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Abstract Book

BIR The British Institute of Radiology

CoR THE COLLEGE OF RADIOGRAPHERS

IPEM Institute of Physics and Engineering in Medicine

Proffered papers: History

SP01.1 Dr James Ambrose- Unsung hero of CT

Elizabeth Beckmann
BSHR

We are familiar with Godfrey Hounsfield as the inventor of the CT scanner. As we approach the 50th Anniversary of the first Clinical CT scan it is important to recognise the Radiologist who made this possible. James Ambrose was born in South Africa and after serving in the RAF, he returned to South Africa to study medicine at University of Cape Town. Two years after graduating he came to England, where he began radiological training at the Middlesex Hospital, then as a senior registrar at Guy's Hospital. He moved to the Atkinson Morley's hospital, one of the busiest Neuro centres in London, and was appointed consultant radiologist in 1962. Jamie had a great desire to develop better non-invasive diagnostic methods for imaging the brain in patients. The techniques available at the time such as pneumoencephalography were invasive, traumatic, and of limited efficacy. On 1st Oct 1971 he carried out the first CT scan on a live patient, revealing a detailed image of a brain tumour. Without the open mindedness and positive attitude of Jamie Ambrose it is highly possible that we would never have had the development of the clinical CT scanner. This presentation will recognise the key role of James Ambrose, in the development of the CT scanner and who by carrying out the first clinical CT scan on a patient, helped create the Clinical CT scanner that has changed Radiology and Medicine over the last 50 years.

Computerized transverse axial scanning (tomography): Part 2. Clinical application Ambrose BJR 1973; 46 (552) pp: 1023-1047

SP01.2 The centenary of the British X-ray and radiation protection committee

Arpan K Banerjee
British Society for the History of Radiology

On 5th Nov 1897 the oldest radiology society in the world the Rontgen Society was formed in London. In addition to founding a journal and organising scientific meetings one of its great achievements was the founding of the British Xray and Radiation Protection committee in 1921. Soon after the discovery of X Rays the harmful effects of the radiation became apparent to some workers. Several early radiology pioneers became radiation martyrs. Sir Archibald Reid a radiologist from St Thomas's hospital, London played an important part in improving radiation protection for staff by forming this committee and was assisted by a physician and great champion of radiology Sir Humphrey Rolleston a Cambridge Professor of Medicine and President of the Royal College of Physicians who became the first chair of this committee in 1921 serving as chairman for 20 years. In 1922 he became President of the Rontgen Society an unusual honour for a physician The committee met regularly at the Royal Society of Medicine, London and in July 1921 published its list of recommendations in the Journal of the Rontgen Society. Today some of its recommendations still remain valid. The committee was disbanded in 1952. Rolleston played a major part in the formation of the British Institute of Radiology becoming its first President in 1927/28. In this presentation the development and work of the committee will be presented.

Banerjee A K, 1997, A History of the British Institute of Radiology (booklet) SP1

SP01.3 Hopwood of Bart's: Ultrasound, neutrons and high-voltage therapy.

Francis Duck

Frank Lloyd Hopwood (1884-1954) was a pioneer of British medical physics. His diverse contributions during the 1920s and 1930s deserve better recognition [1]. Son of a mining engineer and graduate from the University of North Wales, he commenced work as demonstrator in physics at St. Bartholomew's Hospital Medical School in 1905. Returning there after WWI as lecturer in physics, he was appointed as Professor of Physics at Bart's in 1924. As radium custodian, he established procedures for its safe management that were widely implemented through the Radium Commission. He performed the first experiments in Britain into high-intensity ultrasound [2]. In 1934, with the emigré physicist Leo Szilard, he carried out pioneering experiments with newly discovered neutrons. They created ^{128}I from ^{127}I using neutrons emitted from beryllium on exposure to radium or high-energy x-rays. Then they devised a new, chemical method for separation, which was subsequently used for medical radio-nuclide preparation [3]. The first 1MV x-ray accelerator in Britain was installed at Bart's under the care of another member of Hopwood's team, George Innes. Szilard went to the USA where he played a major part in the Manhattan project to build the atomic bomb. During WW2, Hopwood went with Bart's Medical School to Queens' College Cambridge, where here was Vice-Dean. He retired in 1949. The leadership of the Bart's physics department, which Hopwood had created and managed so successfully, passed to Joseph Rotblat, the reluctant Manhattan project physicist who would later be a joint

recipient of the Nobel Peace Prize.

1. Duck, F. (2020) Hopwood of Bart's. IPEM Scope, Winter 2020, 22-25. 2. Hopwood, F.L. (1929) Experiments with high-frequency sound waves. J Sci Intr 6(2), 34-40. 3. Szilard, L. and Chalmers, T.A. (1934) Detection of neutrons liberated from beryllium by gamma rays: a new technique for inducing radioactivity. Nature 134,494-495.

SP01.4 The radiograph as memento mori, time for reappraisal?

Adrian Thomas

Canterbury Christ Church University

Background: Memento mori is a Latin phrase meaning "remember you must die". At a Roman triumph with the return of a victorious general, the people would look at the victor at the head of the column. However behind the victor an aide would be whispering into his ear "Remember, thou art mortal." Prior to radiography the inside of the body was only seen in limited places - the operating theatre, the battlefield or the graveyard.
Purpose: The discovery of X-rays by Wilhelm Conrad Röntgen on 8 November 1895 transformed our understanding of both ourselves and of the physical world. To see our living skeleton produced a strong sense of unease and of the macabre. We are now so used to seeing medical images that we can forget the impact that they had in earlier times. We see things differently with Röntgen's light. The avuncular old man holding a scythe becomes the grim reaper. The pleasant seaside scene becomes under the rays a danse macabre or Totentanz. The danse macabre or Totentanz is an allegory on the universality of death. No matter one's position in life, the "Dance of Death" unites all of us.
Summary: The impact on the popular imagination of the new photography will be assessed and illustrated with contemporary images. Does radiography still remind us of our mortality, or are our responses more nuanced?

1. Forde, K. (2012) Death, A Picture Album. Wellcome Collection, London. 2. Thomas, A.M.K. (2017) History of Radiology, in Handbook of X-ray Imaging: Physics and Technology (Series in Medical Physics and Biomedical Engineering), Ed. Paolo Russo. CRC Press, Boca Raton.

