically injure the thalamus, anterior part of the vermis, and dorsal brainstem . In mild to moderate ischemia the most common location for injury to premature brain is periventricular white matter. Thalami, brainstem, and cerebellum in the immature brain have high metabolic activity, they are susceptible to injury in severe hypotension, seen as hyperechogenicity of the injured brain at US, hypoattenuation at CT, and restricted diffusion at MR.

The primary locations of ischemic injury in the term neonatal brain are the watershed territory. In severe ischemia metabolically active tissues in the brain are most susceptible to injury and include the lateral thalami, posterior putamina, hippocampi, brainstem, corticospinal tracts, and the sensorimotor cortex. US findings may include hyperechogenicity of involved structures .Changes on CT scans include mild hypoattenuation of the thalami and basal ganglia.

Multisystem disorders

P-167 Venous thromboembolism and investigations for cancer

Charles Hall; Lilia Khafizova; John McCaig
St Helens and Knowsley Teaching Hospital NHS Trust

Aims: The incidence of new cancers in patients with idiopathic venous thromboembolic disease (VTE) is approximately 4-10%. NICE have recently released new guidance regarding the investigation for occult cancer in patients with a first unprovoked VTE. It recommends that these patients who are not known to have cancer should be offered a physical examination, chest radiograph, blood tests and urinalysis. Those aged over 40 years, further investigation with abdominopelvic computed tomography (CT) should be considered. The aim was to audit compliance with NICE guidance and to determine the overall cancer detection rate.

Methods: Retrospective review of patients diagnosed with VTE attending anticoagulation clinic over a 3month period. Evaluation of the patient demographics, clinical details and subsequent investigations for cancer was performed. Discrepant cases were reviewed by two operators.

Outcomes: 110 patients over a 3 month period were identified. 15 patients did not meet the inclusion criteria. 95 were included into the analysis. 50/95 were aged over 40 years and presented with a first unprovoked VTE. 37/50 (74%) underwent chest radiography. 21/50 (42%) underwent abdominopelvic CT. Cancer was detected in 2/50 (4%).

Discussion: Our findings show that there is an inconsistent approach to the subsequent investigation of patients diagnosed with VTE. The overall prevalence of occult cancer is low, and given the known risks of exposure to ionising

radiation there is little evidence in the use of abdominopelvic CT in these circumstances. We plan to re-audit, evaluating greater patient numbers and check for improved compliance with chest radiography standards.

P-168 Pictorial review of abdominal and pelvic TB mimicking other pathologies

Richard Hopkins; Helen Oliver
Cheltenham General Hospital

Aims/objectives: Our pictorial review will demonstrate the CT findings of abdominal and pelvic tuberculosis infection, mimicking diffuse peritoneal disease and small bowel inflammation. We hope to remind radiologists of the unusual presentations of TB, and to keep this aetiology in mind when reporting CT studies.

Content: The pictorial review of the unexpected cases of abdominal and pelvic tuberculosis infection will demonstrate the imaging findings from a number of patients. Cases demonstrate:

Infection mimicking primary or metastatic peritoneal disease with CT features of nodularity, omental and peritoneal stranding and ascites. The case was an unexpected finding as the patient had no particular recent risk factors for TB.

Infection mimicking small bowel Crohn's disease with CT features of segmental small bowel mucosal thickening, luminal narrowing and omental stranding. The patient had previously been treated abroad for TB as an adolescent several years ago. The symptoms were more typical of inflammatory bowel disease, and had no other features of active TB infection.
Ascites and peritoneal enhancement in a patient with no risk factors for TB.

Relevance/impact/discussion: Tuberculosis infection is becoming increasingly common in the UK, with an expected increase therefore in unusual and unexpected presentations. We hope to remind reporting radiologists of the features of abdominal and pelvic TB infection mimicking common pathology, so as to suggest this aetiology as a differential diagnosis in the appropriate setting .

P-169 Vasculitis through the airways: Pictorial review of the respiratory involvement in granulomatosis with polyangitis (GPA)

Roopa Tekkatte; David Collins; Nicholas Ridley
Great Western Hospital, Swindon

GPA is a systemic necrotising granulomatous vasculitis (formerly known as Wegener's granulomatosis) predominantly affecting the respiratory and renal systems. Laboratory investigations include raised inflammatory markers (CRP/ESR), positive anti neutrophil cytoplasmic antibodies (ANCA) and proteinase 3 (PR3) antibodies. Imaging modalities include plain X-ray, CT and MRI. Other investigations include bronchoscopy, nasal or sinus biopsy. Respiratory tract involvement is manifested as nasal crusting/ bleeding, sinus inflammation, subglottic stenosis, bronchial wall thickening, pulmonary infiltrate, pulmonary nodule, cavitating mass, ground glass opacity and consolidation.

Here we have reviewed our rheumatology and radiology case files and have constructed a pictorial review of this condition's effect on the respiratory tree. This includes sinus, tracheal, bronchial and lung parenchymal abnormalities. Imaging modalities include plain X-ray, CT and MRI scans.

P-170 Incidentaloma- storm cloud or silver lining?

Nicholas Carter; Dave Gay
Derriford Hospital

Aims: Over 5 months 247 CT Traumograms were performed in a trauma centre. We noted malignancies detected incidentally due to the CT scan.

Content: Three incidental malignancies were identified. Two were potentially curable and one is receiving palliative treatment.

A motorcyclist involved in an RTC sustained a femoral and clavicular fracture, a small subarachnoid and subdural haemorrhage, and an incidental T4N3M0 bronchogenic carcinoma was identified. This subsequently was biopsied and discussed in MDT and surgery is being planned pending histology result.

A woman was trampled by cows and sustained a scapula and rib fractures. A breast mass was identified with bone and liver lesions. She subsequently underwent breast biopsy that confirmed metastatic breast cancer for which she is undergoing palliative treatment.

A woman fell down a flight of stairs and underwent a trauma scan which revealed no acute life threatening or treatment changing findings. It did identify a sigmoid mass which was later characterised as a 6cm tubulovillous adenoma on MRI. Histopathology results are still awaited but if cancerous this will be a curable T1N0M0 sigmoid tumour

Outcome: Pending histopathology results 2 cancers may be cured that if identified later could have been inoperable, and one metastatic breast cancer was identified, and life prolonging therapy commenced.

Discussion: As more imaging is being performed incidental findings are increasing, often burdening follow-up imaging. These cases demonstrate when performing CT for trauma it is prudent to identify and follow up relevant incidental findings.

P-171 Diagnostic yield and utility of CT chest, abdomen and pelvis imaging in the investigation of weight loss?

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Introduction: Standard follow up and cancer staging involves CT of chest, abdomen and pelvis (CT CAP). Such imaging is often extended to investigate unexpected weight loss or systemic upset without clear evidence base1. Radiation exposure, equivalent to seven years background radiation, is administered. Cumulative risk can be estimated2, but appropriate patient selection is necessary.

Aim: Investigate indications, yield and outcome of CT CAP scans in medical specialities. Secondary aim considered the predictive value of clinical factors and CRP/ESR.

Methods: All CT CAP scans performed over a six month period in a district general hospital were reviewed. No known Oncology imaging requests were included. Radiologist reports and referrer history were reviewed. Patient demographics, indications, medical specialty, imaging diagnoses and CRP/ESR pre-scan were recorded.

Results: 175 Scans performed with median age 73 years. In 89% (n=155), the request was suspected malignancy with unexplained weight loss. 61% of total patients (n=107) scanned had no known prior malignancy; 17% (n=18) had new malignancy diagnosed and 25% (n=17) required further diagnostic imaging. Overall 55% (n=85) of all query malignancy scans were negative.

CRP and /or ESR was performed in >95% pre-scan with positive predictive value of 30% (n=46) in malignancy when ESR>15 and CRP>10.

Discussion: 42% demonstrated malignancy/suspected malignancy suggesting reasonable patient selection. Earlier diagnosis means early treatment and avoiding missed diagnoses. This series suggests CRP/ESR neither adequately predicts nor excludes malignancy but raises the suspicion of infection when elevated. Weight loss and older age remain significant, yet non-specific, clinical predictors of malignancy.

Errors and discrepancies

P-172 To 'Err is Human': A methodological framework limiting radiographic error?

Christopher Hayre
University Campus Suffolk

This poster proposes a methodological framework enabling radiological practitioners to critically explore and reflect on radiological errors/near misses within the clinical environment. The methodology employed was used as part of a PhD study conducted in the United Kingdom in 2012. The PhD methodology highlighted errors and near misses within the general imaging environment leading to national and international publications. The methodology proposed can be employed in other clinical environments such as 'higher dose' modalities including computed tomography and interventional imaging. The poster discusses the methods employed and supporting philosophies. Importantly it proposes a step by step guide for prospective researchers and practitioners to critically reflect on

'what radiographers do and how they do it'. This is important to consider because it remains generally accepted that 'no safe radiation dose' exists and still remains the largest artificial source to individuals globally.

P-173 Traffic light: An alternative approach to abnormality signalling

Sarah Higgins; Chris Wright
Sheffield Hallam University

'Red dot' is the most common form of abnormality detection system in clinical practice. The SCoR 2013 policy recommends replacement with preliminary clinical evaluation (PCE) however this requires a different skill set. This research presents the results of a 'traffic light' system which requires the radiographer to make a decision on all images and could help bridge the gap.

Radiographers (n=39) at a busy NHS hospital were required to make a decision on every patient examined 24/7 for three weeks. 'Red' = abnormal, 'Green' = Normal, 'Amber' = unsure; and provide a PCE. Responses were later correlated with the official report to assess image interpretation performance.

Of the 1411 examinations performed 34% (n=484) received a red or green response; Accuracy 93%, Sensitivity (Red TP) 84%, Specificity (Green TN) 97%; however a marked decline in performance was evident during the night shifts. 66% (n=927) received an amber response. Elbow (19%) Knee (14%) and Shoulder (14%) were the most common anatomical regions of uncertainty. 26% of the radiographers (n=10) selected amber for all examinations performed and provided no commentary.

Some radiographers prefer not to participate in any form of ADS. Using the traffic light system, those that do appear to make reliable decisions (red or green) when they can, but opt for amber when unsure. It is now obvious to the referring clinician that additional input may be required to confirm the diagnosis. The amber responses facilitate the targeting of professional development activities in order to scaffold learning.

P-174 Are diagnostic radiographers 'image acquisition' experts?

Christopher Hayre
University Campus Suffolk

This paper challenges whether diagnostic radiographers remain 'image acquisition' experts in an imaging modality that constitutes approximately 90% of all radiological examinations. The use and practice of general radiographic examinations were explored as part of a PhD study in the United Kingdom. The radiographers in the PhD work acknowledged their limited knowledge and understanding of advancing digital technology. Historically radiographers knew if an X-ray film had been over or underexposed because radiographs appeared 'too white' or 'too black'. This paper argues that if radiographers fail to understand advancing technologies in a general imaging modality how can radiographers begin to optimise an imaging modality that remains a large part of radiographic work undertaken? This is central to the role of the radiographer in keeping with the 'as low as reasonably practicable' principle thus arguably important to consider in our profession.

P-175 Exposure errors? Assessing X-ray exposures using digital radiography

Christopher Hayre
University Campus Suffolk

This poster explores the use of X-ray exposures following the introduction of digital radiography. Radiographers are central to delivering optimum levels of ionising radiation whilst maintaining sound image quality for radiological interpretation. Yet do radiographers utilise X-ray exposures appropriately? A central theme uncovered as part of a Doctorate of Philosophy (PhD) study was the lack of autonomy concerning X-ray exposures within the general imaging environment. The findings highlight ‘how radiographers behave’. For example, some radiographers do not alter ‘pre-set’ X-ray exposures, arguably failing to produce images of optimum diagnostic quality. Secondly, radiographers acknowledge ‘whacking up’, ‘cranking up’ and ‘bumping up’ X-ray exposures ensuring image production. In conclusion this poster provides an original insight into the attitudes and behaviours of radiographers regarding X-ray exposures in contemporary practices using digital radiography. Dose and image optimisation are central tenets of radiographic practice that may be hindered in contemporary practices.

P-176 Inflammatory liver lesions mimicking metastatic disease

Ese Adiotomre; Hannah Warner; Robert Peck
Sheffield Teaching Hospitals NHS Foundation Trust

Aims/objectives: The purpose of this exhibit is:
To review the appearances of inflammatory disease of the liver
To highlight imaging appearances of inflammatory liver disease which can mimic malignancy

Content: Review of the variable imaging appearances of this unusual group of conditions on US, CT and MRI illustrated through four biopsy proven cases.

Relevance/impact: An incorrect diagnosis of metastatic disease and the expected prognosis that may be incorrectly given has psychological, social and possible financially damaging implications for the patient.

Outcomes: We will present a pictorial review of 4 cases of benign inflammatory liver disease initially diagnosed as metastatic cancer on imaging.

Discussion: It is useful to remember this group of entities when considering a diagnosis of metastatic disease without a known primary or in cases where repeat tissue biopsy fails to demonstrate malignant cells.

P-177 Preliminary clinical evaluation: The What/Where/How (WWH) approach to scoring

Tatsuhito Akimoto; Chris Wright; Pauline Reeves; James Harcus
Sheffield Hallam University

The SCoR is driving for preliminary clinical evaluation (PCE) however; currently there is no method of quantification to assess quality. FRCR has an approach to quantify comments in the rapid reporting examination (CR2B).The aim of this project was to develop a robust scoring system that enables comprehensive image evaluation regardless of profession.

An image test bank was administered using RadBench with equal prevalence of normal /abnormal. A random sample of attempts was selected to pilot the scoring model. Sensitivity, specificity and accuracy were calculated. A scoring system (WWH) was developed based on the WHAT (fracture type), WHERE (location), HOW (displacement/angulation) concept (Harcus & Wright 2014) to evaluate the PCE. The results were compared to those obtained using the FRCR model.

Calculated actual mean accuracy, sensitivity and specificity scores were 87%, 80% and 93% respectively. FRCR scores were 88%, 80% and 97%. WWH scores were 65%, 37%, and 93%. The FRCR score appears to mirror the actual decision scores however it does not reflect the fact that the PCE for abnormal cases is often incomplete; 'What' 67%, 'Where' 87%, 'How' 7%.

The PCE score should ideally correlate with the actual score in order to provide useful information to the referring clinician. Whilst most comments state the location, less states the type, and very few refer to angulation or displacement. Analysis of the PCE is a useful indicator for targeting professional development. The same model could be applied to radiology reports, regardless of profession, to provide an auditable assessment of quality.

P-178 Magnification assessment aids: Evaluation of practice

Kimberley Carlile; Chris Wright
Sheffield Hallam University

This research evaluated the role of magnification assessment aids as part of the imaging process of knees and hips, in the workup for orthopaedic surgery.

The quantitative method used the orthopaedic template scaling ball in routine use. Positioning was recorded from direct observation of radiographers (n=14) examining patients (n=56), focus receptor distance, as well as the completed images. A model was also developed and tested to demonstrate the variation in magnification when using different FRD's.

20% (n=11) of cases failed to demonstrate the whole scaling ball. For supine pelvis examinations the ball was positioned either between the legs at the symphysis pubis (62%), lateral skin surface level with the greater trochanter (25%) or directly on the table top (13%). For AP knee examinations; 60% in the middle of the coronal

plane, 28% on the table top, and 12% in the middle of the sagittal plane. 100cm FRD was used by half the radiographers; others ranged from 90-130cm.

Inaccurate positioning of the template scaling ball can ultimately lead to measurement errors which may impact surgical outcomes. A defined protocol for practice is recommended to ensure consistent FRD, placement of the scaling ball, and inclusion on the resultant image.

P-179 Implementation of NICE recommendations on abdomino-pelvic CT, following unprovoked venous thromboembolism, in a UK teaching hospital: No additional detection of occult malignancy and high numbers of incidental findings

David Garwood; Bryan Renton; Elizabeth Joekes
Royal Liverpool University Hospital

Introduction: NICE Clinical Guideline 144 recommends patients with an unprovoked-VTE, who don't have signs/symptoms of cancer on initial investigation, be considered for further investigation with an abdomino-pelvic CT to exclude occult malignancy. We aimed to evaluate numbers of scans performed/outcomes in a UK teaching hospital following this recommendation.Methods: Retrospective review of CT scans performed before and after publication of the NICE guidance in 2012. CT reports and case notes were analysed.Type/stage of malignancy, treatment and other relevant findings were documented. For the 2014 data set, incidental radiological findings and follow-up recommendations were reviewed.

Results: The number of CT-scans requested for "unprovoked-VTE", rose by 142% following publication of Clinical Guideline 144. In the 2011-2012 data set, 21 patients were included, one of which was found to have a malignancy, which was clinically overt at diagnosis (not occult). Five patients (23.8%) had incidental findings requiring further investigation. In the 2014 –2015 data set, 51 patients included, five (9.8%) were found to have malignancy. In retrospect, all showed signs/symptoms of potential malignancy on initial investigation and were inappropriately requested under NICE criteria. No occult malignancies were detected in correctly referred patients. Incidental findings warranting further investigation were reported in ten cases (19.6%). Follow-up advice was deemed incorrect in four of these.

Conclusion: Addition of abdomino-pelvic CT scan in patients with first unprovoked VTE and no signs/symptoms of cancer on initial investigation, significantly increased the number of scans and incidental findings, but didn't pick-up any additional occult malignancies.

P-180 It's only words. A comparison of transcription error rates in radiology reports produced via voice recognition software and traditional dictation

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Hull & East Yorkshire NHS Trust

Background: Voice Recognition (VR) software has replaced Traditional dictation (TD) in most radiology departments for transcribing reports. Although VR has been a factor in reducing the turnaround time of reports and increased productivity, questions still remain over the accuracy of reports compared to TD. Studies have shown that between 4-42% of reports dictated with VR software contain transcription errors. These errors can potentially have a significant impact on patient management.

Purpose:
1. To evaluate the number and type of transcription errors within radiology reports produced via Voice Recognition (VR) software at our institution.
2. To compare the error rate of voice recognition (VR) with error rate of traditional dictation (TD) transcription.

Method: We retrospectively analysed 100 consecutive reports each for CT, MR, US and plain film in Jan 2014 produced via the VR software. We then compared this with 100 consecutive reports each for CT, MR, US and plain film in Jan 2009 produced via Traditional Dictation (TD). Errors in the reports were categorised into minor errors, major errors and nonsensical phrases.

Results/conclusion: Out of the 400 reports produce via VR, 98 reports (24%) contained errors. The majority of these (96/98) contained minor errors. One report contained a major error and one report contained a nonsensical phrase.

In contrast 30 reports (7%) produced via TD contained errors, all of which were minor errors. In summary VR transcribed reports have a significantly higher error rate than TD transcribed reports with more major errors which can impact patient management.

P-181 Managing PACS errors in radiology: Utilising a quality management system (QPulse)

Katie Pickles; Beverly Snaith; Gareth Cinnamon
Mid Yorkshire Hospitals NHS Trust

Aims: To review non-conformance errors in a PACS system.
To share experience of using a quality management system for non-conformances.
To review errors from a single NHS Trust.

Content: In 2014 the non-conformance module of the Q-Pulse system was set up to manage PACS errors. This allowed the team to design an electronic form which once completed alerted staff that there was a pending request. PACS administrators now receive an email alert of errors requiring action. Data analysed over twelve months showed that 0.12% of images required PACS changes, these are auditable and can be analysed by reason as well as owner, modality, hospital site and days to closure. Once the error has been corrected the system also alerts the individual who identified the error and requests a check and approval of the change, thereby closing the loop.

Relevance: In the filmless radiology environment errors occur during patient or examination identification and result in a non-conformance. These errors require communication with the radiology IT systems team and manual intervention to correct, usually through a paper-based system. Previous studies of PACS errors have identified the prevalence to range from 0.2 to 0.5% of images acquired.

Outcomes: Quick and efficient management of such changes has enabled errors to be communicated and rectified with secure data transfer. The continuous audit process has also highlighted staff training issues and improved communication between systems and clinical teams. The innovation in radiology PACS processes has led to improved governance thereby increasing quality of care and reduced risk.

P-182 Evaluating the need for intra fraction motion monitoring scans for tomotherapy delivered SABR

Sarah Petty; Christopher Thomas
Guy's and St Thomas' NHS Foundation Trust

In August 2015 we began to deliver SABR under the Commissioning through Evaluation(CtE) programme. Prior to this the department delivered SABR to NSCLC with step and shoot or VMAT IMRT on conventional linacs. Pre-correction, post correction and post treatment CBCT's were acquired with the option of a mid CBCT for step and shoot IMRT. Average intra-fraction motion was 0.008mm(x) (+/-0.06), 0.004mm(y) (+/-0.1) and 0.028mm(z) (+/-0.09). It was concluded the post treatment scan could be safely omitted and that a mid treatment CBCT was not necessary thus reducing the amount of time the patient remained in the treatment position for.

A VMAT solution for all SABR CtE indications (spine, pelvic/spine re-irradiation and lymph nodes) was not possible, however acceptable Tomotherapy plans could be produced. In order to ascertain intrafraction motion, evaluate verification requirements vs increasing the risk of intrafraction motion, guide immobilisation design and investigate the option of reducing PTV margins, a pre-, mid- and post-treatment imaging schedule was implemented.

Verification data were analysed for each immobilisation technique used and were correlated with beam on time and scan time demonstrating:

Intra-fraction motion is within acceptable limits in the of context of the PTV margins applied.

Recommendations can be made to remove mid treatment and post treatment scans reducing the overall treatment time and possibility for motion to occur dependant on beam on time and immobilisation technique used.

Health informatics

P-183 Accuracy of radiology requests and reports – are patients at risk?

Peter Brown; Oliver Hulson; Gemma Sheehan-Dare
Leeds Teaching Hospitals Academy of Radiology

Aims/objectives: To determine the accuracy of voice recognition software-generated reports compared to the accuracy of electronic imaging requests. We used the RCR AuditLive template (less than 5% errors overall, 0% major errors) to compare our outcomes.

Content: Inpatient CT scans were selected randomly from a four-week period; the electronic imaging request and issued report were analysed separately. We classified errors as: minor (spelling mistakes/small substitutions eg. 'am' v 'an'), moderate (incorrect words/syntax) or major (elements causing misinterpretation eg. missing 'No').

Relevance: Good communication leads to good patient care. Errors could be avoided by a simple spell checking tool or a prompt to review the report/request prior to completion.

Outcomes: 221 scans were included, 88(39.8%) requests and 109(49.3%) reports contained no mistakes. Requests contained 65(29.4%) minor and 35(15.8%) moderate mistakes, compared to 36(16.2%) and 41(18.5%) in the reports. Requests and reports each contained 4(1.8%) major errors. The major errors in the requests were all due to missing significant clinical information. For the reports errors included: Incorrect side (promptly corrected), a missing negative, a missing word ('suggestive of - ') and other ('no large or drain is present').

Discussion: The error rate observed was higher than the RCR standard, but the impact on patient safety of these errors (the majority of which were minor) is unclear; most moderate errors did not alter the sentiment of the report. The higher rate of error within the electronic imaging requests must be addressed as it directly impacts the accuracy of reports.

P-184 Examining the end-user experience of the National Integrated Medical Imaging System (NIMIS)

Jennifer Smith; Hong Kuan Kok; William Torreggiani
Adelaide Meath incorporating the National Children's Hospital

Purpose: The National Integrated Medical Imaging System (NIMIS) is a secure, centralised system for storing and retrieving medical imaging which is currently being rolled out across a number of clinical sites. The purpose of this audit was to obtain feedback from the end-users of NIMIS in order to understand the perceived advantages and disadvantages of NIMIS and its existing interface. A secondary aim was to gather suggestions about potential improvements directly from its end-users.

Materials/methods: A survey was created using an online service provider. It was sent to consultants and non-consultant hospital doctors (NCHDs) at 34 NIMIS sites. The 260 completed responses were analysed in relation to key areas of NIMIS functionality, performance and end-user satisfaction.

Results: The results indicated that while users are generally satisfied with NIMIS, areas exist where its design and functionality could be improved. These areas included difficulty in identifying the appropriate code for a study (34%); dissatisfaction with ordering and viewing scans (32%); and a need for improved communication between end-users and local Radiology departments, with 104 (40%) unsure when to contact the department and 137 (53%) dissatisfied with the feedback they received.

Conclusion: Although generally satisfied, this survey has highlighted issues that need to be addressed in order to improve functionality while promoting patient safety. These improvements relate to IT infrastructure; increased clarity regarding patient records; simplified image ordering; and, the continued improvement of communication between end-users and local Radiology departments.

Emerging technologies

P-185 The use of needle guidance software within interventional radiology

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Cone Beam CT (CBCT) has allowed for the expansion of the examinations/procedures that can be performed within the interventional radiology suite. Many of these procedures were once only possible within CT, however with the avalibility of CBCT and needle guidance software within the interventional suite these exams can be brought into the Interventional setting. This has allowed for the improved safety and care of the patients whilst not limiting the

imaging facitilites avalible to the radiologist. With improved experience, knowledge and confidence in using needle guidance even the most complex cases have the possibility of being performed within the inteventional suite.

P-186 Can CSPINE-CAD software increase diagnostic accuracy and confidence in c-spine imaging?

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[1]University of Exeter; [2]City University London; [3]Royal Devon and Exeter Hospital

Aims/objectives: To determine if CSPINE computer-aided detection (CAD) software increases diagnostic accuracy and confidence scores in c-spine radiograph interpretation.

Content: 30 lateral c-spine radiographs were reviewed by 21 participants (radiographers and doctors). Each radiograph was diagnosed with a confidence score on a scale of 2-6 (2=0.01-19.99% and 6=80-100% confident). The CSPINE-CAD software (version 1.0.2) was then applied and each radiograph was re-diagnosed and rescored. Questionnaires asked how confident participants felt during testing both without and with the assistance of the software. The software was also tested 10 times by itself to assess its repeatability at indicating the correct injuries.

Relevance/impact: The use of c-spine CAD technology may increase diagnostic confidence and accuracy.

Outcomes: The levels of 80-100% confidence scores increased from 138 correct diagnoses to 144 when using CAD. Questionnaire data showed 80.95% of participants stated they found the software useful as an additional pair of eyes, and participants felt on average 9% more confident when making a diagnosis with the assistance of CAD. Three images scored 10/10 for indicating the known injuries; all three had an increase in diagnostic accuracy after using CAD (for the 5 and above threshold i.e. 60%+), with one radiograph showing an increase of diagnostic accuracy by 38.10%.

Discussion: The data shows an increase in diagnostic accuracy in the 60%+ confidence level when using CSPINE-CAD, but only when the CSPINE-CAD has high repeatability in indicating the injuries. Further improvement and investigation is needed in the accuracy and repeatability of the CSPINE-CAD software.

P-187 Knowledge-based iterative reconstruction: It's efficacy in noise reduction and effect on CT image slice thickness

Caroline Aird[1]; Ken Lau[2]; Kevin Buchan[2]; Paul Leong[1]

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Purpose: To assess the efficacy of knowledge-based iterative reconstruction (KBIR) in noise reduction and the implication on slice thickness in contrast enhanced CT abdomen and pelvis (CE-CTAP).

Materials/methods: First group of consecutive adult patients presenting for CE-CTAP were included and scanned with standard radiation dose protocol. Second group of consecutive adult patients for CE-CTAP were scanned with 24% radiation dose-reduced protocol. Axial image reconstructions were performed across both groups at 5mm employing statistical iterative reconstruction (SIR) and 5mm, 4mm, 3mm, 2mm and 1mm using KBIR. Regions of interest (ROI) were positioned in liver, spleen, kidneys, psoas and bladder for all reconstructed images. Attenuation values in Hounsfield units (HU) and standard deviation (SD) representing image noise were recorded and compared.

Results: 32 patients (50% male,mean age 65.4,mean BMI 24) in standard dose and 32 patients (40% male,mean age 64.2 years,mean BMI 25) in reduced dose protocol were recruited. Using two tailed paired samples t-tests, image noise in the 3mm KBIR slices was similar to that of 5mm SIR slice thickness in both standard and dose reduced groups ($p<0.05$) at all measured structures. Image noise in 3mm KBIR slices for the dose reduced group was also comparable to that of 5mm SIR slice thickness of the standard group ($p<0.079$).

Conclusion: KBIR is capable of decreasing radiation dose while reducing imaging noise. It can produce thinner slices of similar image quality to SIR for both standard and reduced dose protocols, potentially improving organ assessment and lesion detection.

P-188 Pioneering telemedicine charity saves lives in war-torn countries miles away from the UK using simple technology

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[1]Aintree University Hospitals NHS Foundation Trust; [2]Royal Liverpool University Hospital

Aims:
. The charity demonstrates that using simple every day technology saves lives and teaches healthcare professionals in Kabul Afghanistan.
. To demonstrate the potential for this charity to expand rapidly in other conflict zones to save lives and teach on emergency topics with radiology being the centre point.

Content: A clinical radiology specialist registrar at an NHS hospital, runs a telehealth charitable trust, which has enabled volunteer UK doctors, backed by the NHS clinical and medical directors as well as the government of Afghanistan, to teach and advise their Afghanistan colleagues using web-based video-conferencing and mobile phones. Dozens of lives are saved at the five Kabul hospitals taking part. Healthcare in Afghanistan and other conflict zones is very basic, despite local doctors' hard work and dedication. Using technology, the charity exhibits that world-class medical knowledge in the UK can be offered to emergency patients thousands of miles away.

Relevance/impact: Due to unsafe access of UK and other European doctors, there is an increasing demand for world-class medical help in conflict zones. The only alternative is telehealth to connect them, which is proven through this charity model.

Discussion: Dozens of lives are already saved in Afghanistan. The potential for this pioneering charity to expand rapidly in conflict zones is immense and vital with help of more volunteers to donate their minimum free time.

P-189 Extending diagnostic information recovered by digital radiographic X-ray imaging

Joshua Cowling[1]; Paul Scott[1]; Gary Gibson[1]; Neil Loxley[1]; Ben Lopez[1,2]; Phil White[3]; Kevin Robson[4]
[1]IBEX Innovations; [2]Durham University; [3]Newcastle University; [4]Newcastle Upon Tyne Hospitals NHS Foundation Trust

Aims: Conventional digital radiography (DR) is limited by X-ray absorption contrast and cannot quantitatively distinguish between thick soft tissue and thin bone, or subtle changes in bone composition. To acquire this kind of information dual energy X-ray absorptiometry (DEXA) scans can be used, which produce a bone mineral density measurement. We demonstrate a novel X-ray technology which allows the recovery of energy sensitive information on a DR system at minimal impact on dose, image quality, and computation time.

Content: We demonstrate the principles behind our multi-absorption plate (MAP) technology which modulates an X-ray beam across a detector and uses this information to infer compositional material information. This is performed in a DR context in a single exposure at clinical dose, with no need for specialised equipment. We also present results from a cadaver study demonstrating our ability to extract relevant information in a near-clinical setting.

Relevance: An extension to DR which collects information similar to DEXA systems without compromising image quality could make separate DEXA measurements in various fracture risk analysis cases redundant. This approach also makes additional diagnostic information about bone composition available from any DR measurement.

Outcomes: Clinical dose DR images of a cadaver are generated demonstrating contrast in "materials" as opposed to absorption, alongside standard clinical images with appropriate dose and image quality. The quality and limitations of this data are contrasted with existing diagnostic methods.

P-190 The limits of blood volume evaluation with dual energy CT

Matthew Dimmock[1]; Sarah Jia En Chine[1]; Richard Bassed[2]; Neil Langlois[3]; Sarah Parsons[2]
[1]Monash University; [2]Victorian Institute of Forensic Medicine; [3]South Australian Attorney-General's Department

CT scanning is being increasingly utilised in forensic centres as a preliminary examination to assist with determining the need for an autopsy. The maximum obtainable image quality in CT is limited by the radiation dose delivered to the patient. However, this constraint does not exist in post-mortem studies, allowing for the full potential use of dual energy (DE) scanning.

Evidence of trauma to subcutaneous fat and scalp injuries have been documented using CT scanning. However, no studies have previously been published regarding the use of DECT to evaluate bruises post-mortem. This study presents an investigation into the analytical process and limitations of DECT in detecting bruise phantoms containing different blood distributions. It was determined that the minimum blood volume that could be differentiated from surrounding fatty tissue is 0.06 mL.The different components of the blood, i.e. serum and erythrocytes, are distinguishable down to 0.4 mL. The effects of the shape of the static blood distribution with respect to the orientation of the scanner are also assessed.

P-191 Dark-field radiography: Harnessing information from small-angle scattering to visualise early stage pulmonary emphysema

Thomas Lown; University Campus Suffolk; Jane Harvey-Lloyd
University Campus Suffolk

Aim: To introduce the emerging techniques of grating-based radiography to analyse small-angle scattering in lung tissue to identify early stage pulmonary emphysema in chronic obstructive pulmonary disease (COPD).

Introduction: COPD describes a collection of lung diseases predominantly caused by smoking, or passive smoking. The damage causes pulmonary emphysema, which can be defined as the permanent enlargement of the air sacs in the lung tissue leading to the decreased ability for gas exchange. It is believed there are around 3 million people affected by the disease in the UK, causing 25,000 deaths a year and costing the NHS up to £1 billion.

Relevance/impact: One in eight people over 35 has COPD that is not properly diagnosed, and will not be identified until presenting as an emergency. Current radiographic imaging modalities offer limited detection and staging options, whereby high resolution computed tomography (HRCT) accumulates considerable radiation dose, ruling it out for screening programmes. Conventional attenuation based radiography has the ability to demonstrate late stage emphysema, but treatment options have by then become significantly reduced. Dark-field radiography has the ability to produce a contrast signal to accurately demonstrate widespread, or regional, alveoli destruction.

Outcomes/discussion: With its ability to accurately image low atomic number structures, such as lung parenchyma, and acquisition techniques which culminate in separate attenuation based, phase-contrast and dark-field signal images, it promises to be an effective emerging modality.

P-192 An experimental investigation into the relationship between exposure index (EI) numbers and image quality on direct digital radiography (DDR)

Elliot Senya; Eglantina Morina; Mohammed Rehman; Samuel Ssekatawa
University of Exeter

Purpose: To investigate the relationship between exposure index and image quality by evaluating the spatial and contrast resolution on the TORCDR test tool. To explore the full potential of Exposure Index in aiding with assessment of image quality of radiographs.

Material/methods: The study was undertaken using the Siemens Multix radiography equipment. A phantom was made consisting of the test tool immersed within a container of lard to mimic the human body. It was exposed at a range of exposure factors with other factors controlled to obtain a set of images. Their varying contrast and spatial resolution were measured by counting the number of low resolution discs and spatial resolution line pairs; analysed by two team members which allowed for inter-observer agreement. Data was recorded and presented in tables and graphs. Five hand x-rays of the phantom were presented to three radiographers for the purpose of subjective ranking based on image quality. The results were analysed, to see how they compared with corresponding exposure numbers.

Results: Statistical analysis of the data obtained is to be carried out to ascertain the relationships between image quality and contrast and spatial resolution in turn linking it to Exposure Index. This analysis will be carried out in the near future.

Conclusion: This study suggests that there is a relationship between image quality and exposure index. There is scope for EI numbers to help objectively guide image quality although further research is required before it can be utilised in clinical practice.

P-193 Radiation dose from pelvic radiography: A comparison of three digital radiography (DR) systems

Andrew England[1]; Paula Evans[2]; Fergus Dunn[3]; Anthony Manning-Stanley[4]; Elizabeth Taylor[2]; Louise Harding[2]
[1]University of Salford; [2]Warrington & Halton Hospitals NHS Trust; [3]IRS Limited; [4]Salford Royal Hospital NHS Trust

Purpose: To compare the radiation dose and image quality between the three digital radiography (DR) systems when undertaking examinations of the pelvis.

Methods: Using a Carestream Directview, Siemens Ysio and a Samsung XGEO a series of antero-posterior (AP) pelvic images were obtained using a phantom. Images were acquired using 75 kVp, outer AEC chambers and the Source to Image Distance (SID) was varied from 115 to 140cm. The phantom was also imaged across two orientations, outer AEC chambers nearest the head and then the feet. Field size, centring point, grid usage and focal spot were fixed throughout the study. For each examination the mAs and source to skin distance were recorded. Entrance surface dose including scatter (ESD) and effective dose (ED) were calculated using the PCXMC software. The resultant images were independently assessed for image quality by two blinded observers using a previously established scoring system.

Results: The lowest ED (0.105 mSv) was achieved at 125 cm, outer AEC nearest the feet and when using Siemens DR. The highest dose (0.161 mSv) was at 105 cm, outer AEC chambers nearest the head and when using Samsung DR. When compared with a reference image (current acquisition parameters) the image obtained with the lowest ED was graded has having the similar image quality.

Conclusion: Based on the equipment and acquisition factors investigated there are differences in ED between DR systems. Such differences should be factored into dose optimisation strategies or attempts should be made to normalise doses between systems.

P-194 Chest radiography: Collimated view of the bases or a full repeat?