Proffered papers: GI and hepatology

SP02.1 Analysis of Imaging Modalities in the Diagnosis of Early-Stage Hepatocellular Carcinoma in Adults with Cirrhosis

Nikhil Shah[1]; Sophie Willis[2]; Edwin Abdurakman[2]

[1]St George's University Hospital NHS; [2]City, University of London

Background: The aim of this study was to compare and critically evaluate the role of functional MRI and CT in the diagnosis of early-stage Hepatocellular carcinoma (HCC) in adults with cirrhosis. HCC is the most common primary liver cancer and has become the leading cause of death in patients with cirrhosis. Diagnosis of HCC is often delayed as patients remain asymptomatic until an advanced stage resulting in a poor prognosis. Recent advances in functional CT and MRI techniques have been introduced in clinical practice to improve the diagnosis of HCC.
Method: A systematic literature review was conducted to identify articles suitable for this evaluation. Approximately 600 articles were found across multiple databases, which were reduced to 34 after the application of inclusion and exclusion criteria, and 11 articles were selected to review.
Results: MRI was demonstrated to be the superior modality of choice for adult patients with cirrhosis due to its high sensitivity and specificity, without radiation exposure. However, limitations pertaining to scan duration associated with the addition of specialised sequences remain a challenge. Alternatively, perfusion CT imaging offers a faster scan time and has shown promise in significantly improving detection rates of small HCCs compared to conventional CT.
Conclusion: This literature review demonstrates that the optimal clinical circumstances in which to select MRI or CT for the diagnosis of HCC should be based on patient circumstances, which include (but are not limited to) acute transient dyspnea, limited breath-hold capacity, chronic kidney disease, and patient safety preferences.

SP02.2 The appropriateness of MRCP requests in investigation of suspected common bile duct stones

Ahmad-Said Ali Attia

Background: Ultrasound and LFTs are the primary investigation for patients with moderate suspicion of common bile duct stones followed by the gold standard investigation Magnetic resonance cholangiopancreatography. In cases with high suspicion of common bile duct stones do not require an MRCP before endoscopic or theatre management.
Purpose of poster: Deliver a simple educational piece of information about guidelines from the British Society of Gastroenterologists (BSG) regarding appropriateness of MRCP requests and when performing the scan may not be necessary, hence reducing the number of inappropriate requests and reducing the pressures on the radiology department especially in DGHs where there is limited capacity for possible scans per day.

Summary of content: The poster includes the standard to the audit as per RCR and BSG guidelines. The poster includes also include the indicator, the target, methodology, results of audit's first cycle, the action plan, results of the second cycle of the audit and the references.

1. Williams E et al. Updated guideline on the management of common bile duct stones (CBDS). Gut 2017; 66: 765e782. 2. Maple JT et al. The role of endoscopy in the evaluation of suspected choledocholithiasis. Gastrointest Endosc 2010; 71: 731e44.

SP02.3 Superior mesenteric vessels: The key piece to the puzzle

Yoke Hong Lim; Michelle Ooi; Velauthan Rudralingam
Manchester Hospitals NHS Foundation Trust

Background: Abdominal Computed Tomography (CT) is increasingly used in the acute setting as a diagnostic tool, playing a key role in determining management pathways for patients. Radiologists are often focused on assessing the solid organs and bowels, where majority of the abnormalities are. There are however cases where the vital clue to making the correct diagnosis is in careful examination of the superior mesenteric vessels.

Learning points:

- Recognising key radiological findings relating to various superior mesenteric vessel pathologies.
- Identify complications from the diseased SMA/SMV.
- To always include scrutiny of the vessels in routine abdominal CT reporting.

Summary of contents:

Multiplanar CT and ultrasound images will be used to demonstrate important findings from various superior mesenteric vessel pathologies, ranging from the common thromboembolic event and external compression by tumour, to rarer entities such as spontaneous SMA dissection, SMA-SMV fistula, pseudo-aneurysms and vascular compression disorders (SMA syndrome). Complications from these pathologies, such as midgut ischaemia from SMA/SMV occlusion and haematuria associated with Nutcracker syndrome will also be demonstrated. Key learning pearls generated from each case will be highlighted.

This poster will demonstrate how important it is to always examine the superior mesenteric vessels thoroughly, for without it, the correct diagnosis would not have been made. Routine scrutiny of the superior mesenteric vessels should be included in any abdominal CT checklist.

1. Sakamoto, I. et al. (2007) Imaging appearances and management of isolated spontaneous dissection of the superior mesenteric artery. EJR. 64(1), 103-110
2. Jung, S.C. et al. (2013) Spontaneous dissection of the splanchnic arteries: CT Findings, treatment, and outcome. AJR. 200, 219-225
3. Okino, Y. et al. (2001) Root of the small bowel mesentery: correlative anatomy and CT features of pathologic conditions. RadioGraphics. 21, 1475-1490

SP02.4 MR and sCT reference images for CBCT verification within an anal and rectal cancer MR only workflow

David Bird[1]; Matthew Beasley[1]; Michael Nix[1]; Marcus Tyyger[1]; Hazel McCallum[2]; Mark Teo[1]; Nathalie Casanova[1]; David Buckley[3]; Rachel Cooper[1]; Alexandra Gilbert[1]; David Sebag-Montefiore[3]; Ann Henry[3]; Richard Speight[1]; Bashar Al-Qaisieh[1]
[1]Leeds Teaching Hospitals NHS Trust; [2]Newcastle upon Tyne Hospitals NHS Foundation Trust; [3]University of Leeds

Background: MR-only treatment pathways require either the MR-simulation or synthetic-CT (sCT) as a reference image for cone beam CT patient position verification. This study aims to be the first to assess the impact of using RT position T2-SPACE MR or sCT as a reference image for CBCT patient position verification using XVI (Elekta) software for a cohort of anal and rectal cancer patients.

Methods: CT and T2-SPACE MR simulation and routine CBCTs were acquired for 32 patients (18 rectum and 14 anus undergoing radical VMAT EBRT). A validated research model generated sCTs. MRs and sCTs were rigidly registered to CT and resampled into the CT frame of reference. DICOM tags were copied from CT to MR and sCT to allow import into XVI (Elekta). The routine clinical registration protocol, using the XVI grey scale algorithm, was undertaken for all reference images and CBCTs (110 anus, 116 rectum). Linear mixed effects modelling identified systematic differences.