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Purpose: The costophrenic angles/bases may be inadvertently excluded from a chest radiograph (CXR). The aim was to investigate the differences in effective dose (E) from performing a supplementary view of the bases or a full CXR repeat.

Methods: The Monte Carlo based dose modelling software PCXMC was used to estimate E. Within the software a series of clinical scenarios were simulated. They included 85kVp and 120kVp projections, all PA at 180cm and with fixed mAs (5 & 1.5, respectively). The field size within the software was adjusted to include the whole chest and then for a collimated view of the bases. For both kVp settings E was estimated for two full-field CXRs and a full-field CXR plus bases. Differences between the two scenarios were then assessed. Hypothetical patient age/genders were included in the modelling in order to investigate variations in risk of exposure-induced cancer death (REID).

Results: At 85kVp, E for two full-field CXRs and one full-field CXR plus bases were 0.034 and 0.026 mSv, respectively (23% difference). At 120 kVp, E was 0.028 and 0.021 mSv, for two full-field CXRs and one full-field CXR plus bases, respectively (25% differences). The greatest risk reduction was for women aged 18 when moving from two full-field projections to a single CXR plus bases.

Conclusion: Debate still exists regarding whether to undertake a collimated view of the bases or a full repeat. Evidence from this study suggests that a collimated projection of the bases is justified having a lower effective dose and risk.

P-195 A comparison of radiation dose and image quality for fixed tube current (FTC) and automatic tube current (ATC) CT methods for abdominal scanning

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Background: Tube current is a determinant of radiation dose and image quality in CT scanning. Fixed Tube current (FTC) and Automatic Tube Current Modulation (ATCM) techniques are methods used to ensure acceptable radiation

dose and image quality during abdominal CT. The aim of this pilot study was to evaluate the radiation dose and image quality between FTC and ATCM techniques for abdominal CT techniques.

Materials/methods: Using a Toshiba Aquilion 16 CT scanner both an anthropomorphic abdominal phantom and an adult ATOM dosimetry phantoms were imaged using FTC and ATCM techniques. The ATOM was loaded with 271 thermoluminescent dosimeters (TLDs). Acquisitions were undertaken three times using the same parameters for each technique. Resultant image quality was assessed using signal-to-noise ratios (SNR) and contrast-to-noise ratios (CNR) for five organs (e.g. liver, pancreas, spleen, kidneys and gallbladder). Absorbed dose from each of the 271 TLDs were converted into organ and tissue doses and then effective dose based on ICRP 103.

Results: No difference was detected in mean physical image quality parameters between the FTC and ATCM techniques. (ATC SNR= 7.323 HU CNR=8.387 HU and FTC SNR=7.378 HU CNR=8.984 HU). There was a reduction in absorbed dose and effective dose between ATC and FTC (about approximately 25%).

Conclusions: When comparingradiation dose between ATC and FTC for options CT scans of the abdomen there is FTC lower than ATC. But both techniques however showed similar results in the physical evaluation of image quality.

P-196 Low dose 80kv CTPA in pregnancy: An audit of dose, positivity and diagnostic quality over 1 year

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Aims: All pregnant women with suspected PE's have a low dose CTPA as first line investigation at our Trust. We performed an audit of CTPA imaging in pregnancy over a one year period looking at Kv acquisition, dose (DLP), positivity and diagnostic image quality.

Method: A retrospective review of one year of CTPA's in pregnancy.

Results: 56 patients included. 50/56 (89%) had 80kv low dose scans with an average DLP of 49 (est 0.8 msV). 4 had 100kv scans and 2 had 120kv scan with an average dose of DLP 110 (1.8 msV) and 277(4.7 msV) respectively. All of the scans were of diagnostic quality and no patient required further evaluation. (There were 3 half dose perfusion scans undertaken in the same period, all 3 of which were normal.) There was one positive scan with bilateral PE's (an 80kv scan), the patient was 9 weeks pregnant, had bilateral PE's, presenting with Haemoptysis and SOB.

Discussion: Although 89% had low dose studies, 6 had higher dose acquisition. This was due to radiographer not selecting a low dose study. The findings have been fed back and we will re-audit next year.

The low dose, along with 100% technical success, indicates that 80kv low dose CTPA is justified in being the first line investigation of suspected PE in pregnancy. The low overall positivity rate of <2% suggests that we are over investigating PE's in pregnancy. We are now undertaking a national survey across other centres to see if our results are reproduced elsewhere.

P-197 DRLs and image quality – the challenge

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The establishment of local diagnostic reference levels is a requirement under

IR(ME)R 2000 (1). They have historically been produced using Dose Audit information from the Radiology Information System (RIS), which is dependent on a manual input for all data. Analysis of this data can be difficult and time consuming with limited access to dose related image quality.

We currently rely on assistance from our Radiation Protection Advisor (RPA) using our RIS data to establish out local DRL's. They use statistical data analysis to exclude outlying records.

An opportunity arose to trial a commercial dose estimating software package for a period of 2 months. This poster describes our experiences in using such software and our initial results. We will include advantages/disadvantages including establishing DRLs, image quality, real-time analysis, trends and time and costs. The software also allows the setting of alerts/dose level triggers. This feature sends an email to key members of staff when the pre-set dose is exceeded and allows audit of acknowledgements. Examinations can be further evaluated with software interaction to review image quality with high and low doses to produce a training needs analysis.

There is a proposal (1)by Public Health England to develop a national data collection system to capture imaging and radiology dose information to support national disease registration and Ionising (Medical Exposure) Regulation monitoring. The authors believe the availability of a local system will complement this national initiative. To comply with this, accurate and timely dose audit data is easily exportable for manipulation and further analysis when required.

References

1. Statutory Instruments. The Ionising Radiation (Medical Exposure) Regulations 2000. London : The Stationary Office Limited, 2000. SI 2000/1059.
2. Communication to Chief Executives dated 16/11/2015 from the Directors of Disease Registry, Radiation Protection and National Clinical Director for Diagnostics

P-198 Differences in effective dose from different paediatric CT brain scan protocols

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Purpose: To develop a method for estimating effective dose (ED) for paediatric CT brain examinations and apply it to evaluate differences between protocols.

Material/methods: An ATOM phantom representing a two year old child was implanted with metal oxide semiconductor field effect transducer dosimeters (MOSFET). Brain scanning was undertaken using a series of helical CT scans across a range of 54 protocols. Protocol variations included changes in rotation times, gantry angulation, tube current/potential and slice thickness. Absorbed tissue doses were read from the MOSFET system and the ED was calculated for each scan protocol.

Results: ED ranged from 1.01 mSv and 4.81 mSv, respectively. Organs located within the scan volume received the highest absorbed doses; however, organs in the periphery of the scan volume still received a significant radiation dose. ED trends encountered during the study were as follows: ED increased consistently by around 33% when increasing kVp from 100 to 120 (mean ED 2.35 SD 0.75 mSv versus 3.52 SD 1.21 mSv, respectively; $P<0.05$). Changes in gantry angle had minimal effect on ED. When moving from a zero gantry angle to +27 degrees the mean ED decreased by 0.04 mSv ($P>0.05$).

Conclusion: This study demonstrated that the most dominant factors affecting ED are tube current, tube potential and scan rotation time.

P-199 The use of secondary lead rubber protection in paediatric extremity radiographic examinations

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University of Salford

Purpose: Although diagnostic X-ray examinations provide great benefits their use carries a small but not insignificant risk. For some radiographic examinations lead rubber shields are available to limit exposure. The use of lead rubber shields often varies between countries, departments, radiographers and can depend on the patient. The aim of this study was to evaluate the utility of a lead rubber shield in paediatric patients undergoing upper limb radiography.

Methods/materials: A full body paediatric anthropomorphic phantom was position for an antero-posterior (AP) elbow examination and exposed to ionising radiation using standard acquisition parameters. The skin dose was measured at five different anatomical locations (eyes, thyroid, flank and testes). Lead rubber was then placed over the pelvis and abdomen and the phantom was re-imaged. For each situation (with/without shielding) the exposure factors were sequentially increased.

Results: The skin dose received at the orbit, right flank and testes increased with increasing exposure factors when no shielding was applied. When shielding was applied no skin dose was measured at either the flank sites or testes for any exposure factor combinations. Eye and thyroid does were marginally higher when shielding was applied.

Conclusion: Secondary lead rubber may provide an option for reducing scattered radiation to the abdomen and pelvis during skeletal radiography in paediatrics. A more detailed understanding of the effects of this intervention on all organs and tissues is essential.

P-200 Out of hours CT scan request

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Background: Despite the importance of CT scan to our daily medical practices, it is associated with significant risk not only to patients but staff as well. This re-audit aimed at finding out whether out-of-hours CT requests criteria met the 100% recommendation made by the initial audit and also to find out if the other recommendations were adhered to.

Methods: Retrospectively, out-of-hours CT request between 09:00pm and 11:59pm for the month of June 2015 was collected and various means was used to validate the data. Data was analysed using Microsoft excel.

Results: North Manchester General Hospital had the least referral in 2015 as compared to 2014 where they had the highest. CT of the head made up of about 90% of the CT request both in the initial audit and the re-audit. Fairfield General Hospital had the highest CT head referral. 75% of the request met the criteria, which was lower than what was achieved in 2014 (81.36%). Off those that met the criteria only 10% had positive findings. Those that had inconclusive information or did not meet the criteria had no positive findings.

Conclusion: Unnecessary CT scan request not only expose patient and staff to radiation, they also have a huge financial implication to the trust. Strict adherence to guidelines limits unnecessary exposures. Fairfield General Hospital had the highest CT head referral mostly as a result of the Stroke unit based there. With the exception of the re-audit, non of the recommendations were implemented.

P-201 A review of CT doses in trauma patients

Kate Hughes
Aintree University Hospital

Aims/objectives: To retrospectively look at doses for trauma 'PAN' scans and compare them to doses for similar scans in a non-trauma setting.

Content: Comparison of doses and presentation of percentage change for both 'PAN' scans and non-trauma scans, looking at causes of dose differences e.g. in trauma 'vac-sac', arms by sides, equipment attached, etc. Brief look at radiology reports and injuries detected on CT to find how many scans report no significant injury.

Relevance/impact: Best practice involves keeping doses 'as low as reasonably practicable'. We looked to see if we could implement any changes in practice to reduce doses e.g. deflation of 'vac-sac' if appropriate, raising arms above the head if patient condition allows.

Outcomes: Doses of CT heads were up to 62% higher and doses of CT chest/abdomen/pelvis up to 53% higher in trauma patients. This increase was partly due to the 'vac-sac' that patients are scanned in and partly due to patient positioning. Review of radiology reports found that 40% of scans found no significant injury, and 58% found either no injury or injury was limited to head or orthopaedic areas only.

Discussion: We could reduce the amount of dose received by trauma patients by deflating the 'vac-sac' before scanning and by raising patient's arms over their head for a chest/abdomen/pelvis. These areas of practice should be suggested to the clinician at the time of the scan and adopted by the radiographers wherever appropriate.

P-202 Thinking outside the box! The effects of collimation and dose reduction techniques on AP shoulder projections

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The aim of the study is to investigate the effects of collimation on patient dose for AP shoulder projections.

The standard colimation technique when undertaking an AP shoulder projection is to keep the light box straight and rectangular to include all relevant anatomy.

Within the immediate surrounding area of the shoulder are the radiosensitive tissues; the breast and thyroid with the latter most susceptible to radiation-induced carcinogenesis; hence the importance of dose optimisation and utilising ALARP for this projection.

By changing the position of the light box to a diamond shape the thyroid and some of the breast tissue is excluded from the primary beam.

Our audit will investiagate the radiation dose between the different orientations.

P-203 Positioning for a conventional skyline patella projection: Evaluation of torso position and its relationship with eye lens and thyroid dose

Joanne Li; Katy Szczepura; Andrew Tootell; Andrew England
University of Salford

Purpose: Numerous techniques exist for acquire a skyline projections of the knee. Within these techniques it is common for the x-ray field to be directed towards the eyes and thyroid. The position of the torso may play a role in the dose received to these organs and this was investigated.

Methods and materials: A full body adult anthropomorphic phantom was positioned supine for a conventional skyline projection, the torso at 90 degrees in relation to the hip joint. Data for surface skin dose was recoded using a solid state dosimeter at the level of the eyes and thyroid gland. The angle of the torso was then adjusted in 15 degree increments and the phantom was re-imaged. Dose measurements were recorded and this continued until the torso angle was 180 degrees.

Results: When moving from 90 degrees to 180 degrees the dose to the eyes and thyroid was shown to increase, peaking at 135 degrees for the eyes and 105 degrees for the thyroid and then fell. Dose differences ranged from 0.0 to 0.168 microGy for the lens of the eye and 0.0 to 1.3 microGy for the thyroid, between torso positions.Conclusion: Torso position has been shown to effect the skin dose at the eye and thyroid levels during traditional skyline knee projections. Further work is needed to understand the effects of different exposure factors and also across a range of technique variations.

P-204 Radiation risk from screening mammography

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Purpose: To present comparative effective lifetime risk data for different screening programmes worldwide.

Material/methods: Thermoluminescent dosimeters accommodated inside an adult dosimetry ATOM phantom were used to measure organs dose during screening mammography. The examined breast was simulated by using PMMA-Polyethylene phantom. Sixteen FFDM machines were used to expose the breast phantom in standard four-view screening mammography (craniocaudal and mediolateral oblique for each breast). Effective risk, the number of cancer cases produced by the exposure to X-radiation, was calculated for each machine and across 28 different screening programmes.

Results: Large differences in lifetime effective risk exist between different screening programmes throughout the world. The highest radiation risk results from the annual early onset US programme for 'high breast cancer risk' women, commencing at 25 years old. For this programme, the calculated total life time effective risk range from 911.3 to 1531.8 cases/106 women across the sixteen studied machines. The lowest lifetime effective risk was 56.1-94.4 case/106 women resulting from biennial screening mammography for women aged 50-64 years. Minor differences in effective risk were found amongst the different machines, but these differences were not significant statistically.

Conclusion: Significant differences in lifetime effective risk have been found between screening programmes throughout the world. These differences are mainly attributed to the onset age of screening mammography. Another less important factor is the time interval between the successive screens, since the tissues' radiosensitivity reduces with age.

P-205 What does mammography optimisation look like for computed radiography vs. a digital system?

Andrea Shemilt; Maria Robinson
Nottingham University Hospitals NHS Trust

It is the ongoing work of medical physics to optimise the performance of x-ray systems. When we talk about optimisation we can mean a range of activities, but in this context we are examining the balance between the risks of the radiation procedure and the benefits. This is especially important for breast imaging, where a healthy population is exposed to radiation for screening purposes. If image features aren't captured, a misdiagnosis could

occur, but with increasing dose we also increase the risk of inducing cancer in the future. A big concern with breast imaging is false-positives, resulting in unnecessary intervention, increasing healthcare costs and patient stress.

What parameters are we working with? How does optimisation appear for CR systems and digital systems? What differs and what is in common between the two modalities? This poster gives an overview on optimisation methodology and intends to paint a picture of the doses, threshold contrasts, spectra used for these systems, which will gives a strong idea of the sort of ballpark each operates within.

P-206 Weight based iodinated IV contrast dosing: A practical approach

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Introduction/aim: There is good evidence that tailoring IV CT contrast doses to patient weight in Chest/Abdo/Pelvic patients improves the images and may save contrast usage (Mott, 2015). This study reviews the feasibility of this approach in a busy DGH categorising patients into three broad groups by weight.

Method: The Department currently pump injects 65mls of 340 IV iodinated contrast strength at 2.5 mls/sec for all patients for CT CAP scanning followed by a saline chaser.

Prospectively 68 patients were divided into 3 weight categories. Each patient in each category was given one of three contrast doses -The usual volume or one of 2 others based outside experience.

40-60Kgs: 55mls-60mls-65mls
60-80Kgs: 60mls-65mls-70mls
80-100Kgs: 65mls-75mls-80mls

Images from each scan were reported independently by 3 consultant radiologists, (blinded to the dose), and assessed for image quality. If image quality was similar for two different doses, the lower dose was graded as optimal.

Results: 68 patients were scanned in total. For patients between 40-60kgs reducing the volume to 55ml was found to be optimal. Keeping our standard dose of 65mls was optimal for 60-80kgs patients, and it was 75mls for the 80-100kgs category.

Discussion: This study demonstrates an effective way to vary CT contrast dose by weight whilst maintaining diagnostic image quality. It uses a limited dose regime in a limited number of weight categories and therefore should be easy to implement. The three doses can be easily preloaded into the CT pump making the change simple to adopt in a busy department.

P-207 What is the failure rate in radiation governance checks on research involving ionising radiation, prior to the implementation of HRA single review?

Andrea Shemilt
Nottingham University Hospitals NHS Trust

The introduction of HRA Approval aims to provide “a single approval for research in the NHS that will incorporate an assessment alongside the independent Research Ethics Committee opinion.”[1] The approach to radiation governance at a trust level will therefore dramatically change, with responsibility for checks for radiation content, in documents like the protocol and the participant information, sitting with the HRA. HRA local process of assess-arrange-confirm means reviewing capacity and capability, making arrangements for the trial procedures and finally confirming that these elements are in place for trial start-up.

Before trust review, the REC has always reviewed participant information, trial protocol and REC form content, including the elements regarding radiation.[2] Individual ttrusts have reviewers to check trials for legislative compliance and local appropriateness as part of that site’s NHS Permission; however it is common for trust reviewers to find unacceptable deviation from the REC guidance. This means that non-compliances may be caught at the second layer of checks.

This work intends to capture a cross-section of causes for trial rejection at the radiation-checking stage, prior to the implementation of the HRA Approval single review process. The results will highlight areas to focus on in the radiation governance process, regardless of the body undertaking the checks. This should inform research applicants, local R&D staff as well as HRA reviewers as to the elements of research applications involving ionising

radiation that require increased scrutiny, in order to ensure a smooth path to trial start-up and thereby reducing patient- and trust-risk.

[1] Research support functions following HRA approval implementation, v1.0. HRA, 19 September 2014.
[2] Approval for research involving ionising radiation v2. NRES, September 2008.

P-208 Radiation, imaging and contrast – effects on cardiovascular system

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Objectives: To review and highlight the health effects of imaging (ionising and nonionising) – on cardiovascular system and increase awareness of implications.

Methods: All the relevant articles in the field were extensively reviewed to some up with a brief summary of potential toxicity.

Discussion: High dose ionising radiation affects the heart and large arteries (i.e., coronaries, carotids, and aorta) including – fibrotic pericardial damage, pericardial adhesions; microvascular damage; and stenosis of the valves. Low dose radiation (LDR) used in cardiac imaging has enough energy to induce DNA damage. LDR increases genomic instability in arteriosclerotic plaques thereby contributing to CVD by forming dysfunctional clones. Radiation-induced ultrastructural changes are seen in myocardial microvasculature.