Results: Systematic translation and rotation differences to CT for MR were ≤±0.3 mm and ≤±0.4 ° for anal cancers; and ≤±0.4 mm and ≤±0.1 ° for rectal cancers, and for sCT were between; ≤±0.8 mm and ≤± 0.2° for anal cancers; and≤±-0.6 mm and ≤±0.1 ° for rectal cancers.

Conclusion: T2-SPACE MR or sCT can successfully be used as reference images for XVI-based CBCT position verification for anal and rectal cancer patients with systematic differences to CT <1 mm and <0.5 °. However, support is required from vendors to clinically enable MR as a reference.

SP02.5 Magnetic Resonance Elastography: Liver Fibrosis

Sunitha Sivarajah
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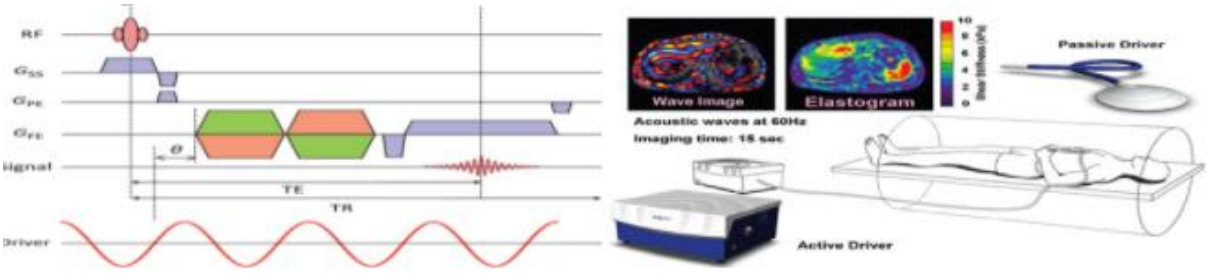

Introduction: Chronic injury to the liver leads to inflammation and hepatocyte necrosis, which when untreated can lead to liver fibrosis. Liver biopsy has been the clinical standard to assess liver fibrosis. (1) However, this invasive method has some drawbacks such as the risk of complications, sampling error, and relatively high cost. (1, 2) MR Elastography (MRE) has recently become commercially available as a non-invasive method for measuring liver stiffness. (2) MR Elastography MRE was originally developed by Dr. Richard Ehman at the Mayo clinic in 1995. It is a technique (3) for quantitatively assessing the mechanical properties of tissue, primarily the tissue stiffness, with fewer technical failures than UltraSound (US) Fibro scan and Biopsy. (1), (4) MRE requires three components. 1.Driver 2. Gradient echo pulse sequence with motion encoding gradients (MEG) 3. Post processing software (3)

1. Driver An active driver, like a loudspeaker (Fig:1), generates sinusoidal variations in air pressure that are transmitted through a long plastic tube to the passive driver (a disc with a drum-like skin) that is positioned securely over the liver. The passive driver generates mechanical waves that propagate through the liver (1, 3, 4). The shear waves (in the frequency range from 40 – 80Hz) that are created by the passive driver cause tiny tissue displacements (3). The frequency used is around 60Hz because of this lower frequency results in waves with better propagation than higher frequency waves (4).

2. Phase-contrast pulse sequence with motion encoding gradients (MEG) The induced shear waves are imaged with a phase-contrast pulse sequence(3) in order to detect the tiny tissue displacements.(1) A pair of bipolar gradients known as Motion Encoding Gradients (MEG) is inserted in the pulse sequence.(4) (Fig: 2) The MEGs are applied at the same frequency as the mechanical wave but with a controlled phase relationship θ.(4) The MEGs are synchronized with the mechanical waves to encode the tiny tissue displacements, typically 10-7mm, into the phase of the MR signal along the encoding direction. (3),(4)Multiple slices at each phase offset are acquired in a breath-hold. For four-phase offsets, the acquisition requires four separate breath-holds.

3. Calculation of tissue stiffness the shear wave speed is related to tissue stiffness (3). Shear waves travel faster in stiff tissues and slower in soft tissues (5). The tissue stiffness can be calculated by repeating the acquisition (but changing the phase offset θ) between the MEGs and the driving waveform (4). Typically, four-phase offsets are acquired and these four images are displayed as a cine which gives the appearance of wave propagation. The acquired images consist of both phase and magnitude information. The phase images show the shear wave propagation (shear wavelength and amplitude decay) whilst the magnitude images show anatomical information (3). Post-processing The phase images are used as the input into an inversion algorithm that calculates the shear stiffness of the tissue (3) based on the speed of the propagating waves. (1) The shear stiffness images are known as electrograms. From the elastograms, quantitative measurements of the tissue stiffness can be determined. (3) Colour maps can be applied to the wave images. Red and blue hues indicate opposite wave polarity and the color saturation indicates wave amplitude.(4) Two-color electrograms are created to qualitatively represent the shear modulus with the scales of 0-8kPa and 0-20kPa(4).

Conclusion: Over the last two decades, MR elastography has significantly evolved.(1) It is now the best modality for the most accurate quantification and hence staging of liver fibrosis(5) compared to other modalities (US and Biopsy).

References Yin M, Venkatesh SK. Ultrasound or MR elastography of liver: which one shall I use?. Abdominal Radiology 2018; 43(7). Serai SD, Trout AT, Miethke A, Diaz E, Xanthakos SA, Dilman JR. Putting it all together: established and emerging MRI techniques for detecting and measuring liver fibrosis. Paediatric radiology 2018; 48(9). Petitclerc L, Sebastiani G, Gilbert G, Cloutier G, Tang A. Liver fibrosis: Review of current imaging and MRI quantification techniques. Journal of Magnetic Resonance Imaging 2017; 45(5). McRobbie D, Moore EA, Graves MJ. MRI from picture to proton, 3rd ed. Cambridge: Cambridge University Press; 2017. Tang A, Cloutier G, Szeverenyi NM, Sirlin CB. Ultrasound Elastography and MR Elastography for Assessing Liver Fibrosis: Part 1, Principles and Techniques. American Journal of Roentgenology 2015; 205(1).

SP02.6 Assessing the diagnostic sensitivity of CT and Ultrasound in suspected appendicitis

Mohamed Elkhouly[1]; Carla Goncalves[2]
Southend University Hospital

Background: Acute appendicitis is one of the most common emergency presentations in surgery(1) . CT Scan is considered a highly sensitive and specific tool in the assessment of acute appendicitis(2). Ultrasonography is still considered as a first-line imaging modality in children/young adults and women of child-bearing age because of concerns regarding high radiation exposure associated with CT. Nevertheless, it is operator-dependent and can be affected by anatomy variation and the patient's body habitus(3).
Method: 1 Retrospective analysis of 9 months' data of all patients who underwent appendicectomies. 2 Review pre-appendicectomy radiology reports and post-appendicectomy histopathology reports. Target: For CT: The sensitivity value should be >90%(4). For US: The overall sensitivity value (includes adults and paediatric subgroup) should be >70% on interval scan following an initial US screening test. The sensitivity value in the paediatric subgroup should be >85%(4). The CT positive predictive value should be >92%(5). The negative appendicectomy rate should be <10% for CT(6).
Results: Out of a total of 304 patients who underwent appendicectomies, 88 patients had pre-appendicectomy CT, and 56 patients had pre-appendicectomy Ultrasound. The CT sensitivity was 95%. The overall Ultrasound sensitivity was 24%, and the sensitivity in the paediatric subgroup was 40%. The CT positive predictive value was 92%. The CT negative appendicectomy rate was 0%.
Conclusion: All the targets of the CT scan were met. Although no interval Ultrasound scans are performed in the hospital, the results highlighted the poor performance of Ultrasound, compared to CT, in the assessment of appendicitis.

1. Humes DJ, Simpson J. Acute appendicitis. (2006) BMJ (Clinical research ed.). 333 (7567): 530-4. 2. Anderson SW, Soto JA, Lucey BC, Ozonoff A, Jordan JD, Ratevosian J, Ulrich AS, Rathlev NK, Mitchell PM, Rebholz C, Feldman JA, Rhea JT. Abdominal 64-MDCT for suspected appendicitis: the use of oral and IV contrast material versus IV contrast material only. AJR. American journal of roentgenology. 193 (5): 1282-8. 3. Debnath J, George RA, Ravikumar R. Imaging in acute appendicitis: What, when, and why?. (2017) Medical journal, Armed Forces India. 73 (1): 74-79. 4. Eng, K., Abadeh, A., Ligocki, C., Lee, Y., Moineddin, R., Adams-Webber, T., Schuh, S. and Doria, A. (2018). Acute Appendicitis: A Meta-Analysis of the Diagnostic Accuracy of US, CT, and MRI as Second-Line Imaging Tests after an Initial US. Radiology, 288(3), pp.717-727. 5. Dude, J.B., Lynch, M.L., Bhatt, S., Dogra, V.S., 2012. Computed Tomography Mimics of Acute Appendicitis: Predictors of Appendiceal Disease Confirmed at Pathology. J Clin Imaging Sci, 2(73), pp.1-8.–6. 6. Colson M., Skinner K.A., Punnington G., 1997. High negative appendicectomy rates are no longer acceptable. Am J Surg, 174(6), pp.723

Proffered papers: Clinical oncology – therapy

SP03.1 Evidence of OAR dose reduction for anal and rectal cancer MR-only planning treatments

David Bird[1]; Michael Nix[1]; Peter Brown[1]; Hazel McCallum[2]; Mark Teo[1]; Nathalie Casanova[1]; Rachel Cooper[1]; Alexandra Gilbert[1]; David Buckley[3]; David Sebag-Montefiore[3]; Ann Henry[1]; Richard Speight[1]; Bashar Al-Qaisieh[1]
[1]Leeds Teaching Hospitals NHS Trust; [2]Newcastle upon Tyne Hospitals NHS Foundation Trust; [3]University of Leeds

Background: For anal and rectal cancers there is no direct evidence showing the benefit of MR-only planning to patient treatments. This study aims to assess the impact of MR-only planning on target volumes and treatment plan doses to organs at risk (OARs) for anal and rectal cancer patients vs. a routine CT-simulation pathway.
Methods: 46 patients (29 rectum and 17 anus) undergoing radical VMAT EBRT received CT and T2-SPACE MR simulation. For CT and MR, RT target volumes (TV) and organs were delineated and RT VMAT treatment plans were optimised following our routine clinical protocols independently. The impact of dose boosting was also assessed. Differences in TV volumes and OAR doses (Vx Gy (volume receiving x dose)) were assessed.
Results: MR GTV and primary PTV volumes reduced vs. CT by 13 cc and 98 cc (anus) and 44 cc and 109 cc (rectum) respectively. The following OARs had statistically significant dose reductions vs. CT; for rectum; bladder and uterus, and for anus; bladder, penile bulb, and genitalia. With GTV boosting, statistically significant dose reductions were also found for additional OARs including; sigmoid, small bowel, vagina, and penile bulb (rectum) and vagina (anus). Further OARs had dose reductions close to statistical significance for standard and boost plans.
Conclusion: Our findings provide evidence that MR-only planning for anal and rectal cancers results in statistically significant reductions in TV volumes and reduced doses to OARS. OAR dose reductions may translate into less treatment related toxicity for patients.

SP03.2 Evaluating the dosimetric impact of uncorrected and IAEA corrected small field output factors on SABR plans with Monte Carlo and Acuros algorithms

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Background: Recent publications by Sendani(2019) and Mamesa(2020) have investigated the impact of IAEA corrected output factors (OF) on beam modelling. This study builds on this work by comparing a Monte Carlo and Acuros algorithm focusing on SABR planning.

Methods: Corrected small field OF were determined using a microdiamond (0.004mm^3) chamber using the intermediate field size method. A 6FFF True Beam HDMLC beam model was produced by Elekta using the IAEA OF for use in Monaco. Output factors, PDDs, off-axis ratios, fluence maps, VMAT plans and 10 patient SABR plans were prepared and calculated in Eclipse (uncorrected OF) using AXB (V13.6.23) and recalculated and compared in Monaco (V5.10.02).