Contrast media used in imaging increases stroke volume, cardiac output and left ventricular contraction. It decreases peripheral resistance and causes bradycardia. Patients with heart failure are at greatest risk of CM. Reduction of myocardial contractility secondary to myocardial chemotoxicity and changes in blood ionicity

In animals, MRI induces transitory arrhythmias and myocardial hyperpolarisation. In humans, reversible ventricular fibrillation and other arrhythmias may occur in susceptible individuals. The fast gradient-induced Magnetic fields in cardiac MRI can stimulate nerves, skeletal and cardiac muscles.

Conclusions: It is vital for physicians/radiologists to be aware of the possible hazardous effects of radiological investigations, especially with the advent of stronger fields in medical imaging.

P-209 A novel phantom for dental OPG systems

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A survey of the image quality of dental OPG systems using Leeds Test Objects' TO PAN phantom.

A survey of numerous dental OPG systems to determine and compare the accuracy of the patient positioning system and image quality (contrast resolution and spatial resolution).

The unique capability of the TO PAN phantom to determine the correct position of the focal trough and thus allow the user to accurately and reproducibly position test features to allow an assessment of image quality. Using this phantom, a survey gives a comparison of commercially available OPG systems in regular use in the UK.

The survey shows a variation between the accuracy of patient positioning systems when compared to the standard focal trough. Image quality, when measured in the focal plane, varies for spatial resolution between 5-8LP/mm and for contrast resolution all of the contrast details were detected on each system in the survey.

The survey proves that good agreement of the imaging system's focal trough results in optimised image quality. The results for checking the accuracy of the patient positioning system show that the phantom is good at discriminating between well-aligned and poorly-aligned systems. The results for spatial resolution show that the phantom is capable of discriminating between systems of high and low spatial resolution. The results for contrast resolution show that there is a need to amend the phantom design in order to extend the details up to and beyond the contrast threshold.

P-210 Health professional awareness on radiation protection in Saudi Arabia

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Introduction: Exposure to ionising radiation is either background or technology-based. Diagnostic radiographs are the most common source of technology-based radiation exposure, and contribute 50% of the annual allowed dose received by individual. There are increasing data about risk of cancer associated with ionizing radiation used for medical purposes and that it has dose dependent effect on the human body. Physicians are not accurately aware about radiation dose received by their patients 1,2. Some tend to underestimate the radiation doses and others think it is not an important factor when choosing which modality to order.

Methodology: The study was conducted on health professionals of all levels at King Abdulaziz University Hospital. A modified version of a validated questionnaire by Reichmuth3 was used. Nine hundred questionnaires were distributed.

Results: Seven hundred and fifty two questionnaires were filled and returned (83.6%). Questionnaires with missing answers were excluded. The respondents were nurses (64.3%), (29%) were physicians of different level of education; the remaining (6%) are technicians and other staff. It included questions differentiating between ionising and non-ionising radiation, and the organ sensitivity. The average score is 37.6±25.0 in (significant at p 0.05). Nurses scored lowest compared to all. On the other hand, senior house officers scored highest among all.

Conclusion: The results indicated the inadequacy in their awareness. Continuous updated knowledge is required to assure no patient is exposed to unnecessary radiation and subsequent risk of developing cancer. Formal training is should be mandatory to raise the awareness and referral practice in imaging.

P-211 Utilisation of patient safety checklist in paediatric fluoroscopy: A full cycle audit

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Aims/objectives: To simultaneously assess (1) local adherence to patient safety checklist (PSC) utilisation in a paediatric fluoroscopy department and (2) the quality of the information filled on the PSC form. Following intervention, to re-assess the change in compliance.

Content: A patient safety checklist (PSC) modelled on the WHO surgical checklist was implemented for use on all fluoroscopic procedures in a single Paediatric Radiology Department. The PSC aimed to encourage good practice and enhance patient safety. An initial audit (Jan-Feb 2013) followed by adoption of recommendations for improved practice predated the re audit (Jan-Feb 2015).

Method: Two complete audit cycles reviewed data from a Paediatric Radiology Department of a single NHS Trust Paediatric Hospital. Intervention following the first cycle involved dissemination of the PSC amongst Radiologists and Radiographers in departmental meeting discussion.

Outcomes: Overall, 1285 fluoroscopic procedures (FP) were performed in the year leading to the 2nd cycle (Nov 2014 to Oct 2015) - 4FPs per day. Cycle 1 (Jan-Feb 2013): 120 FPs performed, 55% (81/120) had PSC forms completed and scanned onto PACS. Compliance to documentation of individual sections on the PSC form ranged from 70-100%. Cycle 2 (Jan-Feb 2015): 188 FPs performed, 47% (88/188) had PSC forms completed and scanned onto PACS. Compliance to documentation of individual sections on the PSC form ranged from 70-100%. The proportion of PSC forms that were completed were reduced from 55% to 47% however the proportion of forms scanned remained the same (46% versus 47%) between the two cycles.

Discussion: Use of PSC is an important adjunct to maximising patient safety during fluoroscopic procedures. However, we highlighted a better compliance with documentation of individual sections on these forms. The low utilisation of the PSC form in the two cycles necessitates further interventions to achieve current standards. The introduction of a structured “briefing and de-briefing” approach for each procedure may enhance compliance to PSC utilisation. A further audit will evaluate the value of this new intervention.

P-212 IRMER in practice

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We all know that any imaging service is required to have employer's procedures for IRMER, but what makes these procedures robust and how do we know that the staff fully understand them when carrying out their duties day to day?

Quality procedures require well thought out roadmaps for each required process, with contingencies for every variable suitably detailed for the staff having to enact them.

Evidencing that practices are compliant with the written procedures is vital. Active management of staff compliance provides confidence that documented procedures are being upheld. Mechanisms for active clinical governance and sharing lessons learnt from incident investigations to facilitate the communication amongst staff bodies provides the best protection against poor practices and poor compliance in any institution.

Clinical governance in the form of auditing, research and development and risk management all then go hand-in-hand to ensure that an appropriate cycle of oversight, review and improvement are culturally embedded in a workforce. These are principles are not only central to achieving accreditation against the imaging UKAS standards, but are necessary to promote active cooperation between services and staff members.

This approach then allows clinical leaders to be confident not only that the procedures they have devised are suitable and robust, but also that they have been tested and are proven to be effective.

P-213 Fluoroscopy survey development: Manufacturer's baselines

Jennifer Bullen; Ryan Jones
Integrated Radiological Services

Aims/objectives: Current fluoroscopy survey methods require several checks such as; manual kV, doses to II face and patient entrance dose. A number of these checks show similar information. This project should improve fluoroscopy survey methodologies by;

- Collecting data from over 100 surveys based on 6 different manufacturers
- Calculating statistics for each manufacturer and individual models.
- Extracting data from previous survey files. All data collected will be tabulated in a spreadsheet.
- Developing baselines to help with routine/commissioning work.
- Improving image quality checks currently performed by subjective human reading.

Content:

- How baselines were developed and compared to IPEM 91.
- How manufacturers differ and the baselines most suitable for each will be presented.

Relevance/impact: Commissioning and acceptance tests are a requirement. By achieving baselines for individual manufacturers, comparison can be done against baselines currently used for survey as described in IPEM 91:

- Phantom: Remedial = ± 25% or >50mGy min-1
  Suspension = ± 50% or >100mGy-1
- II Face: Remedial = ± 25%
  Suspension = ± 50%

Outcomes:

- Survey templates used in QA testing will be improved.
- Baselines will be set for each manufacturer based on previous survey work.
- Survey methods can be reviewed and improved.

Discussion: Improving survey methods for routine/commissioning checks will be beneficial for future fluoroscopy QA testing. This will help to develop accurate baselines which are tailored for each manufacturer.

P-214 Implementation of a radiographer led fluoroscopic proctography service: Challenges and opportunities

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Objectives: To address the dual challenge of a rise in the referral rates for fluoroscopic proctography, and increasing demand on consultant time, by delivering a new radiographer led service.

Content: We describe the process, challenges and outcomes of creating a new radiographer role extension for fluoroscopic proctography:
Identifying growing workload with limitation on consultant time
Radiographer selection process
Designing and implementing a training curriculum
Defining competencies to be achieved within agreed timescale
Importance of ongoing mentorship and supervision during training process
Enhanced learning opportunities - attendance at regional pelvic floor MDT meetings and clinics, and specialist Conferences - capturing the whole patient journey
Achievement of 1o goal: independent image acquisition and dual reporting of studies with consultant
How to reach the 2o goal: request justification and independent reporting

Discussion: The challenges of this process include:

No SCoR recommended curriculum - we created one from scratch
Making the transition from dual to independent reporting - how we would make this a robustly safeguarded process
Currently no loss of radiographer activity - how we would address this if workload increased
There are multiple benefits for both the individuals and the department:
Increased radiographer and department assistant job satisfaction
Improved staff morale due to visible commitment of department to role extension
Raised profile of the service, with subsequent increase in tertiary referrals and Trust income
Greater flexibility in when the tests can be performed
Future-proofing the service by developing capacity
Enabled radiologist to assist in tackling cross-sectional workload

P-215 Outcomes following the implementation of the BAD list: A quality improvement project at a tertiary referral centre

Asha Omar; Nelofer Gafoor; Sharmila Chhatani
Plymouth Hospitals NHS Trust

In 2015, a biopsies, aspirations and drains (BAD) list was introduced in a large tertiary referral centre in the South West. The aim of setting up this service was to increase the accessibility and availability of interventional radiology for clinicians with the benefit of increasing the number of patients that could be treated and reducing the time to treat. Guidance form the RCR percutaneous biopsy procedures audit also states that an adequate specimen from the biopsy site should be provided for histological/cytological assessment in 95% of cases. We have looked at 53 cases following the implementation of a specific BAD list over a 3 month period, and how it has altered practice over the same time period in the previous year. We have been able to assess if we are achieving the recommended target for adequate histology in order to provide an accurate histological diagnosis as well as see an improvement in the number of cases that we are able to perform. In addition, we have created a more streamlined approach to the service in general, which is not only beneficial for the clinical team, but most importantly provides a better experience for the patient. We share our experiences of setting up this service, that could be implemented by other trusts nationwide.

P-216 Primary care radiology services: A general practitioner satisfaction survey

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City Hospitals Sunderland NHS Foundation Trust

Objectives: As radiologists strive to increase their visibility and emphasise the value they bring to patient care, many are focusing on how they can best meet the needs of referring physicians. But achieving that goal first requires an understanding of how referring physicians use and view radiology services. The overall aim of this project is to assess what factors affected satisfaction with radiology services amongst primary care clinicians.

Content: The presentation includes the results of an online survey distributed to 51 local primary care practices along with conclusions, discussion points and recommendations for quality improvement.

Impact: In a dynamic and evolving field such as radiology, end user satisfaction measures must be evaluated in order to achieve an efficient and satisfactory service while preparing to meet future requirements.

Outcomes: Responders had an overall positive opinion. However, areas of improvement identified included ultrasound waiting times, lack of a standard report structure, inconsistency in providing conclusions/recommendations in reports, difficulty in obtaining advice from a radiologist and minor IT issues.

Discussion: Similar surveys can act as an effective means of identifying areas to target quality improvement efforts by highlighting the areas that are most important or needing improvement in the eyes of the requesting clinician. Providers of radiology services have a responsibility to monitor their performance on a regular basis and to address any deficiencies that are identified as a result.

P-217 Audit and re-audit of compliance with College of Radiographers guidelines regarding preliminary commenting on "red dotted" radiographs

Zosia Rodak; Victoria Ames
Norfolk & Norwich University Hospital

Background: The College of Radiographers recommends that a preliminary assessment should be provided when adding a red dot to an image1. It has been noted by several radiology trainees that when there is a subtle abnormality and no comment is provided, time can be lost attempting to contact the radiographer who added the red dot to ascertain the perceived abnormality.

Standard: All red dotted radiographs should have an associated note on RIS describing the abnormality.

Method: Retrospective study of 100 consecutive adult appendicular radiographs from A&E x-ray.

Results: 1% compliance.
Plan: inform radiographers of the results and ask that they add a comment in future specifying the abnormal site. Re-audit in several weeks.

Re-audit results: 25% of radiographs were accompanied by a comment describing the site of abnormality. 12 of these were relatively subtle fractures. A further 7 radiographs were subjectively assessed as showing subtle fractures which were not commented upon. The majority of the remaining fractures were immediately obvious and a comment is probably not required in these cases.

Plan: Inform radiographers of the results which show a significant improvement, particularly with regard to commenting on subtle fractures which are more likely to be missed. To avoid subjectivity regarding assessment of fractures as subtle or not, we plan to change our local guidelines to include comments on all red-dotted radiographs.

1The College of Radiographers. Medical Image Interpretation and Clinical Reporting by Non-Radiologists: The Role of the Radiographer. London: The College of Radiographers; 2006.

P-218 Delivery of imaging studies within acute medical and surgical admission populations during peak and non-peak admission periods; review of modalities employed and the timeliness of imaging and reporting

Zosia Rodak; Stuart Williams
Norfolk & Norwich University Hospital

The issue of increased mortality amongst weekend admissions has been linked to calls for more 7-day patterns of working. We reviewed how long acute admissions waited for their imaging and reports: the types of imaging patients underwent and the total number of imaging tests during the admission. These parameters were obtained for both the Wednesday and Sunday of the busiest and quietest emergency admission weeks of 2014/15.

Patient data was obtained from hospital health informatics. Information regarding examination and report times was found in the Radiology Information System and PACS.

Results: A wide variety of data was obtained for presentation. Some of the findings are summarised below.

-Surgical patients waited longer for their first imaging test, in part due to weekend waits for ultrasound; medical patients being more likely to have plain radiographs as their first imaging test (71% vs 45%).

-Shorter average wait for imaging and reports in the busier week for surgical patients - possibly due to micro-management when the hospital is stressed, suggesting a system that can increase patient throughput at busy times, but not necessarily always working at peak efficiency.

-A smaller proportion of patients were imaged on the busiest week compared to the quietest - medical 81.2% vs 85.3%; surgical 61.9% vs 66.2%. Possible reasons for this are discussed.

-Overall there was a similar number of imaging tests for surgical and medical patients (1.65 vs 1.62), but of those patients who were imaged, surgical patients had more studies (2.59 vs 1.94).

P-219 The impact of outsourcing out-of-hours CT reporting in a UK district general hospital

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Basildon Hospital

A service change at Basildon Hospital extended routine in-hours CT reporting by 3 hours and outsourced out-of-hours reporting to a teleradiology service.

Aim: Assess the impact of this change on reporting times.

Method: This retrospective closed-loop audit used data retrieved from the radiology information systems. The first 100 scans to pass the inclusion and exclusion criteria, in the period shortly before and after the service transition (from 01/12/2014 and 01/03/2015, respectively), were included. Subgroups included in-hours routine scans and out-of-hours urgent and emergency scans. Criteria and standards were based upon local and national guidelines:
1) Routine in-hour scans to be reported within 24 hours.
2) Emergency and urgent out-of-hour scans to be reported within 1 and 4 hours, respectively.

Results: After the service change standards were met for routine scans with average reporting times improving from 30 hours 45 minutes to 21 hours 12 minutes. Average reporting times for emergency scans also improved, from 2 hours 32 minutes to 1 hour 39 minutes. There was a slight decline in performance for urgent scans (1 hour 42 minutes to 2 hours 5 minutes) however standards were met both before and after the service change.

Conclusion: Outsourcing out-of-hours reporting is a management strategy that can improve reporting times for routine and urgent CT scans however there are issues to be addressed to ensure high priority scans are reported in a timely fashion out-of-hours.

P-220 National UK survey assessing renal function prior to contrast enhanced MRI

Martine Harris; Ruth Clarke; Beverly Snaith
Mid Yorkshire Hospitals NHS Trust

Aims/objectives: To identify current practices in the UK for the identification and minimisation of risk in out-patients referred for contrast-enhanced magnetic resonance imaging (MRI) with gadolinium-based contrast agents (GBCA).

Content: Radiology departments were invited to complete an online survey about local policies and guidance followed; practice for checking renal function and patient management pre and post-GBCA administration.

Relevance/impact: Nephrogenic systemic fibrosis (NSF) is an iatrogenic scleroderma-like systemic disorder occurring in patients with severe or end-stage renal disease, Gadolinium chelates are a causal agent. To minimise risk the Royal College of Radiologists (RCR) have suggested a blood test for renal function (eGFR or SCr) should be available for non-emergency patients prior to GBCA administration.

Outcomes: A response rate of 39.1% (68/174) was achieved, 82.3% of sites confirmed a policy was in place for the administration of GBCA. The majority indicated alignment with at least one national and/or international guideline (n=49/56; 87.5%) although there was variation between responses. 28 sites (41.2%) check blood test results for all

contrast patients, whereas 31 sites (45.6%) only check those with known renal dysfunction or identified as high risk. Several prophylactic and investigation strategies were described, including a small number of sites who utilise point of care technology.

Discussion: The survey highlighted the range of guidance which informs UK practice; however there is diversity in their implementation with a variety of processes for the Identification and management of high risk patients. A consistent approach is required to minimise risk and assure safe practice.

P-221 MRI Safety has the human factor

Darren Hudson
InHealth Group

Objectives: Despite a consistent level of reported MRI Safety Incidents, with trends analysis showing the number to be relatively low per 1000 patients and correlating between patient activity, a review of reported MRI Safety Incidents was carried out. The root cause analysis of 4 main incidents were reviewed, specifically to see if there were any human factors contributing to the incidents that may need to be addressed to help further reduce risks associated with MRI Safety.

Content: Review of the 4 main events showed all staff members to have been suitably trained and competent in MRI Safety, the correct policy and procedure guidance was in place and staff were fully aware of these. Other factors played a part in the event occurrence; tiredness, distraction, workload pressures, stress, lack of attention, patient condition, sickness and lack of appropriate supervision.

Relevance/impact: MRI Safety is paramount when working within the MR Environment due to the potential hazards it presents to both staff and patients. As a result it is important safety is managed by MR Authorised persons and that an open culture of reporting exists so lessons can be learned in order that near miss events do not turn into serious safety incidents. Consideration should be given to Human Factors Theory when investigating safety events.

Outcomes: There needs to be better communication and shared learning around MRI Safety events within our teams and within the MRI community. Human factors training could help make staff more aware of their limitations.

P-222 Improving the patient experience in dementia patients attending for MRI

Darren Hudson
InHealth Group

Aim: With the number of people suffering from dementia on the increase, it is inevitable that at some point they will become patients and require MRI scans, either as part of their diagnostic workup or related to some other co-morbidity. Following the introduction of specific patient referral pathways from local mental health trusts in two of our community based scanning centres in London, and the publication of professional guidance on imaging dementia patients from the Society of Radiographers, the organisation evaluated ways to improve management and experience of patients referred for assessment of dementia.

Content: Key points of interest were taken from the society guidance to formulate a standard operating procedure; outlining guidance around referrals and ensuring patient safety in those with more severe forms of the condition, considerations around the booking process and scan appointment, as well as requirements for staff training. As well as this, the two departments were assessed as a sample to evaluate how dementia friendly they were. This was done using the environmental assessment tool from the Kings Fund which looks at 7 key areas.

Outcomes: Four keys areas were highlighted and addressed in the work to help improve the experience received by this patient group, and their relatives/carers. 1. Specific guidance document, 2. Importance of appropriate communication skills, 3. Adjustments to the department environments, and 4. Need for training at all levels of staff interacting with this patient group.

P-223 Pictorial review: Open MRI in clinical practice

Carina Wells; Apollo Exconde
InHealth Group

Claustrophobia is commonplace and frequently encountered within the MRI department and poses problems for both radiographers and patients alike. Claustrophobia can vary in severity and manifests itself in many ways from

the milder feelings of panic, anxiety and increased heart rate to an irrational perception of threat, an inability to escape and sometimes fear of death or burial.

In our scanning centre at the Croydon University Hospital, claustrophobic patients are regularly scanned on the Hitachi Oasis 1.2T open scanner, currently the only one of its kind in the UK. This scanner has been designed to be more patient friendly with open sides to give the perception of more space, and the receiver coils are designed to be more spacious so that for a brain scan patients can be scanned either supine or decubitus (if body habitus allows). This all helps to make the patient experience a more positive one and still achieve a diagnostic outcome for their further management and care.

With particular emphasis on diagnostic quality of axial T2 and FLAIR sequences, comparison between the Hitachi Oasis and its conventional counterparts, Siemens 1.5T Avanto and GE Signa 1.5T is made and demonstrates that clinically, images obtained on the lower strength Hitachi magnet are comparable, diagnostic and acceptable for reporting and ultimate diagnosis in the claustrophobic patient. Consequently, the Hitachi open scanner provides a useful alternative for imaging claustrophobic patients, helping to avoid the need for sedative medications to achieve diagnosis.

P-224 Evaluation and impact of a dedicated radiographer chest reporting team

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University Hospitals of North Midlands

A large percentage of plain film radiographs in any imaging department are chest examinations. Recognising this fact and realising the ever increasing radiologist workload, a team of radiographers were selected and trained to report chest examinations. The team has been successfully autonomously working for 24 months now with regular audit of performance and consultant radiographer and radiologist support, achieving a high level of diagnostic accuracy, sensitivity and specificity. We describe the impact this has had on the plain film reporting service, including turnaround times and evaluation of referrers opinions of the service and financial implications. Limitations of the service are identified together with reporting radiographers evaluation of their service provision.

P-225 Ultrasound guided transrectal prostate biopsies. How can we improve service delivery to our patients?

Senan Alsanjari; Ashish Mandavia; Arsalan Wafi; Shirish Prabhudesai; Alexander Chapman
St Peter's Hospital

Introduction: The aim of this audit is to establish the cancellation rate for ultrasound guided transrectal prostate biopsy (TRUBP) procedures within the interventional radiology department at Ashford and St Peter's NHS Trust. As a department, it is important for us to ensure an efficient service is being provided to patients and put measures in place to minimise cancellation rates.

Results: 151 TRUBP procedures were carried out between 9/10/14 to 10/10/15. 31 TRUBP biopsies were cancelled (21% cancellation rate). Of these, 12 biopsies (37.5%) were cancelled because the biopsies were booked before the MRI scan. The remaining cancellations were due to patients not attending (28%), patient's blood markers out of range (18.5), patients not taking their antiibotics (9%) and no blood tests available for the patient (6%).

Conclusion and recommendations: The current recommendations by BAUS is that MRI scans should be performed prior to the TRUBP to allow targetted biopsies of a suspicious area. The results from this audit indicate that there is a significant cancellation rate within the department due to a miscommunication within the MRI department and biopsy clinic.

The recommendation that was implemented was the introduction of a TRUBP checklist and proforma which allows for a nurse-led telephone pre-operative assessment with patients to ensure they are fully informed about the procedure, confirms dates for both MRI and Biopsy clinics, and ensures they are fully informed about the importance of the prophylactic antibiotics. We propose this will significantly reduce cancellation rates and will improve patient information.

P-226 The patients' perspective of CT colonography in a district general hospital

Harriet Barber; Rheanne Derby; Mark Puckett
Torbay and South Devon NHS Foundation Trust

Aims: The aim was to assess patient satisfaction with the current CT colonography service and to identify areas in which to improve the quality of the care provided.

Content: CT colonography (CTC) examinations provide a key role in the detection of colorectal cancer with a large number of CT colonography studies performed in our institution each week. The literature reports that CTC is a well-tolerated investigation and in some patients is the preferred choice of investigation for bowel symptoms compared to traditional colonoscopy, but the perspective of our patient population was unknown.

A patient survey evaluated all aspects of the CTC patient experience from bowel preparation and its effects on the individual, to discomfort during the study and if they had a preference of CTC versus traditional colonoscopy.

Relevance/impact: Increasing numbers of patients are undergoing CTC studies, which can to some patients be an apprehensive experience. Providing a good quality service and ensuring patient satisfaction is therefore paramount. Good patient experience also aids patient co-operation and preparation, which in CTC is key to good quality diagnostic images.

Outcome: The majority of patients tolerated the procedure well, had little to no discomfort and would be willing to have the test again or recommend it to family/friends. Of the patients who had experienced traditional colonoscopy, the majority preferred CTC.

P-227 Radiographer led urethrograms: Experience from a specialist tertiary referral centre

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Central Manchester University Hospitals Foundation Trust

Objectives: To describe the radiographer led urethrogram service, including how it was set up, and to provide a pictorial review of the normal and pathological findings that we have encountered.

Content: A radiographer led urethrogram service was set up in our centre one year ago. Our centre is a specialist referral centre for the treatment of urethral strictures. Urethrograms were traditionally performed by a uro-radiologist. It was decided that training would be provided for the three advanced radiographers in the department whom already carry out various fluoroscopy studies independently.

Relevance: Several fluoroscopy studies have now been replaced by other imaging modalities. Urethrograms still have a valuable role in the investigation of lower urinary tract pathology. It is not commonly performed and Radiologists may be unfamiliar with the technique, normal findings and pathology encountered. Utilising experienced radiographer skills for a further fluoroscopy study contributes to the many benefits of the skills mix that already exists in many Radiology departments.

Outcome/discussion: The Advanced Radiographers have performed a total of 60 urethrograms in one year with more than half demonstrating pathology. The main indications were for suspected stricture, assessment of urethral injury following trauma and to delineate urethral fistulas. With more radiological procedures being performed by Radiographers, we found that urethrograms could also be one of them. Radiographers are maintaining the service at a high standard as confirmed by our Urology colleagues. Their role will be extending to reporting urethrograms independently.

P-228 Obesity, heuristic reasoning and the organisation of communicative embarrassment in patient-facing diagnostic radiography

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The reported research qualitatively elucidates difficulties emerging around radiographer-patient communication regarding obesity in radiographic encounters, and the situated strategies found by radiographers for handling such situations. There has, to date, been no empirical investigation of obesity-related communication in everyday radiographic contexts. The discussed findings, thus, develop a number of themes for further investigation.

Semi-structured interviews with eight expert diagnosticians working in plain radiography (mean experience = 21.56 years) were explored using Interpretative Phenomenological Analysis (IPA), so as to highlight the practical, nuanced and real-world experiences of these individuals regarding obesity communication.

Participants generally viewed communicating with obese patients as a potential 'minefield', in which both parties were likely to be embarrassed. Most reported having had negative experiences in which patients had acted with denial or outright aggression during examinations but, conversely, all reported cases in which patients had been frank and open about their obesity, and even been happy to joke about it. Equally, all participants were able to document a range of communicative strategies for effectively handling potentially difficult situations.

Results further indicate that communicative problems and embarrassment for the patient only generally arise within material contexts; i.e. when equipment is inadequate or multiple exposures are necessary. Participants largely expected any interaction about obesity with a patient to be embarrassing for both parties, but their actual experience was much more varied. This indicates a more complex communicative environment than may be expected, and also a potential availability heuristic in play that requires quantitative clarification.

P-229 Preliminary clinical evaluation (PCE): Perceptions and barriers to implementation

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The College of Radiographers (CoR) 2013 policy and practice guidance identifies the ability to write Preliminary Clinical Evaluations (PCE) should be a core competency for radiographers. This research used a mixed methods approach to investigate the perceptions and potential barriers to the implementation of abnormality signalling systems (ASS) and in particular PCE in clinical practice.

A purposive sample of qualified radiographers from two NHS Trusts was identified (n = 62). Response rate was 90% (n=56).

20% (n=11) had been qualified <2years, 53% (n=30) 2-4 years, 27% (n=15) >5years. Only 30% (n=17) felt that their university training prepared them well for PCE upon graduation however responses differed by group. 72% of those qualified <2 years felt prepared versus only 20% of the remainder.80% (n=45) in total participated in CPD to develop their image interpretation skills which has a positive impact on confidence. The >5 years qualified group are more likely to engage with CPD than the other groups. Only 23% (n=13) felt that PCE would improve service delivery stating lack of skill, guidance, 'too busy imaging', too much responsibility, and 'no pay increase', as common reasons. 70% (n=39) felt that PCE should not be implemented in practice.

The evidence suggests that the CoR 2013 policy is having an impact on undergraduate training in that the <2years qualified group are more responsive to delivering PCE but less likely to participate in CPD. Further work is required to measure graduate image interpretation competence and subsequent development.

P-230 Orthopaedic auto reporting in radiology – the delegation dilemma

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Objectives: To highlight IR(ME)R 2000 compliance of orthopaedic referrers (medical and non medical) with regards to delegation of image review and documentation.
To assess report content and quality of orthopaedic referrers in line with RCR guidelines and highlight the risk of missed/misinterpreted findings in the absence of systematic review.
Highlight the potential utilisation of reporting radiographers to remove risks associated of non compliance with IR(ME)R 2000.
Highlight the disparity of radiology teaching hours in undergraduate medical training and why this should be considered in relation to IR(ME)R 2000 entitlement - in which all GMC registered doctors are entitled to review plain film images within their speciality.

Relevance: To ensure all imaging is comprehensively assessed and documented to ensure high quality patient care in efficient time scales.

Outcomes: Results found that orthopaedic referrers were only 87% compliant with IR(ME)R 2000. Reporting standards advised by the RCR and RTT's set by the diagnostic imaging board were not met.

Discussion: Measuring the performance of a reporting radiographer to enable future production of timely and comprehensive reports.

Exploring the way orthopaedics formulate and store image reports by following systematic review and recommend utilising PACS sticky notes to store reports alongside the image.

P-231 An audit on total hip replacement at King George Hospital

Wan Lam Foo; Jeyasulthan Ambalavanar
Barking, Havering and Redbridge University Hospitals NHS Trust

The purpose of the audit was to identify the standard of quality of total hip replacement surgery delivered to patients and service users in the trust. Therefore, areas for improvement are identified in order to give our patients and service users the highest standard of care.

The audit of post total hip replacement surgery was conducted based on all the cases had been completed in the past three months at the King George Hospital under the Barking, Havering and Redbridge University Hospitals NHS Trust.

All images of post total hip replacement were reviewed. The results are classified as successful when the prosthetic hip is well in tact in situ and satisfactorily in position. Otherwise, it is considered as a failure. Data are presented into a chart and histogram, both in percentage and number of cases, for better visualisation of the quality of the total hip replacement surgery.

There is a PRIDE brand in our trust which is based on our values of Passion, Responsibility, Innovation, Drive and Empowerment. In order to fulfil PRIDE features in our working lives, we are committed to continuing development ensuring that our services delivered to patients and service users are the possible best of care.The outcome of the audit well represented the level of quality of care we stand and giving us the opportunity always looking for improvement.

P-232 The lung cancer escalation pathway: A radiology department-led protocol for streamlining patients to early diagnosis

Syed Haydar; Julie Cox; Scott Elwell; Elizabeth Judson; Ralph Marsh; Jonathan Spratt
City Hospitals Sunderland Foundation Trust

Lung cancer is the second most common cancer in the UK. Given the national background incidence, the local Sunderland area has almost twice this. Performance data from the original two-week-wait referral pathway (TWWRP) showed that the time taken from abnormal CXR to booking of a CT was approximately 28 days (before April 2014). By introducing a lung cancer escalation pathway (LCEP), we aimed to: reduce timelines to diagnosis; reduce cancer breach targets; and to create a seamless pathway between primary and secondary care.

Methods: For GP-referred patients at SRH, every abnormal CXR suspicious of malignancy as assessed by a consultant radiologist was cycled into the LCEP where the radiology department through a dedicated cancer services facilitator arranges an urgent CT scan and subsequent chest clinic appointment, resulting in a reported scan prior to consultation.

Results: From April 2014-June 2015, 419 lung cancers were diagnosed at SRH: 28% (n=117) from the LCEP; 17% (n=72) from the TWWRP; and 55% (n=230) from routine referrals (Emergency Department (ED) and chest clinic). The average time from abnormal CXR to CT was reduced to 8 days (LCEP patients), with a cost-saving of a chest clinic appointment.

Discussion: Using LEAN tools and techniques we have incorporated a MDT approach to streamlining the diagnosis of lung cancer. Furthermore, by extending this referral pathway to other patient groups (e.g. those with unexplained symptoms of concern) and streamline direct referral and CT investigation, we can aim to reduce the high numbers of incidental cancer diagnoses at ED admission.

P-233 "Follow up" alerts generated following abnormal CXR: Are they acted on by the referring clinicians?

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Warrington and Halton Hospitals NHS Foundation Trust

Background: CXR "follow up" alert is generated by the radiologist if there is any abnormality found which requires further imaging to be performed after an appropriate time interval. These alerts would prompt the referring clinicians to do so and suggest the modality for the follow up image.

Radiology alerts are developed after several incidents of abnormal images not been acted on by clinicians in the past.
Consequently the NPSA and RCR have issued safety notice and documents outlining the importance of communication of these abnormal results to the referring clinicians.

Method: CXRs done between October 2014 and March 2015 with "follow up" alerts are selected using CRIS. 50 CXR are selected from each source of referral i.e. GP, AED, Outpatients and Inpatients. PACS system is used to see if alerts are acted on.

Results: The results showed 90% of this alert was acted on by GP, 80% by AED, 92% by Outpatients and 54% by Inpatients.
Average time of these alerts being acted on is 5.7 weeks by GP, 5.3 weeks by AED, 7.1 weeks by Outpatients and 4.6 weeks by Inpatients.

Discussion: These alerts are important and need to be acted on by referring clinicians. Ways to improve this include setting up a read/acknowledge system on PACS, radiology secretaries to notify the clinician's team directly of these alerts, and disseminating the information of the importance of acting on these alerts in grand rounds.

P-234 A pilot single-centre single-blinded randomised controlled trial study to compare the use of video demonstration or telephone interview verses routine intervention to alleviate anxiety in patients prior to MRI

Jenna Tugwell-Allsup
Betsi Cadwaladr University Health Board

Aim: The aim of this study is to determine whether a video demonstration (visual) or a telephone conversation with a radiographer (verbal) in comparison to routine preparation/information can be used to alleviate patient's anxiety prior to MRI examinations.

Method: A three-group controlled experimental design was used. 90 patients were randomly assigned to one of three groups, 30 received routinely given basic written information (control group), another 30 received a DVD (intervention group 1) while the remaining 30 received a phone call from an MRI radiographer explaining the procedure and answering any questions the patient may have regarding the scan (intervention group 2). To measure patient anxiety before and after the interventions, the self-report psychometric test State-Trait Anxiety Inventory (STAI) was used. After the MRI scan patients completed a questionnaire on satisfaction regarding their MRI preparation and entire experience. The images were also assessed with regard to motion artifacts. A small percentage of patients (2%) was interviewed to gain an in depth understanding of their MRI scan experience.

Potential practice implications: Both interventions can easily be implemented in clinical practice to improve patient experience, patient throughput, reduce waiting times, improve image quality and also have positive financial implication.

Results: Mid way through patient recruitment and already some interesting results have been witnessed. Patient recruitment should be completed by March/April.

Funding: CoRIPS small grant scheme

P-235 Paediatric radiographer led service for administration of Entonox in micturating cystourethrograms

Vanessa Waspe[1]; Angela Staley
[1]*Nottingham University Hospitals NHS Trust*

Aim: To reduce distress that may be caused to paediatric patients and carers during Micturating Cysotourethrograms (MCUG's), whilst improving cost efficiency. This service also extends the role of the radiographer.

Content: The renal nurses had made significant improvements to patients experience during urodynamics by delivering Entonox, to aid catheterisation.
To improve the service further for other patients undergoing examinations, we decided as radiographers to take relevant training to administer Entonox ourselves.
The training was given by the pain nurses within the trust who signed us off as competent. Training also included PEWS and medical devices training.

Impact: The efficiency of the process from receiving the request for the examination to the patient attending for the appointment has improved. This includes the flexibility such as timing of LMP's following the ten day rule, Radiologists time and room utilisation. Theatre time is no longer required for suprapubic catheterisations.

Outcome: Our extended role has meant the patient pathway for MCUG's has improved, as well as the experience for patients and carers on the day. Due to fewer theatre cases and failed examinations the cost for the trust has been greatly reduced.

Discussion: The success of our training has meant we have been able to increase our patient numbers, and our failure rate is negligible. We have also been able to extend this service for other procedures. More importantly, positive feedback received from our patients and their families demonstrates the improvement we have made to our service.

P-236 Enhancing PACS by integrating external applications

Barnaby Waters; Stuart Green; Kal Natarajan
University Hospitals Birmingham NHS Foundation Trust

Aims/objectives: To highlight some generic interfaces that can allow PACS users to launch external applications to provide extra clinical functionality that is not available in the core PACS product.

Content: This poster will present the ways in which we have linked with various external applications from within our Agfa IMPAX PACS.

Relevance/impact: PACS teams and clinicians need to know what is possible to get more from their current or next PACS system.