Results: For static fields, differences in OF were <1% for jaw-defined and <2% for MLC-defined field sizes down to 2x2cm^2. Conformal, half-arc and VMAT prostate plans had dose differences <2% at isocentre and <1% difference in mean dose to PTV. VMAT SABR plans had a systematic dose discrepancy of -5.0% at isocentre in Monaco (SD: 1.5%, range 2.8%-7.8%) and a similar systematic decrease in mean dose to PTV (-4.9%, SD: 1.4%, range 2.3%-7.0%). Percentage differences in mean doses to OARs varied between -22.9% to 11.9%.

Conclusions: For static fields and simple plans there was minimal impact from using corrected OF. However, a significant difference has been found between the two planning algorithms for PTV and OAR doses in VMAT SABR plans. Further work will include comparing patient plan calculated to measured doses and looking into differences in MLC modelling for very small fields.

1. International Atomic Energy Agency and Medicine, I. (2017). Dosimetry of small static fields used in external beam radiotherapy: an international code of practice for reference and relative dose determination. Vienna: International Atomic Energy Agency.
2. Mamesa, S., Oonsiri, S., Sanghangthum, T., Yabsantia, S. and Suriyapee, S. (2020). The impact of corrected field output factors based on IAEA/AAPM code of practice on small-field dosimetry to the calculated monitor unit in Eclipse treatment planning system. Journal of Applied Clinical Medical Physics, 21(5), pp.65-75.
3. Sendani, N.G., Karimian, A., Mahdavi, S.R., Jabbari, I. and Alaei, P. (2019). Effect of beam configuration with inaccurate or incomplete small field output factors on the accuracy of treatment planning dose calculation. Medical Physics, 46(11), pp.5273-5283.

SP03.3 Margin reduction strategy in rectal cancer short course radiotherapy

Lynsey Devlin[1]; Gail Marshall[1]; Sean O'Cathail[2]; Hiwot Chemu[1]; Philip McLoone[3]; Alice Smith[1]; Siobhan Corish[1]; Aileen Duffton[1]
[1]Beatson West of Scotland Cancer Centre; [2]Institute of Cancer Sciences, University of Glasgow; [3]Institute of Health & Wellbeing, University of Glasgow

Background: Short course radiotherapy for rectal cancer (SCRTrc) delivers large doses. Planning target volume (PTV) margins include set-up error to encompass clinical target volumes (CTV).

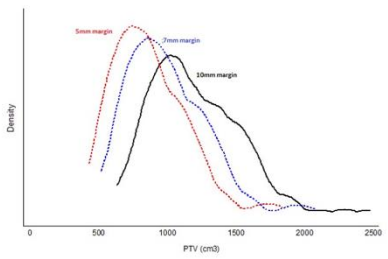
Aim: To assess safety of reducing PTV margin in SCRTrc. 1.Calculate set-up error margin if using an offline imaging protocol. 2.Describe effect of reduced margins on volume? 3.Do reduced PTV margins of 7 or 5mm maintain daily CTV coverage?

Methods: Patients were treated with VMAT 25Gy/5 fractions. Daily CBCT images were registered to bone with all shifts applied. Radiographers assessed PTV10mm target coverage and OAR before treatment. The group systematic error(Σ) and random error(σ) was calculated for the AP, SUP/INF and R/L shifts. Setup error margin was calculated for offline protocol using Van Herk et al. equation(2.5Σ+0.7σ). PTV7mm and PTV5mm were created retrospectively and volumes recorded. Two radiographers assessed daily coverage of all PTV margins.

Table 1. Absolute volumes for each structure.

PTV vol (cm^3)	PTV10mm	PTV7mm	PTV5mm
min	636.52	521.43	432.85
max	2476.43	2077.53	1836.59
median	1147.41	934.12	807.035
IQR	986.55-1451.01	807.99-1204.70	700.02-1058.81

Figure1. The distribution of PTV volumes for 5,7 and 10mm margin.



Results: Forty patients (CBCTn=200) were analysed, median age 70(IQR60.75-77) rectum level upper(n=10), mid(n=8) and lower(n=22). Using an offline protocol, set-up error margin was calculated as 9.1, 8 and 9.5 mm on the AP, SI and RL respectively. PTV volumes are shown in table1 and distribution in figure1.For PTV7mm and PTV5mm CTV coverage failed in 2.5%(5/200)and 4.5%(9/200) of fractions respectively. Occurring for 7.5%(n=3) and 15%(n=6)of patients. Occurring with PTV7mm 2/5 fractions(n=2), and 1/5(n=1); with PTV5mm in 2/5 fractions(n=3), and 1/5(n=3).

Conclusion: Daily CBCT allows safe margin reduction, essential to mitigate set-up error. Although PTV5mm covers most patients, PTV7mm provides a cautious approach. Enhanced bladder/rectal preparation could improve CTV coverage.

SP03.4 Survey of UK adaptive radiotherapy practices for head and neck cancer patients

Victor Shing-Cheung Lee[1]; Giuseppe Schettino[2]; The National Physical Laboratory; Andrew Nisbet[3]
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Objective: To provide evidence on the extent and manner in which adaptive practices have been employed in the UK and identify the main barriers for the clinical implementation of adaptive radiotherapy (ART) in head and neck (HN) cancer cases.

Methods: In December 2019, an online questionnaire, of 23 questions, was sent to all UK radiotherapy centres (67). This covered general information to current ART practices and perceived barriers to implementation.

Results: 31 centres responded (46%). 56% responding centres employed ART for between 10 to 20 patients per annum. 96% of respondents were using cone beam computed tomography (CBCT) either alone or with other modalities for assessing "weight loss" and "shell gap," which were the main reasons for ART. Adaptation usually occurs at week 3 or 4 during the radiotherapy treatment. 25 responding centres used an online image-guided radiotherapy (IGRT) approach and 20 used an offline ad-hoc ART approach, either with or without protocol level. Nearly 70% of respondents required 2 to 3 days to create an adaptive plan and 95% used 3-5mm adaptive planning target volume (PTV) margins. All centres performed pre-treatment QA. "Limited staff resources" and "lack of clinical relevance" were identified as the two main barriers for ART implementation.

Conclusion: There is no consensus in adaptive practice for HN cancer patients across the UK. For those centres not employing ART, similar clinical implementation barriers were identified. This survey is also an insight into contemporary UK practices of adaptive radiotherapy for HN cancer patients indicating national guidance for ART.