Outcomes: Radiologists need a robust system for quickly raising urgent alerts to referrers, auditing acknowledgement and escalating if necessary. Rivendale RadAlert uses an HL7 reports interface to raise email alerts when key phrases are detected in validated reports. The web application can also be manually launched in a study context via button within PACS.
Neuroradiologists need to be able to quantify changes in whole brain volume to monitor the effectiveness of treatments for multiple-sclerosis. CorTechs Labs NeuroQuant uses a bidirectional DICOM interface with PACS to process volumetric MR data and produce reports on brain atrophy which are stored back in the clinically safe PACS environment. Radiologists can transmit MR series for analysis from within the PACS viewer.
An ED clinician's communication efficiency is increased with templated Outlook emails containing the patient and study details. A keyboard shortcut or button calls a VB script that opens a new prepopulated Outlook email.

Discussion: PACS Teams and clinicians need to be aware of the options for launching external application to enhance the functionality of their current or future PACS.

P-237 Fit for practice. Fit for purpose. A literature review of diagnostic radiographer first post experiences

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Aim: To critically evaluate the literature pertaining to the first post experiences of graduate diagnostic (DI) radiographers.

The objectives are to identify and appraise the literature using a structured search strategy and an appropriate appraisal framework thus identifying gaps in the research so as to inform a Professional Doctorate thesis proposal pertaining to DI radiography learner preparedness for their first post.

Content: The poster includes a pictorial overview of the search strategy. A detailed outline of how the CASP qualitive critical appraisal tool has been applied to reach the conclusions drawn.

Relevance/impact: The curriculum in undergraduate DI radiography continually evolves, driven by technological advancements, developing professional roles and a changing healthcare landscape. Areas of practice once seen as a specialism are now considered first post-competencies. Accordingly there is a responsibility on Higher Education Institutes to ensure appropriately focused clinical and academic training of the future workforce whilst meeting professional body requirements. Investigating the preparedness of new graduates for their first post is essential in aiding this activity.

Outcomes: This review highlights a gap in research which explores the technical competencies required by newly qualified diagnostic radiographers working in the modern imaging department.

Discussion: This finding is important given the increase use of imaging modalities. [CT (10%), MRI (12%), Ultrasound (5%)] in the last decade. It is 15 years since research has published on first-post competency requirements in diagnostic imaging. Subsequently this work provides a foundation to which to further develop an appropriate methodology for research of future radiography education.

P-238 MSK ultrasound training - our organisation's approach

Felicity Kinsey[1]; Lorelei Waring[2]; Samina Afzal[1]
[1]InHealth Group; [2]University of Cumbria

Objectives: Early 2013, AQP signalled a nationwide change in clinical services commissioning within the community. The fastest growing demand was centred on the lack of provision for MSK ultrasound. Our team recognised a clear gap in staff ability to deliver the full range of ultrasound skills, especially MSK which was mandatory for AQP. Also an ever increasing demand from NHS partners to supply dedicated MSK ultrasound could not be met by the existing team. In order to maintain our competitive edge in service delivery for Ultrasound, we took steps to address a highly specialised clinical need which was lacking within our staff workforce.

Content: A mid/long term vision was developed, with training to meet our requirements. This necessitated a well-planned, structured programme, with emphasis equally focussed on academic capability and practical skills of the individual.
A planned regime of tutorials was employed for the 3 months leading up to the start of the CASE accredited MSK module at the University of Cumbria. These sessions continued after the University course and the students also began attending MSK scanning sessions. After 6 months the tutorial sessions were reduced to one per month and concentrated solely on scanning clinically with experienced MSK sonographers.

Outcomes: An incredible journey over a 12 month period has produced MSK qualified sonographers who will go on to benefit our organisation. The key to our training success stems from a well-supported approach between two organisations, working together in partnership towards achieving a common goal.

P-239 Are we ready for the future? A reflection on the Shape of Caring review and its implications for radiography

Denise Baker
University of Derby

The current review of nursing (Shape of Caring Review) scopes several aspects of training as well as the current fields of nursing. This presentation will give an overview of this review and explore how and if this is applicable to diagnostic imaging.

Aim: To explore pre-registration training of diagnostic radiographers and consider whether the current route to registration is fit for the future.

Objectives: To review the non-registered workforce route to registration, to consider the role of the mentor, to explore preceptorship and professional 'fields' in diagnostic imaging.
The areas listed are key in the nursing review, and are all applicable to diagnostic imaging. Whilst mentorship and preceptorship are key to pre-registration training of radiographers, they are not currently monitored in the same way as in nursing. Conversely, nursing has much to learn from the career structure and progression opportunities in radiography. However, sometimes barriers exist as assistant practitioners specialise in one imaging modality and the current undergraduate curriculum focuses largely on general imaging. This makes it difficult to recognise prior learning and achievement if APs have been working in cross-sectional imaging or mammography for example. The evidence to support the topics identified in the objectives will be briefly explored.

Impact: Current shortages of registered staff influence skill mix and working practices. Is this an opportunity to recognise pre- registration specialisation?

Outcomes: To stimulate a professional debate about the current shape and future requirements of the profession.

P-240 The educational impact of outsourcing on radiology registrar education

Nicholas Chua[1]; Esubalew Alemu[2]; Qaiser Malik[1]; Cherry Sit[1]
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Introduction: Outsourcing overnight imaging is increasing in DGHs. Whilst it is common to audit discrepancy/costing, there is little existing data regarding the proportion of positive findings and the subsequent loss to registrar education from overnight outsourcing. This affects exposure to emergency radiology curriculum and therefore we examine the impact of outsourcing on registrar education.

Methods: We performed a four month retrospective observational study at our institution, a teaching DGH (108,000ED attendances/pa). We included all out-of-hours CT/MRI scans from 8pm-8am, Monday-Sunday. We compared radiology reports from PACS to the college's Emergency Radiology curriculum diagnosis list. Non-emergency findings were not included.

Results: 1,505 CT scans were performed over four months. No MRIs were performed. 60% of scans were for CT-head, 15% for CT-KUB, 12% CT-Chest/abdo/pelvis(CAP) with the remainder a mixture of skeletal-CT, CT-PA and CT-angiogram. Overall positive findings rate was 31%. The highest rate was for CT-CAP(50%) and CT-Angio(60%) and the lowest for CT-head(15%) and CT-skeletal(10%).

Conclusion: Positive scans could be found on 31% of out-of-hours imaging, a significant amount. This figure is likely to be higher if non-emergency pathology was included. We appreciate hospitals may not have enough registrars to fill a night rota, instead we encourage trainees/trainers to review out of hours imaging, particularly angiograms and chest/abdomen/pelvis imaging where the highest proportion of positive findings are found.Our data can assist planning for 'on-call preparation' training and we recommend DGH trainees to actively seek major trauma and emergency MRI spinal imaging experience which was absent in our study.

P-241 Teaching dementia awareness to 2nd year medical imaging students

Julie Mills
University of Exeter

Identification and rationale behind the key drivers as to why we revised our dementia training at Exeter university.

Discussion to describe setting up of a 2 hour-stage 2 seminar to include the use of 'Barbara's story' (Guys and St Thomas'), the use of discussion around SCoR recommendations and HCPC SETs. After examing these resources students were asked to put together a 5 minute presentation for stage 1 students on each set of the recommended SCoR guidelines.

Results to include student feedback on how sessions were received and pointers for further sessions as suggested by students themselves using EBI - even better if and WWW - What Went Well

Conclusion - seminars were well received and students could see the value of the session as they had all seen patients with dementia, so these sessions will have helped to ensure our students have the requisite skills and knowledge to understand dementia, how it presents and be well equipped and prepared to deal with the rising numbers of patients presenting to imaging departments in the United Kingdom in a compassionate and professional manner.

P-242 Interprofessional learning (IPL) working with others module assessment

Ruth Strudwick; Jane Harvey-Lloyd
University Campus Suffolk

Aim: To evaluate an innovative approach to interprofessional learning and assessment.

Content: This poster describes and evaluates the assessment used for a module entitled 'IPL - Working with Others'. 320 students sat the module from; adult, child health, and mental health nursing, midwifery, social work, operating department practice, diagnostic and therapeutic radiography.

Relevance/impact:
Students were able to work together, learn from and about one another and understand one another's roles

The assessment mirrored interprofessional practice, highlighting issues that occur with interprofessional team working.
Case studies help students to see the relevance to their own professional practice

Outcomes: Both staff and students have found this to be both a good learning experience as well as a good way to assess IPL. Students had a 'real' experience of interprofessional working, facing the barriers and challenges to overcome which are similar to practice.

Discussion: Students were divided into interprofessional groups of eight students. Groups were given a case study of a service user coming into contact with different health and social care professionals. They worked together to produce a poster about the case study. These groups provided a 'real' experience of working together and understanding one another's roles (CAIPE, 2008). The students then had to defend their poster as a group and answer questions from two assessors.
In order to review the assessment both students and staff were asked to provide feedback about the assessment process, listing the positive and challenging aspects.

All staff provided feedback and approximately 60% of students.

References: CAIPE (2008) www.caipe.org.uk/about-us/defining-ipe

P-243 An exploration of student learning and performance of radiation physics: A correlative pilot project

Naomi Shiner
Robert Gordon University

Objectives: To explore correlations between learning styles and assessment performance; to improve pedagogy and assessment alignment.

Background: Physics can be a conceptually difficult subject yet fundamental to radiography. Student centeredness requires educators to adapt pedagogy. No research could be found exploring the impact of student learning style and performance in the field of radiation physics.

Method: The Kolb's Learning style inventory (1984) was distributed to first year undergraduate diagnostic radiography students (n=21) - response rate was 81% (n=17). Individual participant results were collected per assessment component.

Results: The calculation of learning attributes led to the determination of learning style; 58.8% (n=10) Accommodating, 11.8% (n=2) Convergent, 11.8% (n=2) Assimilative, 5.9% (n=1) Divergent, 5.9% (n=1), Convergent/Assimilative and 5.9% (n=1) Divergent/Assimilative. Two-tailed Pearson correlation coefficient was applied to two sets of data, the Learning Style Inventory (LSI) scores and the assessment scores. A significant (p-value 0.003) negative correlation between Active Experimentation (AE) and Abstract Conceptualisation (AC) was found (r-value 0.669). A second significant (p-value 0.018) negative correlation was identified between Concrete Experimentation (CE) and Reflective Observation (RO). No statistically significant correlation was found between learning style and assessment performance.

Conclusion: Students demonstrated strength in practical tasks and undertaking new experiences. Weak areas correlated in planning and creating theoretical models. The physics component had the widest variation in results, indicating difficulties. The information obtained may be used to inform strategies for physics pedagogy and assessment.

P-244 CT head: Image interpretation performance of student radiographers

Jennifer Gibson; Marcus Elkington; Chris Wright
Sheffield Hallam University

The ability to perform CT Head scans is a first post competence for HCPC registration. At this university, students receive the technical CT component and at least two weeks clinical CT practice during year two. This research aimed to assess the image interpretation skills of final year student radiographers (n=30) using a longitudinal study. The results present the findings of the entry to year three test.

A quantitative method was adopted using a twenty image (10 normal, 10 abnormal) RadBench style test. Decision making was assessed using a five point scale (definitely normal, probably normal, possibly abnormal, probably abnormal, and definitely abnormal). Sensitivity, specificity and accuracy were calculated and the written preliminary clinical evaluation assessed.

Sensitivity scores ranged from 58-100% (mean 92%), specificity 33-100% (mean 69%), and accuracy 50-100% (mean 80%). Four students could already meet a 90% (13%) accuracy benchmark and a further eleven (37%) 80%.

The results suggest that with further education and training in year three, the vast majority of new graduates might well be able to achieve a 90% benchmark, able to support a radiographer lead abnormality signaling system. Refreshing brain anatomy and lots of case evaluations, in addition to further clinical practice, are critical to skill development. A further test will confirm graduation competence.

P-245 Exploring the personality traits of diagnostic radiography students

Amelia Drake; Sarah Naylor
Sheffield Hallam University

Introduction: This research investigates whether diagnostic radiography students exhibit common personality traits and how these maybe used to select prospective students. By studying three distinct year groups, this work explores how personality changes as individuals undertake the journey from student to radiographer.

Method: Given the relatively ambiguous nature of 'personality', there was equal value in collecting and analysing quantitative and qualitative data. For the quantitative aspect of the research the questionnaire used is based upon the Big-Five factor markers (Emotional Stability, Extraversion, Openness, Agreeableness and Conscientiousness) (Goldberg 1992) and is available from the International Personality Item Pool, a scientific collaboration (IPIP 2015). The qualitative aspect of the research utilised the Structured Focus Group Interview for the Five Factor Model of Personality (SIFFM) (Trull and Widiger 2002).

Results: The quantitative data reveal relationships with traits such as; agreeableness, conscientiousness and emotional stability and gender; agreeableness and age and emotional stability and prior education. While there is no statistical evidence to suggest any relationship with the Extraversion trait, the qualitative results suggest that this is an important aspect of being a radiographer. Even radiographers that describe themselves as introverts recognise the need for confident communication and often 'perform' in a more extrovert manner as the role demands

Conclusion: The five personality factors are broad and are shaped by influences such as gender, age and life experience, particularly between the ages of 18 and 30. It is doubtful whether the FFM can detect the subtle similarities in the personality traits of radiographers. Nonetheless, working in a stressful environment appears to develop facets of the personality, leading to changes in these higher level factors. Some of these facets manifest themselves as coping strategies. Moreover, as students' progress through their course, and become accomplished radiographers, their personalities become increasingly homogenous.

In this way the personality of the individual and the demands of the job form a pseudo-symbiotic relationship, where the demands of being a radiographer shape the personality and the personality shapes the role.

P-246 Embedding diversity and culture in a radiography and radiotherapy undergraduate degree programme: An inclusive curricula for patients and students

Zainab Hussain; Bev Ball; Flora Al-Samarraie; Porritt Bridget; Vicki Pickering; Gordon Cath
University of Liverpool

Aim: To evaluate a new 2nd year professionalism module aiming to raise awareness of patient diversity.

Content: This module was developed to advance students' awareness of diversity and culture. Students received teaching in workshops from community groups and service users e.g. Black and ethnic minorities (BME), disabled, LGBT and received communication skills teaching (cultural communication, neurological disorders deaf and visually impaired). It was also apparent the programmes were attracting increasing numbers of BME students. The assessment gave students the opportunity to produce a health promotion poster and reflective report focussing on communication, diversity and patient dignity.

Relevance: Professional standards require radiographers to be aware of the impact of culture, equality, and diversity on practice and to practice in a non- discriminatory manner. The Equality Act 2010 means Higher Education Institutions must minimise disadvantages and meet the needs of people with protected characteristics. The Higher Education Academy suggests this necessitates new methods of learning, teaching and assessment.

Outcomes: The module was highly evaluated by service users, students and staff. Students reported the module made them think differently about themselves and additional challenges faced by many patients. It was evident the module allowed students to benefit from their own cultural and social capital. Students also commented that often their own communities were invisible in the profession and education.

Discussion: The module has added to the blended learning approach, developing the skills and support patients require with consideration of diversity. Student diversity is also valued by recognising the students own social and cultural capital in learning, teaching and assessment.

P-247 The transition of diagnostic radiographers during their first twelve months of practice

Jane Harvey-Lloyd
University Campus Suffolk

The radiography profession is undergoing significant change in response to social, economic and political influences. This has resulted in increasing service demands and a requirement for graduates to possess a much wider range of skills (Decker, 2009). The pressures now being placed on newly qualified health and social care practitioners has initiated research in both nursing and medicine which has focussed on the transition of student to practitioner (Ross and Clifford 2002; Mooney, 2006). The aim of this project is to explore the experience of transition from student to practitioner in diagnostic radiography and to utilise the findings to improve transition in the future across a range of health professionals

Method: An interpretive phenomenological approach has been adopted consisting of three face-to-face interviews of each participant at three months, six months and twelve months post qualification. These time intervals have been identified in the literature as critical times (Decker, 2009; Smith and Pilling, 2007). Thematic analysis is to be utilised in that through examining each individual experience, commonalities and relationships, including differences across the participants may be identified (Gibson and Brown, 2009).

Results: The results from all three interviews will be discussed in an attempt to represent the journey of the participants.

Discussion: The themes identified in the results will be discussed in view of current literature and contextualised in order to identify areas for improvement.

P-248 Image Interpretation performance of diagnostic radiographers

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This research aims to benchmark radiographers' image interpretation skills, and to provide a unique characterisation of an individual image interpretation performance.

The notion that radiographers have the ability to provide an accurate report on radiographic images is well established. There is growing evidence that radiographers internationally are participating in preliminary clinical evaluations (PCE) and it is suggested that accuracy and confidence in PCE will improve with appropriate education and training. On the other hand, there is no published evidence about radiographer image interpretation capability in local nor asian context. Some early results will be presented.

Radiographer led image interpretation locally is still at an infant stage. The results from the study will provide better understanding of the current diagnostic radiography competencies in musculoskeletal image interpretation in a local tertiary hospital.

It is important for the department to track radiographer performance and also enable radiographers to benchmark themselves against others as desired so that both the individual and department can take steps to improve the performance of the individual. Benchmarking radiographers can further enable identification of educational needs necessary for future professional role development. Managers involved in recruitment of new radiographers can

also have fully visibility of current performance within the interviewees, and how that perform within the department cohort with a similar level of experience.

With the upcoming local state registration of the radiography professional and also the commencement of the first degree programme in diagnostic radiography, tomorrow's radiographer could have an individual image interpretation rating tied to their annual appraisal rating.

P-249 Analysis of training needs for radiographer image interpretation in clinical practice

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This study explored the training needs for radiographers to improve their image interpretation skills and clinical decision making to underpin potential radiographer-led discharge in an emergency department setting.

30 appendicular musculoskeletal projection radiography cases were made available to two hospital sites. The images contained a variety of findings; respondents were asked to rate images on a scale from 'definitely normal' to 'definitely abnormal' and supply a written comment. They were also asked to identify the appropriate treatment pathway from options provided and their degree of confidence in their choice.

In 2013 the College of Radiographers called for the introduction of preliminary clinical evaluations, replacing the traditional 'red dot' approach with written comments. There is evidence that patients with appendicular injuries could be discharged by the radiographer directly after imaging, without the need to be seen again by a doctor if no fracture is detected.

Sensitivity ranged from 40% to 94% (66% average) and accuracy from 44% to 83% (68% average). Respondents (n=31) were more likely to rate an image as definitely abnormal, than normal, which is reflective of confidence levels in interpretation skills. Confidence levels were higher in the presence of pathology than in normal examinations. The correct choice of discharge pathway varied from 22% to 100% and related to the confidence of their interpretation.

The sensitivity, specificity, accuracy and discharge data demonstrate a clear need for further education. Supporting radiographers through education and development is key to enhancing and expanding practice.