SP03.5 Investigation of latencies for a visual biofeedback system on the Unity MR-linac

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Background: MR-Linac systems enable use of MRI for real-time tumour motion estimation. At the local centre an MR-compatible in-room monitor provides visual biofeedback, allowing for real-time patient-assisted breathing modulation for improved respiratory gating. For this, latency should be minimised. In this work, image streaming via MR-TC (external MRI control-interface) is compared with cloning part of the MRI console. Additionally, biofeedback's impact on gating efficiency is investigated.

Method: Experiments were performed on a Unity MR-linac (Elekta AB, Stockholm, Sweden). A motion phantom (T=4s, A=10mm) provided low-latency (<1ms) reference position data. Sagittal T1GRE sequences were acquired at 4/8/12Hz. In-house software was used to time-stamp and clone the AutoView section of the Philips MRI console. Template-matching identified the phantom's position. By fitting sinusoidal models, the phase difference between phantom-reported and screen-cloning-observed positions was used to determine the latency[1]. Alternatively, cine-MR images were streamed via MR-TC and similarly processed to determine MR-TC latency. Gating efficiency was assessed for 3 healthy volunteers, with and without biofeedback. A rolling graph of current positions, based on extracted breathing traces from the MR-TC images, and gating window was shown on the in-room MR-compatible screen.

Results: MR-TC latency was 49-91ms. For screen-cloning, this latency was increased by 80-91ms for the same MR-sequences. Jitter was below 20ms for all sequences. Gating efficiency was increased by 24-58 percentage points with biofeedback (see Figure 1).

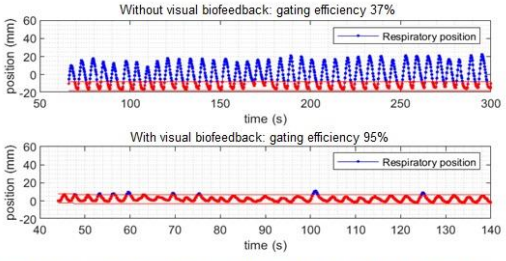

Figure 1: An example of gating efficiency on the Unity MR-linac with and without visual biofeedback.

Conclusion: Screen-cloning was found to be easily implemented, while MR-TC is recommended due to lower latencies and reduced jitter. Gating efficiency was dramatically improved by visual biofeedback.

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SP03.6 Introducing and managing the spleen as a standard organ at risk in the radical treatment of upper gastro-intestinal cancers in South West Wales Cancer Centre (SWWCC)

Ashley Poon-King[1]; Harrison Sprague[2]; Sarah Wright[1]; Adam Selby[1]; Rebecca Jennings[1]; Stuart Foyle[1]; Filippos Apostolopoulos[2]; Owen Nicholas[1]; Rebecca Lloyd[1]; Rebekah Rees[1]; Russell Banner[1]; Emma Christopher[1]; Sarah Gwynne[1]
[1]South West Wales Cancer Centre; [2]Swansea University

Background: The spleen has not been considered a standard organ at risk (OAR) during radiotherapy treatment for upper gastro-intestinal cancer. However, there is growing evidence of the risk of radiotherapy induced hyposplenism following splenic irradiation with a mean dose > 10Gy, and particularly > 40Gy (1,2) This may result in increased risk of infection and OPSI (overwhelming post-splenectomy sepsis). (3)

Method: Within SWWCC, patients who received > 45Gy radiotherapy for upper gastro-oesophageal cancers between January 2016 and August 2020 were analysed to assess splenic mean dose. Pancreatic cancers were included from January to August 2020.
Results: Of the 117 patients identified, 65 had received a mean dose to the spleen > 10Gy (55%). Only 1 of the 12 pancreatic cases identified were found to have a mean dose > 10Gy (8.3%). No patients received a mean dose > 40Gy. Work is ongoing to contact all patients identified, and initiate appropriate prophylactic lifelong antibiotics and vaccinations as per post-splenectomy local trust guidelines (4) (excluding patients with life expectancy < 3 months). Prospectively, hyposplenism is now included as a potential risk in standard consent. A radiotherapy induced hyposplenism pathway is under development to ensure all patients at risk are identified, counselled and treated as above in collaboration with our physics department, radiotherapy review treatment radiographers, clinical nurse specialists and general practitioner colleagues.
Conclusion: This project has identified the importance of identifying this cohort of patients as a high proportion of these patients are at potential risks of the complications of hyposplenism.

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Proffered papers: Breast

SP04.1 Audit of Recall Rate in High Risk MRI breast screening

Lucinda Frank[1]; Iain Lyburn[1]; Richard Sidebottom[1]; Carina Brolund-Napier[1]; Zoe Wray[2]; Sarah Vinnicombe[3]
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Introduction: BRCA gene mutation carriers and women who have had previous thoracic radiotherapy are classified as very high risk of developing breast cancer and are entitled to annual screening with MRI +/- mammogram over age 30. Further assessment is recommended for MRI detected indeterminate or suspicious masses ≥5mm, or non-mass enhancement ≥10mm. The minimum standard for recall rate is <10% with an expected standard of <7%. Nationally this has been difficult to achieve so this audit aimed to review recall rates and outcomes in a single breast screening unit.
Method: All high-risk screening MRIs conducted between January 2014 and September 2019 were reviewed including classification, type of follow up imaging and any biopsy results.
Results: There were 283 screening episodes between January 2014 and September 2019. Nineteen patients were recalled for assessment (12 prevalent screens, 7 incident screens), for an overall recall rate of 6.7%. The recall rate per year varied from 3% to 9% with no discernible trend. Five cancers were diagnosed (cancer detection rate 17.6/1,000; PPV for recall 26%). On retrospective review of recalls, 3 were deemed unnecessary. All 3 were before a protocol change to include subtraction images; in one case there was misinterpretation of diffusion weighted imaging.
Conclusion: In a centre with a small number of experienced MRI reporters and a rigorous protocol, it is possible to meet the expected recall rate standard. Diffusion weighted imaging is invaluable for increased specificity, especially in prevalent screens.

SP04.3 A service evaluation of a newly introduced KV-MV pair imaging protocol for five fraction breast treatments.

Ashley Lambert; Kirsty Farnan; Kirsty Muir; Gareth Hill; Douglas J A Adamson
NHS Tayside

Background: Publication of the FAST FORWARD trial and the impending consequences of the Covid epidemic resulted in the need to implement an alternative breast pathway locally. The dose and fractionation regime to be adopted was 26Gy in 5#. Due to the higher fractional dose it was felt that existing imaging verification methods, in beam MV imaging only, would be insufficient to ensure set-up accuracy.
Method: A new daily treatment KV-MV pair imaging strategy was devised and implemented to support the new dose and fractionation regime. The first 30 patients referred were evaluated on the basis of displacements and lung depth. The following local imaging tolerances were applied to each daily image: 10mm for displacements on initial online

match, 5mm displacements a the second online match which was incorporated due to departmental technique and 5mm tolerances for the MV in beam imaging.
Results: Results indicate that out of a cohort of 30 patients, only two had discrepancies of >10mm on the initial imaging, one patient >5mm on the second online match, and six had >5mm on the in-beam images, which were concluded to be random errors owing to relaxation or patient movement.
Conclusion: Findings indicate that an initial KV-MV image pair combined with the MV in beam images is sufficient to ensure correct isocentre verification and thus the delivery of accurate treatment. This evaluation demonstrates that the second online match confirming initial displacements was not required and thus can be ceased for dose optimisation, saving time and unnecessary radiation exposure.

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SP04.4 Does yearly mammographic surveillance put a large group of younger breast cancer patients at further risk?

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[1]Northern Devon Healthcare NHS Trust; [2]University of Keele

Background and Objectives: National and international guidelines require women diagnosed with breast cancer at an early age to undergo numerous annual mammograms beyond diagnosis until screening age. This despite younger women having dense breast tissue with reduced mammographic sensitivity for detection of abnormalities, and the lifetime risk for developing radiation-induced cancer being highest in younger women. A current UK trial (Mammo-50) investigates targeted surveillance for patients over 50 years, but there is no known trial seeking change for younger women.
Ultimately: Could there be a targeted approach for follow-up of younger age women breast cancer groups? This study aims to investigate how many younger women are affected by non-targeted screening.
Methods: Younger women under 45 years who have undergone more than 5 years of annual mammograms are investigated for: grade of cancer diagnosis, breast tissue density, whether original cancer was mammographically occult, number of mammograms since diagnosis, and whether discharged from annual surveillance (including reason).
Results: UK-wide results suggests 9% of new breast cancers were diagnosed in women below 44years in 2014-2016. Sensitivity of surveillance mammography for detection of recurrence was 64-67% with a specificity from 85-97%, while sensitivity was reduced in patients with increased mammographic breast density to ~30%. This study seeks to determine the current accuracy of these figures.
Conclusions: Early results suggest that this is a rising population of breast cancer patients. The ultimate aim of the study is to determine whether a more suitable mammographic surveillance can be determined for this group of younger.

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SP04.5 Determining the accuracy of PerFraction™ for detecting clinically relevant changes for breast patients

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Background: Surgical intervention and effects of radiotherapy for breast cancer patients may cause the breast to swell (Seppälä et al., 2019), while setup to orthogonal kV images for radiotherapy can leave some residual setup error (Feng

et al., 2015). Both effects can reduce dose to target volumes or increase the dose to organs at risk. PerFRACTION™ (Sun Nuclear Corporation) is a commercial software package for performing autonomous in-vivo 2D EPID-based transit dosimetry (Sun Nuclear Corporation, 2017). The aim of this study is to determine how accurately PerFRACTION™ can identify clinically relevant changes caused by breast swelling and shifts in patient setup.
Methods: An anthropomorphic phantom was used to simulate breast swelling margins and setup shift. 18 breast radiotherapy plans were created and delivered following local protocols. 2D gamma analysis results calculated by PerFRACTION™ were assessed by ROC (receiver-operator characteristic) analysis (Bojechko and Ford, 2015), to quantify the test performance and select optimal gamma analysis criteria and gamma passing thresholds for in-vivo protocols.
Results: PerFRACTION™ detected clinically relevant breast swelling (>10 mm, $p < 0.001$) but was unable to detect setup shifts > 5 mm in any cardinal direction. An optimised protocol is derived from the ROC analysis to identify breast swelling, setting gamma analysis criteria of 3%/3 mm and a gamma passing rate threshold of 86.7%.
Conclusion: Results show promising accuracy using PerFRACTION™ to identify clinically relevant breast swelling. As a phantom cannot perfectly imitate the complexity of a real patient, further work is planned to measure performance in a patient cohort.

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SP04.6 Identification of discrimination parameters for diagnosing breast cancer using Raman spectroscopy

Gourav Kumar Jain; Arun Chougule; Rajni Verma
SMS Medical College and Hospital

Background: The present study focuses on identifying the features and parameters of Raman spectroscopy for diagnosing cancer in human breast surgical samples.
Method: The collection of specimens of the human breast including tumor and normal tissue was conducted under a protocol approved by the institutional ethical committee. Thirty five clinically unprocessed, fresh human breast surgical samples (20 cancerous and 15 normal tissues) were obtained. Confocal spontaneous Raman spectroscopy in reflection mode was performed using incident excitation laser monochromatic beam of 532 nm.
Results: There were 17 identifiable peaks. Most of the positive bands seen around 751, 841, 979, 1147, 1168, 1415, 1558, 1594, 1938, 2109, 2333, 2449, 2705, 2889, 3154, 3243, 3295 cm--1 can be assigned to different vibrational modes of proteins and lipids. The differences observed between spectral profiles of cancerous tissues are less pronounced compared with normal breast tissues. However, notable spectroscopic differences exist in both the absolute and relative intensities of the peaks in the spectra. The wavenumber range 830 --1938 cm--1 spectral region provided several identifiable peaks and the Raman region corresponding to protein vibrations. The Raman fingerprint region 2800 --3200 cm--1 provided the best discrimination. The absolute and relative Raman intensity is very high in cancerous breast tissue in this spectral region. The Raman fingerprint region provided information on the complex interactions between multiple bonds including carbon-hydrogen stretching in lipids resulted in broad peaks.
Conclusion: The Raman spectra were recorded and analyzed for the human normal breast and cancer tissues.