P-250 Role modelling in diagnostic radiography

Ruth Strudwick
University Campus Suffolk

Aim: To look at how students learn through role modelling in practice.

Content: In many studies of work-based culture and the process of learning a profession, role modelling is mentioned. This presentation will use data from an ethnographic study carried out in one diagnostic imaging department to evaluate role modelling with diagnostic radiography (Strudwick, 2011). The methods used were participant observation for four months and semi-structured interviews with staff from the department.

Relevance/impact: The process of learning to become a radiographer involves the use of role models. Students observe radiographers doing their work. This suggests a type of 'apprenticeship model' of learning where the learner spends time with the experienced practitioner in order to learn skills.

Outcomes: Role modelling was shown to be important in diagnostic radiography.

Discussion: Other studies of students and environments where newcomers have to learn a role discuss role modelling. Colley et al. (2003) writing about learning and becoming in vocational education and training talk about the importance of role models in identity transformation and picking up norms. Holland (1999) and Mackintosh (2006) looked at student nurses and how they learnt to become nurses. They both talk about how role models influence the socialisation of students. Smith (1992) when writing about emotional labour in nursing says that students observe professionals and identify role models.
This poster presents data from the study to demonstrate how role modelling is important in the student's transition from student to qualified practitioner.

References: Colley H, James D, Tedder M and Diment K (2003) Learning as becoming in vocational education and training: class, gender and the role of vocational habitus. Journal of Vocational Education and Training, Vol. 55, No.4, pp 471-496.
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Smith P (1992) The emotional labour of nursing: How nurses care. MacMillan Education Ltd, Basingstoke.
Strudwick R M (2011) An ethnographic study of the culture in a Diagnostic Imaging Department (DID) DProf thesis, unpublished, University of Salford.

P-251 A reporting radiographer led educational approach to facilitate staff integration

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Background: Pressures from an amalgamation timeline of 4 sites into one with a significant influx of recently qualified radiographers and a host of unfamiliar new equipment. Consequently reporting radiographers recognised an increased reject rate, decreased image quality and a weak adherence to amalgamated protocols.

Aims/objectives:
Identify the causes of image quality deficit
Initiate processes to improve image quality
Reduce reject rates

Content:
Team cohesion was reduced due to the amalgamation, quantity of new staff, rotation, shift system and unfamiliar equipment.
Initial reporting radiographer led remedial presentations failed to reach enough staff. Consequently a reverse small radiographer team teaching approach was adopted, allowing staff self identification of knowledge gaps and following research, present to their peers for discussion.

Relevance/impact: Recognition of technical issues from plain radiography and change management associated with hospital mergers resulting in the development of a process to rectify and maintain staff development and image quality acceptability.

Outcomes: Departmental integration and morale have increased though this initiative with positive feedback from staff discussions resulting in images of improved diagnostic quality and reduced reject rates.

Discussion: Following the introduction of an integrated educational team approach we have experienced recognition of enhanced staff morale, decreased reject rates and improved image quality.

Our experiences have shown that it would be beneficial to initiate an integration and education plan prior to any move or initiate a system soon after merger.

P-252 The applicant evaluation of the use of Multi Mini Interviews (MMIs) in selecting radiography students

Caroline Vince; Caroline Doolan; Jane Harvey-Lloyd; Hollie Hadwen
University Campus Suffolk

Introduction: In line with the Health Education England's (HEE) core objective of values based recruitment, UCS implemented a new student selection strategy. Four Multi Mini Interviews (MMIs) of eight minutes were designed for each applicant to rotate through. These were:

Clinical scenario group discussion
UCAS personal statement
Understanding the radiography profession
Communication with a service user
Academic staff, service users, practice partners and final year undergraduate students all participated in the MMIs and formed part of the decision making process

Method: Due to a new process being used it was essential to evaluate the applicant experience in order to inform future use. Applicants were handed the questionnaire at the end of the selection day and a box was provided for them to place the completed questionnaires.

A questionnaire was designed using 14 quantitative statements. Using a 4 point Likert scale the applicants were asked to indicate their level of agreement to 14 statements. The data was then analysed using descriptive statistics and presented in a range of charts and graphs.

Results: 108 questionnaires were returned, 78 from diagnostic radiography applicants and 30 from radiotherapy applicants. Overall, 99% of students agreed or strongly agreed that they were satisfied with the selection day experience.

Discussion: Overall, the feedback was very postive in terms of clarity of questions, information, the design of the MMI stations and the overall experience. There were some areas identifed for improvement such as the opportunity to ask questions, oragnisation and the understanding of the NHS values.

P-253 Implementing value-based recruitment through the use of Multi Mini Interviews (MMIs) in radiography

Caroline Vince; Caroline Doolan; Jane Harvey-Lloyd
University Campus Suffolk

Introduction: Values based recruitment is a core objective in the HEE Mandate (2014-15) and is also recognised as a key priority for HEE and its Local Education and Training Boards (LETBs). There is a growing body of evidence that traditional 'single panel' interview approaches do not provide the best opportunity to select appropriate applicants based upon an accurate assessment of their attributes and that such approaches are prone to bias and lack reliability (Humphrey et al., 2008). In contrast, the MMI offers the opportunity to more actively assess applicant's suitability for a programme of study by moving the applicant through a series of 'stations', each requiring them to demonstrate a skill or attribute. The use of multiple panels has been found by a number of studies to enhance the reliability of the selection process (Humphrey et al., 2008; Rosenfeld et al., 2008).

Design of the MMIs
Four stations of eight minutes duration were designed as part of the MMIs:
Clinical scenario group discussion
UCAS personal statement
Understanding the radiography profession
Communication with a service user
Academic staff, service users, practice partners and final year undergraduate students all participated in the MMIs and formed part of the decision making process.

Discussion: This presentation will discuss the design of the MMIs and how the course team incorporated the mandate for value-based recruitment in this process. Issues of implementation and management will also be explored in order to share the experience with other HEIs.

P-254 Health improvement and health promotion education of undergraduate radiographers in a Scottish HEI: 'Policy in practice' evaluation at the grass roots

Amy Wareing[1,2]; Morag Howard[1]
[1]Robert Gordon University; [2]Lancaster University

Aim: To address the impact value of profession specific policy of health promotion in a HEI.

Background: AHP's are a key workforce to improve and promote the health and wellbeing of the UK population. Training is cited as a major barrier to health promotion interventions in practice. There is very little empirical or evaluative literature in this area.

Method: The student /lecturing staff 'blocks of the implementation staircase' were chosen as a focus. The RUFDATA tool was used for a series of decisions framing the project. A democratic evaluation was used to establish the various 'value/worth' measures of health promotion by stakeholders within a course via; course documentation and assessment outcomes, grade distribution and appreciative inquiry (AI).

Results: Content analysis of course documentation showed an increased incidence of health promotion keyword use (7:0) between the pre 2012 and post 2012 programme. Grade profiles whereby health promotion education was embedded were distributed along a bell curve. AI sessions were audio-recorded and charts compiled using the AI framework. Thematic results were presented as a response series defined by one of four outcome measures; reaction criteria, learning criteria, behavioural criteria and results criteria.

Recommendations:
Defining the 'how' to deliver effective health promotion practice
Empowering radiographers to overcome the reductionist view of the role
Specific training being made available for academic staff regarding health promotion knowledge and skills
The need to share and incorporate health improvement and health promotion research into the wider profession

P-255 An investigation into breast imaging as part of the undergraduate (UG) education of diagnostic radiography students in the UK

Ruth Strudwick[1]; Kathryn Taylor[2]
[1]*University Campus Suffolk;* [2]*Addenbrooke's Hospital*

Aim: To determine any variations in the breast imaging component of the UG education of diagnostic radiography students in the UK.

Content: This presentation will outline the results of this CoRIPS funded project. The questionnaire and follow up interview results will be summarised to build a picture of breast imaging education within the UG radiography curriculum in the UK.

Relevance/impact: Naylor (2001) discussed the opportunities for career progression that existed in breast imaging in 2001. She mentions the shortage in the workforce in 2001 and the increase in workload. With the current pilot study increasing the age range for breast screening this is still a relevant issue (DoH, 2011).
It is hoped that this research will uncover any issues around recruitment to breast imaging that may come from UG education. The researchers are hoping to make recommendations for future education in order to improve the knowledge students have about breast imaging and enable them to see career opportunities that exist in the specialism.
The results of the study could assist the College of Radiographers in implementing strategies to influence the future breast imaging workforce.

Outcomes: An overview of breast imaging education as part of undergraduate radiography provision in the UK.

Discussion: The data may also be useful for future research into breast imaging education. Students could be asked about their knowledge of the subject. The breast imaging workforce could be asked about what attracted them to the specialism.

References:
DoH (2011) Improving Outcomes, A Strategy for Cancer. HMSO, London.
Naylor S (2001) Opportunities for education in breast imaging. Synergy. June 2001, p22.

P-256 An evaluation of interactive sessions involving radiography students and a simulated patient

Ann Westmoreland; Susan Devine; John Huckle
University of Leeds

Aim: The aim of this paper is to evaluate the effectiveness of the simulated patient in different clinical scenarios used with undergraduate radiography students.

Content: Kilminster et al (2004 p. 724) found that students valued working with simulated patients in interprofessional workshops because of the feedback they received, the opportunities to practice new strategies, the 'clinical realism and work-based focus'.
The simulated patient provided feedback during and after each scenario, tailored to individual student needs. The effectiveness of particular styles of communication could be further explored by re-running parts of the scenario.

Relevance/impact: Students found realistic simulated learning experiences relevant to their future as a health care practitioner. Students benefitted from patient feedback which they would not normally receive in practice.

Outcomes: Students were challenged by scenarios involving an autistic patient and a patient with a possible life changing diagnosis.
The workshops helped students to learn new strategies for coping with more complex situations in practice.

Discussion: The students indicated that this was a value added learning experience as they saw the situation from the patient's viewpoint, thus avoiding making assumptions regarding what the patient actually wanted.

The autistic patient scenario was challenging in that it highlighted how apparently small details such as the colour of the walls could be viewed as a significant obstacle by the patient.
Students were able to stop, think and analyse their actions and modify their behaviour in response to feedback from the simulated patient in a safe environment.

P-257 Ultrasound career structure and education: A time for change

Pauline Mitchell; Ian Maynard; Pauline Reeves
Sheffield Hallam University

Aims: An exploration of the current ultrasound workforce challenges and the consequences of leading the profession through the culture change.

Content: A presentation of findings from a doctoral study exploring the influencing factors that have created resistance to change in the career framework and education of ultrasound professionals

Relevance: Persistant sonographer workforce deficits have been a challenge for more thand two decades and has now reached a crisis point. HEI's are being asked to develop undergraduate training programmes however there is no consensus amongst professional groups what the graduate sonographer role will be and whether they will be accepted into the workforce.

Outomes: The study will exlore percieved barriers to change and develop strategies to facilitate and motivate sonographers to drive and adopt a new framwork for ultrasound practioners

Discussion: Since 2003 there has been much debate about, and historical reluctance to the concept of direct entry ultrasound training programmes. The SCoR (2009) explored the possibility of a direct entry programme and identified some of the advantages and issues with providing a direct entry route alongside the existing postgraduate provision. However, there is still no professional agreement on what the clinical role of a band 5 or 6 sonographer would be. It has become evident that in order to establish what the clinical role of a band 5 and 6 sonographer will be it is necessary to develop a clinical competence framework for these levels, however this is proving problematic with very lttle support from sonographers even though this is now on the national agenda.

The research idenitifies several key influencing factors that enhances the professional reluctance to change working practices and education. Value of professional identity, culture and maintaining a postion of power are key factors when exploring what underpins the reluctance to engage with the concept of change. It is concluded that any progress in shaping the sonography workforce to meet the increasing service demands needs honest communication of rationale, engagment at all levels and creative education models.

P-258 Undergraduate anatomy teaching using ultrasound: Our experience

Taryn Kalami[1]; Ashely Utley[1]; Karen Flood[1,2]
[1]Leeds Teaching Hospitals; [2]University of Leeds Medical School

Background: Traditionally medical undergraduate anatomy teaching has involved cadaver dissection and prosection. In recent years undergraduate anatomy teaching has been criticised, with suggestions to move towards more clinically relevant anatomy. With this in mind an ultrasound based anatomy teaching programme for first year University of Leeds medical students was designed and implemented. Ultrasound is safe and has the added advantage of allowing dynamic visualisation of structures and organs.

Content: Dedicated ultrasound sessions in groups of 10 students were organised with an anatomy demonstrator. Initially the ultrasound was carried out on a volunteer medical student and then the students were given the opportunity to practice on themselves or others. Anatomy demonstrators included sonographers, radiology registrars and radiology consultants. Prior to the session the students received a teaching package with cross sectional images, line diagrams and questions to answer.

The aims of the session included:
Dynamic demonstration of the major upper solid abdominal organs and how these organs relate to each other.
An introduction to ultrasound as an imaging modality with a basic overview of the physics principals.

Discussion: Ultrasound is a very clinically relevant, safe and useful adjunct to traditional anatomy teaching. It allows dynamic demonstration of organs whilst introducing ultrasound as a clinical investigation used in current medical

practice. After analysis of the current teaching scheme, the aim is to incorporate ultrasound skills into the medical school curriculum in the view to teaching students to gain ultrasound competencies in FAST scanning and ultrasound guided cannulation.

P-259 Trait emotional intelligence of student sonographers; is it learnt or inherent?

Kate Newstead[1]; Pauline Mitchell
[1]*Sheffield Hallam University*

Aims/objectives: The aim of this study was to evaluate the emotional intelligence of student sonographers from different year groups and healthcare professionals in order establish whether EI is an inherent trait or can be learned over time.

Content: The poster will present the findings from an undergraduate study that investigated the trait emotional intelligence (EI) profiles of a cohort of first and second year student sonographers studying Obetetric or Abdominal Ultrasound. The cohorts consisted of radiography, midwifery and nursing healthcare professionals. EI profiling explored differences between the subgroups such as area of ultrasound study, 1st and 2nd years and professional backgrounds, compareing against the Trait Emotional Intelligence Questionnaire (TEIQue-SF).

Relevance: Developing an understanding of the EI profile of students undertaking ultrasound will inform recrutiment and curriuclum planning for ultrasound programmes

Outcomes: Radiographers scored the highest mean for the factors of Well-being, Self-control and Sociability. The highest score for Emotionality was a midwife. The difference of scores between professions were minimal and could not be considered as a significant statistic. The difference between years 1 and 2 Trait EI scores whereby the second years had undertaken obstetrics in the 1st year were signigficantly higher.

Discussion: The results indicate that Trait EI could be inherent to people who are drawn to obstetric practice however the results that demonstrated a significant increse in Trait EI in the 2nd year students would support the hypothesis that EI can also be learnt over time.

P-260 A case study of the development of interprofessional workshops over four years involving audiology and radiography students

Ann Westmoreland; Susan Devine; John Huckle; Paul White
University of Leeds

Aim: The aim of this paper is to evaluate the effectiveness of interprofessional learning workshops used with final year radiography and audiology students over four years.

Content: It is intended that the workshops will provide an opportunity for students to gain an insight into how other professions cope with challenging situations in practice.
Students should then recognise the value of interprofessional learning through their interactions with other professions.

Relevance/impact: Four cohorts of the two professional groups consistently found the interprofessional workshops a relevant and effective learning and teaching method which met their expectations.

Outcomes:
Through the workshops all student cohorts:
Gained an Insight into each other's profession, facilitating the development of communication strategies.
Overcame communication barriers with other health professionals.
Developed interprofessional team working skills.

Discussion: Most students rated the workshop excellent or very good as it allowed them to learn new strategies and see how other professions cope with challenging clinical situations.
The sample size varied from year to year for both audiology and radiography students. Students expressed disappointment in the small cohort sizes of audiology students compared with the larger radiography cohorts.
In order to improve future workshops, students commented that having smaller student groups would be less intimidating and allow more students to volunteer to take part in the scenarios. In this way more students could

potentially benefit from interacting with the simulated patient and receiving feedback. In addition students may be more willing to volunteer and to contribute to the discussion.

P-261 Mentoring for students on clinical practice

Naomi Brown; Amanda Jefferies; Trevor Barker
University of Hertfordshire

This is a summary of work done exploring the mentoring of students in clinical practice. A requirement for entry to the ultrasound programme is that students are provided with a named mentor. This mentor is expected to be familiar with the expectations and requirements of the role if they are to support the student to their fullest potential. The aim of the study was to investigate from a mentor's perspective; the characteristics required of a mentor and the constraints they encounter when undertaking the role. A questionnaire was sent to 19 mentors,a response rate of 60% (n=11) was achieved and analysed with a thematic approach. Of the responses 67% claim to be passionate about mentoring and teaching; of the 33% who do not claim passion for the role, none were given a choice about being a mentor. All respondents provided detail about the good practices they perceive they demonstrate in their role. Personal attributes of an ideal mentor was provided and compared with the findings in the literature. All mentors reported that they thought they should be knowledgeable, adaptable & supportive. The main constraints encountered within mentoring were lack of support from managers and colleagues and limited time to give to the role. A lack of student motivation and enthusiasm was also indicated as a restriction by some mentors. Conclusions were that greater awareness of the personal attributes and characteristics of the mentor should be considered.Mentors face constraint within their role;however solutions to this were not explored.

P-262 Developing a mentoring framework for a team of advanced practitioners in general radiography

Lisa Field; Nicholas Barlow; Beverley Snaith
Mid Yorkshire NHS Trust

Background: Mentorship programmes are highlighted as providing support; helping newly qualified staff, reducing errors and increasing job satisfaction. The SCOR supports mentorship through its advantages of facilitating career progression, promoting quality and strengthening working relationships.
The Radiology department has currently developed a mentoring framework to support staff in general radiography and encourage participation in audit.

Objectives: The main objective of mentoring is to support the radiographers particularly the newly qualified radiographers. Mentor teamwork develops professional confidence, self-esteem and interpersonal skills. The mentoring framework encourages continued professional and protocol development and facilitates audit.

Design: A mentoring framework was developed prior to establishing the groups to determine the role, responsibilities and expectations of the mentor who is a reporting advanced practitioner, and the mentees. Additionally objectives were developed to focus each mentor and ensure consistency.

Mentor objectives:

1. Ensure awareness of current policies /guidelines/incidents
2. Discuss radiographic quality & technique
3. Offer support with audit projects
4. Encourage evidence based learning and self-reflection

An audit programme was designed to ensure all staff fulfil their responsibility to contribute to the audit process. Each group were allocated 2 audits and were responsible for data collection, the final audit report and dissemination of the results.

Conclusions: Mentoring has been successful in facilitating clinical audits and valuable in developing career progression, improving working relationships and maintaining quality. It provides a level of ownership and team work in clinical developments in radiology. Initial feedback from both the mentors and mentees on this new development has been positive.

P-263 Easing the transition: The importance of high quality mentorship in placement support

Emma Hyde
University of Derby

Aims/objectives: To measure the impact of curriculum development and improvements to placement support. To make recommendations for further enhancement to placement support which benefit both students and mentors.

Content: Previous research carried out at one UK University has identified the transition to clinical placement as an experience which impacts greatly on student radiographers satisfaction levels with their programme of study. This can be due to concerns about using radiographic equipment, concerns about working with very ill patients, and/or concerns about working with clinical staff. Radiography educators at the institution have been working to address these concerns, and facilitate a smoother transition. This paper will disseminate new research carried out at the institution, which critically evaluated the impact of curriculum development and changes to placement support which were designed to improve student experience of the transition to their first clinical placement.

Relevance/impact: In a period of significant staff shortages in Diagnostic Radiography, investing time and effort in students is essential to ensure the workforce of the future, and likely to reap rewards in terms of retention.

Outcomes: The research found that there was still significant room for improvement in placement support, particularly around the role of mentors. A more formal system of mentor support, including training for mentors, is recommended

Discussion: This paper aims to encourage discussion and debate around the role of the mentor in diagnostic radiography education, in order to further enhance student experience, and provide additional support for mentors themselves.

P-264 Service user feedback in practice

Ruth Strudwick[1]; Patricia Black[2]
[1]University Campus Suffolk; [2]The Norfolk & Norwich University Hospital NHS Trust

Aim: To provide evidence for the Quality Improvement and performance Framework (QIPF) KPI 1—Education Governance 'Service user, staff and student feedback is used to improve education governance' for student radiographers.

Content: The Department of Health (DH) outlined its vision for involving service users in the design and planning of healthcare services in its White paper, The NHS Improvement Plan: Putting People at the Heart of Public Services (DH, 2004). In educating the future healthcare workforce it therefore seems prudent to help students to develop working relationships with service users early on in their career.
The practice placement department in conjunction with the university designed a patient questionnaire and we have just completed the pilot and a limited trial.
19 questionnaires were distributed with the feedback being generally positive.
The poster will outline the pilot study and findings.

Relevance/impact:
Feedback from service users can contribute to student assessment
Students can reflect on the examination from the service user's perspective
Students can use comments to inform change in their practice
Service users feel valued as their comments are being utilised
We can meet the requirements of QIPF

Outcomes: Service user feedback was largely positive.

Discussion: We plan to include service user feedback as a formative assessment method. Feedback from service users will be another useful tool for students to use to reflect on their performance in placement. We also plan to roll this out to all of our practice placement sites.

References: DH (2004) The NHS Improvement Plan: Putting people at the heart of public services. The Stationary Office, London

P-265 Games with aims

Gill Harrison; Allison Harris
City University London

Aims/objectives: We present an overview of how games and simulated scenarios are used as part of the learning process in a post-graduate programme.

Content: An overview of how games are used to meet learning outcomes and engage students with the learning process will be provided. A range of simulated scenarios and basic games are used within the programme, some of which will be showcased, including the use of classroom clickers, bingo and crosswords.

Relevance/impact: Collaborative experiential learning is a useful skill for health care professionals to develop during their education, to assist with changing demands in their future practice. The use of simulated learning and games can help engage students with the learning process and provide a way to link theory to practice.

Outcomes: Informal qualitative student feedback suggests that many students enjoy the games and find that they make learning fun.

Discussion: Literature has suggested that the use of games can improve motivation for learning, because it is fun, but also increase problem solving skills (Sung et al, 2015), help to develop critical thinking and reasoning, provide real time feedback and allow active and collaborative learning (Boctor, 2013). Simulation is used to provide an opportunity for students to try out new skills in a safe environment, where instant feedback can be provided.

P-266 Enhancing the student experience with the use of iPads during simulation sessions

Jane Harvey-Lloyd; Ruth Strudwick
University Campus Suffolk

At UCS the student radiographers spend eight weeks at university before practice placement. During these eight weeks they are introduced to the role of the radiographer and the clinical environment. The students also have two evening sessions at the local NHS Trust where they can move and use the X-ray equipment and practice positioning one another for X-ray examinations. The students can practice clinical skills in a safe, low pressure environment, facilitated by staff.

There is currently very little written about preparing student radiographers for placement. However, it is known that students feel under pressure from qualified staff when entering practice. The purpose of these sessions is to increase the students' confidence by providing a safe environment in which they could make and learn from mistakes. These sessions have to date received positive evaluation. However in order to enhance the learning experience and to fully integrate theory and practice the introduction of image viewing as part of these sessions is proposed. This will allow the lecturers to immediately demonstrate and explain variations of positioning the patient by using a range of pre-selected images.

Project aim: To evaluate student experience evening simulation sessions following the introduction of image viewing via the use of iPads

Objectives:
1.To deliver wo evening simulation sessions to current first year students
2.To introduce image viewing alongside the current delivery of the evening sessions for one session
3.To collate feedback from the students as to whether or not the introduction of image viewing has enhanced their learning in these sessions

Following the session, the students were asked to complete a questionnaire to establish whether or not their learning has been enhanced by the introduction of image viewing as part of the simulation sessions. The findings will be discussed as part of this presentation.

P-267 Knobs matter: A pictorial review of ultrasound knobology

Sean Tenant[1]; Harriet Bowles; Robert Hodnett[1]; Mark Thurston[1]
[1]*Peninsula Radiology Academy*

Modern ultrasound machines have an ever-increasing number of features and functions, which can leave the inexperienced practitioner feeling overwhelmed, utilising few of them. Error rate and exam quality in ultrasound is generally accepted to be user dependent. Despite using ultrasound frequently in their clinical practice, many radiologists, especially registrars, are unfamiliar with several of the more advanced settings. Using each of the settings correctly can avoid many errors of omission and interpretation.

This poster will be a pictorial review demonstrating how the optimisation of just one setting for each case can have a dramatic impact upon the quality and diagnostic potential of the ultrasound images. It will focus on the settings which are most useful to the general ultrasound practitioner and will be most helpful to registrars and trainee sonographers. A brief explanation of the function of each of the illustrated settings will be given. The advice for each case will be applicable to most brands of ultrasound machine.

The aim of the poster is to encourage practitioners to perform ultrasound in a more dynamic way, increasing understanding and familiarity with ultrasound. This will also improve confidence in the technology that they use during a normal working week and on-call. The hope is that practitioners will begin to use optimising functions that are simple to employ but previously unknown to them. The implementation of this will improve diagnostic quality of ultrasound and minimise error rate.

Other

P-268 Radiologist's cleudo: Can you detect the signs?

Jenn Shiunn Wong; Kirsten Pearce
PHNT

Aims/objectives: This poster uses the well-known board game, Cleudo to provide a pictorial review of some radiological eponymous signs.

Content: Was it Colonel Mustard in the dining room with the spanner? We will attempt to link signs from different specialties through radiological eponyms, specifically using the murder weapons in Cleudo as our inspiration. We will present a number of cases with the relevant imaging, diagrammatic illustrations and accompanying explanations to help the general radiologists familiarise themselves with radiological presentations of conditions such as melorheostosis, femoro-acetabular impingement or ulcerative colitis. Answers and discussions for each of the cases will be unveiled in a quiz-style format to engage the reader.

Relevance/impact: This is aimed to be a memorable and fun teaching aid for the general radiologist. This poster can be used as an educational tool to either introduce new eponyms or to allow readers to revisit their existing knowledge.

Discussion: With over 8000 eponymous names in medicine, it can sometimes be difficult to memorise what each one stands for. In addition, the eponymous descriptors are often tenuous, making visual associations even more difficult to conceptualise. By using this novel method of teaching, conditions such as a lead pipe colon in ulcerative colitis, the pistol grip deformity in femoro-acetabular impingement or the dagger sign in ankylosing spondylitis become easier to visualise and remember.

P-269 The celestial art to radiology: A pictorial review

Kirsten Pearce; Jenn Shiunn Wong
PHNT

Aims/Objectives: The aim of this poster is to widen the general radiologist's horizons regarding a constellation of different radiological signs.

Content: This is a light-hearted pictorial review of radiological eponymous signs, specifically those relating to astronomy. We aim to provide the reader with the imaging, descriptions, diagrammatic illustrations and explanations regarding a variety of radiological signs. These will include examples such as the galaxy sign, comet tail sign, half-moon sign and a starry sky etc. These examples take inspiration from a variety of radiological specialities.

Relevance/impact: Many radiologists will be familiar with some but not all of the signs provided in our poster. We hope this will be a memorable pictorial review for our readers, designed to aid their recall and help them appreciate the gravity of their clinical significance.

Discussion: Eponymous names with visual similes can be illuminating, memorable and can aid teaching, particularly to those learning about radiology for the 1st time or in subject area they are unfamiliar with. Equally the terms used can be tenuous and difficult to visualise. This article is not designed to exalt the benefits of eponyms, but hopefully our diagrammatic illustrations and explanations can make these eponyms more universally understood.

P-270 Vitamin D deficiency and insufficiency in the radiography population: Are we at risk?

Sara Al-Rubeyi; Warsan Farrah; Marjilla Furmully; Robert Meertens; Jenny Shepherd; Demelza Green; W D Strain; Karen Knapp

University of Exeter

Aims/objectives: This study explored sun exposure, serum Vitamin D (25OHD) levels and calcaneal stiffness index (SI), a surrogate measurement of bone mineral density among radiography students and academic staff in a University setting.

Content: 40 premenopausal student and academic radiographers were recruited (mean age 24.7 ± 8.9) and had their calcaneal SI measured using quantitative ultrasound (GE Lunar Achilles Insight, Bedford, UK), completed questionnaires on sun exposure and had their vitamin D measured via a venous blood sample.

Relevance/impact: Vitamin D deficiency is common in the UK population and is related to osteomalacia, rickets, muscular pain and an increasing range of non-musculoskeletal pathologies. Radiography students and academics spend a large proportion of time indoors during daylight hours, which potentially puts them at risk of low Vitamin D levels.

Outcomes: The mean serum 25OHD was 46.3nmol/L (±28.5), with 35% considered deficient, 23% insufficient and only 42% having normal levels. There were no significant differences in SI, time spent outside, body mass index or age between these groups. 10% reported Vitamin D supplementation (mean 25OHD 70.0nmol/L ± 28.0 for users versus 43.6nmol/L ± 27.2 for non-users) and the use of sun screen was wide-spread.

Discussion: Radiographers in the academic setting have the potential to suffer Vitamin D insufficiency and deficiency, with a potential for long-term negative health outcomes associated with this. If national recommendations for safe sun exposure or Vitamin D consumption are not adhered to, then supplementation may mitigate the risk.

P-271 Measuring abdominal fat distribution using retrospective computer tomography and magnetic resonance imaging – a comparative study

Amal Sharaf; Mohammed Abdul Waduud; Iain Roy; Rosario Gonzalez; Giles Roditi; John Biddlestone

NHS Greater Glasgow and Clyde

Aim/objectives: We demonstrate an interchangeable mathematical relationship between CT and MRI imaging modalities that allows quantification of visceral and subcutaneous fat and abdominal circumference (collectively; abdominal fat distribution [AFD]). This technique is designed to work without pre-defined criteria and on scans taken at different times.

Content: (a)Our method of measuring AFD using free software is demonstrated.(b)The mathematical relationship between imaging modalities is described.(c)One clinical role in the operative planning of breast reconstruction is shown. Relevance/ImpactQuantification of the AFD is clinically useful for operative planning and risk stratification since high AFD is associated with adverse clinical outcome.

Outcomes: The AFD was quantified at the level of the umbilicus on paired CT and MRI scans from 15 patients planning to undergo breast reconstruction. In total 30 scans were analysed. The mean time between the imaging modalities was 11.9days (95% CI, -69.6, 45.8). Pearson's correlation demonstrated strong relationships between imaging modalities for total abdominal fat (R=0.846,p<0.001***), visceral fat (R=0.858,p<0.001***), subcutaneous fat (R=0.844,p<0.001***), and abdominal circumference (R=0.617,p<0.05*). The mathematical relationship between imaging modalities was determined by linear regression and intra- observer and inter-observer variability was shown to be insignificant.

Discussion: We have validated a method for the quantification of AFD by MRI and CT that is designed to work without pre-defined criteria and on scans taken at different times. This method has a high inter- and intra-rater reproducibility and requires no additional cost to perform. This method has clinical use in operative planning and risk stratification.

P-272 Magnetic resonance imaging quantification of visceral and subcutaneous fat mass and its relationship to anthropometric measurements routinely used to quantify health risks

Saeed Alqahtani[1,2]; Jon Fulford[1]; Jude Meakin[1]; Rachel Palfrey[1]; Karen Knapp[1]
[1]Exeter University; [2]Najran University

Aims/objectives: This study investigated the correlation between anthropometric measurements and visceral fat as measured using magnetic resonance imaging (MRI).

Content: Abdominal MRI data (1.5 Tesla, GyroScan Intra; Philips, The Netherlands) from 49 participants were analysed. All participants were female aged 20-75 years with a body mass index (BMI) range of 18.4-45.9 kg/m2 and were scanned using a T1-weighted pulse sequence. All participants were healthy with no ongoing medication or current illness that might affect their fat or lean mass. Visceral and subcutaneous fat mass were quantified separately using a single slice at the L4-L5 level on all participants. Data were analysed using STATA (SE13), to determine the correlation between waist diameter-to-height ratio and visceral fat mass, between waist diameter and visceral fat and BMI and visceral fat.

Relevance/impact: Abdominal obesity rather than overall obesity has well been recognised as a good predictor of the link between obesity and cardiovascular disease. Thus, it is of importance to quantify the abdominal fat and particularly the visceral part of abdominal fat.

Outcomes: There was a positive correlation between waist diameter-to-height ratio and the visceral fat mass with r= 0.66 (p=<0.01). The correlation between waist diameter and visceral fat mass was higher at r= 0.80 (p=<0.01), while visceral fat and BMI was lower at r=0.57 (p=<0.01).

Discussion: The patient abdominal diameter at L4-L5 level is a better predictor of visceral fat mass than both waist diameter-to-height ratio and BMI in our study population.

P-273 Life and time of early radiation pioneers at St Bartholomew's Hospital

Paul Bland; Sophie Willis
City University London

This presentation will detail the narrative of the early x-Ray pioneers at St Bartholomew's Hospital, London. Specifically it will discuss their role in establishing the radiology and oncology departments in the United Kingdom to still remain on its original site in London.

Originally termed an 'Electrical department' Physician William Edward Steavenson was appointed to take charge in October 1882. Following Steavenson's death, Dr Henry Lewis Jones was appointed head of the Electrical Department in 1891. In early March 1896 members of the St Bartholomew's Hospital Photographic Society attended a demonstration of the Electrical Department's X-ray equipment, and subsequently, in April 1896 the first X-ray plant was installed under the charge of Hugh Walsham who had been appointed Assistant Medical Officer to the Electrical Department in 1896.

The x-ray department separated from the Electrical Department in 1912, with Hugh Walsham being appointed as head of the department. At the time, nationally, X-ray and radium therapies had been introduced into clinical practice as treatments to destroy malignant tumours. However at that time the work of the department was still mainly diagnostic. Specifically, the treatment of cancers was significantly limited by the small amount of radium which the St Bartholomew's Hospital possessed, which was inadequate for radiotherapeutic use. When Neville Samuel Finzi joined the X-ray department as its Chief Assistant in 1913 he donated his own radium stock and began treating cases of malignancies – initiating the current radiology and oncology services that remain at St Bartholomew's Hospital to this day.

P-274 The archaeology and imaging of rickets

Kate Kingston[1]; Susie Dick1; Alan White[2]; Malin Holst[3];
[1]York Teaching Hospitals NHS Foundation Trust; [2]Leeds Teaching Hospital NHS Trust; [3]Department of Archeology, University of York

Aims/objectives: To review the macroscopic appearances of rickets in archeological specimens, comparing with radiographic images of skeletons and current patients.

Content: We present a pictorial essay illustrated with photographs of skeletons that manifest the features of severe rickets from UK archeological sites. We will provide comparative radiographic images from the skeletons and living

patients. We will discuss the historical context of the era in which the people lived and the factors contributing to their development of the disease and contrast that with present day scenarios.

Relevance/impact: Rickets is defective mineralisation of bones before epiphyseal closure in immature skeletons. It is predominantly due to dietary deficiency of Vitamin D or calcium, but is also seen with impaired metabolism of Vitamin D, phosphorus or calcium. Rickets is still seen today allbeit on a sporadic basis but during the Industrial Revolution it was far more prevalent with up to 80% of children showing some features of the disease. Variation in severity was mainly due to lifestyle and living conditions, being more prevalent and severe in the overcrowded, industrial, smoke and fog bound towns and cities. Malnutrition and lack of sunlight would both have contributed.

Discussion: Rickets like skeletal deformities in infants were reported as early as the first and second centuries AD, it was defined as a disease in 1645 with a Treatise on the subject appearing in 1650. We will show archeological and radiographic examples of rickets and discuss them in their historical and social context, contrasting past with present.

P-275 Incidental findings on whole body computerised tomographic scanning (WBCT) in a tertiary trauma centre

Emma Merrick; Sumita Chawla; John Taylor
University Hospital Aintree

Aims/objectives: WBCT have become a standard assessment in the assessment of major trauma patients. As well as trauma related findings inevitably there will be significant incidental clinical findings which may require further investigation or intervention. Previous reviews have shown significant incidental findings (IF) in up to 8% of patients however we are not aware of a similar review in a UK major trauma population.

Content: A radiology database search was conducted using the key phases CHNTPC and TRAUMA to identify any WBCT scans performed on trauma patients from September 2014 to February 2015. Scans that were WBCT and performed at first presentation of trauma were included. The written radiology report was then assessed to identify IF.

Relevance/impact: IF were grouped into 3 categories: Category 1, benign findings of no clinical significance; Category 2, findings of minor clinical significance which may require future investigations and Category 3, previously unknown clinically significant findings that require further investigations.

Outcome: 97 patients fit the criteria and were investigated. Overall there were 119 IF in 65 patients. Therefore 67% of patients had an IF. Age group 0-40 34% of patients had an IF; 40-65 53% had an IF and 65-100 90% had IF.

Discussion: We found a significantly higher rate of IF particularly in the older population which although may be explained by the trauma population profile in the UK. The majority of incidental findings may prove benign but there needs to be improved systems to ensure appropriate follow up.

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