Proffered papers: Neuro and head and neck

SP05.1 Evaluation of a remote blended-learning neuroradiology teaching programme during the COVID-19 pandemic

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The Royal London Hospital

Background: Maintaining an effective registrar teaching programme is essential for training outcomes, but traditional methods are constrained by the COVID-19 pandemic, particularly social distancing and remote working. We evaluate a remote video-conference based teaching programme with web-based individual case viewing.
Method: 16-seminar teaching programme implemented to address the educational needs of specialist trainees in their Neuroradiology attachment (10 trainees). Each consisted of trainee-led didactic presentation followed by review of relevant trainer-selected cases. Post-intervention qualitative survey assessed pre- and post-programme satisfaction with the subject matter, as well as preferences between two platforms for case sharing. Perceived advantages and

disadvantages of this educational method were identified.
Results: Survey response rate was 80%. All trainees found the programme "very useful" and rated the sessions more accessible (4.75), and improved by the addition of web-based imaging playlists (4.5) on 5-point Likert scales, as compared to "traditional" teaching. Radiopaedia was preferred (32.5% vs 25%) over pacsbin as a viewing platform. Trainee confidence with neuroradiology reporting increased from 2.25 to 3.875 over the course of the programme, although confounded by concurrent informal training. Qualitatively, trainees valued the increased accessibility of sessions and opportunity for individual study review. Disadvantages included reduced interactivity and software technical requirements.
Conclusion: Remote radiological education is feasible, especially when supplemented with user-navigable case playlists. Free to access platforms for both video conferencing and DICOM sharing are functional for this purpose with high levels of user satisfaction. Potential pitfalls include teacher and learner technical familiarity with platforms and altered interactivity.

SP05.2 Novel dual phase cerebral CT angiography and venography using a single bolus of contrast injection- assessing the diagnostic quality

Jennifer Dale; Maxine Helsby; Athar Barakat; Shubhabrata Biswas; Kumar Das
The Walton Centre

Cerebral CT angiography (CTA) and CT venography (CTV) are typically acquired using 2 separate contrast boluses and acquisitions. On the other hand, dual phase cerebral CTA-CTV is a technique to demonstrate both arterial and venous phases in a single setting and using only a single bolus of contrast. This allows for smaller contrast dose (reducing the risk of contrast induced nephropathy), reduced cost and less time; in comparison to 2 separate single phase acquisitions- often acquired on two separate settings. This study aimed to assess the quality of dual phase CTA-CTV compared to single phase studies. Mean attenuation (in HU) from specific arteries and venous structures were calculated from dual phase CTA-CTVs (n=10). Using Student's 't-test the values were compared with the mean attenuation values of the same arteries and veins described in literature published previously from our unit. Two neuroradiologists reviewed the dual phase CTA-CTVs to subjectively assess for venous contamination in the arterial phase scans and arterial contamination in the venous phase scans. The mean attenuation for each artery and vein on the dual phase CTA-CTVs were higher compared to those in single phase scans ($p< 0.05$). 90% of CTA images from the dual phase scans demonstrated mild venous contamination. Also, 90% of the CTV images acquired by the dual phase technique showed only mild venous contamination. Dual phase CTA-CTV can generate high quality arterial and venous phase images as demonstrated by high attenuation achieved in the arteries and veins, without any significant vascular contamination.

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SP05.3 Stroke detection using low intensity radio frequencies with data visualisation

David Heatley[1]; Ibrahim El Rube[2]; Saudi Arabia; Mohamed Abdel-Maguid[3]
[1]University of Suffolk; [2]Taif University; [3]Canterbury Christ Church University

Rapid on-scene diagnosis is crucial for patients suffering from a stroke. The authors are researching a new experimental head scanner[1] for that purpose. It uses low intensity radio frequencies which are intrinsically safe for the patient and operator(s) and avoid the costly shielding and specialist infrastructure required by CT/MRI. This, combined with the inherently low cost of its component parts and the prospect of a compact, portable construction, enables it to be carried in ambulances and used on-scene at the patient's location while sharing diagnostic data with remote stroke specialists in real time via 4G/5G connections. Enabling stroke patients to be diagnosed before arriving at the hospital will greatly increase the percentage who commence treatment within the first hour after the onset of their stroke. This will be transformative for these patients, greatly improving their outlook and reducing the number who require costly rehabilitation and long-term care, which will help to reduce the current £26bn annual cost of stroke to the UK nation[2]. The authors present the latest results from their research into visualising the data captured during a scan in novel ways that reliably display whether the distinctive signature of a stroke is present in the data. A new approach is described that analyses the reflected portion of the scanning beam rather than the through-head portion, which facilitates the use of computationally-efficient conventional signal processing techniques. The results conclusively show that an identifiable signature is indeed discernible in the data from which a diagnosis can be made.

1. Heatley, D. and Abdel-Maguid, M. (2020) Stroke detection by scanning with low intensity radio frequencies. UKIO 2020. 2. The Stroke Association. State of the Nation – Stroke Statistics 2018. stroke.org.uk.

SP05.4 Barium swallow - Are we using it safely in ENT patients?

Ciara O'Donnell; Huw Roach

University Hospitals Bristol NHS Trust

Background: Many patients with high dysphagia are referred to the Ear Nose and Throat (ENT) team on a suspected cancer pathway. If no cause is found at direct/nasoendoscopic inspection, some are then referred for barium swallow, to seek other causes. Dysphagia can be difficult to localise clinically and oesophageal cancer can present with high dysphagia. As endoscopy (rather than barium swallow) is accepted as the optimal investigation for diagnosing oesophageal cancer (1), the purpose of this study was to assess if using barium swallow in this way is leading to missed/delayed diagnoses of oesophageal cancers in these patients.

Method: 5 year retrospective data collection between 2014 and 2018. Radiology Information System and the Cancer Registry were cross-referenced to identify all patients diagnosed with oesophageal or oesophagogastric junctional cancer within 1 year after a barium swallow referred by ENT.

Results: Within the 5 year period, 10 oesophageal cancers were diagnosed in ENT patients within 1 year of having a barium swallow. Of these, 9 were reported on the barium swallow and 1 was missed. This gives a "miss rate" of 10%, which is slightly higher than published "miss rates" for endoscopy (2). Incidence of oesophageal cancers in this patient group was however low, with 2 cases diagnosed per year out of a total of approximately 380 examinations per year (0.5%), making meaningful statistical comparison difficult.

Conclusion: Our current use of barium swallow is safe and does not appear to lead to a significant number of missed oesophageal cancers in ENT patients.

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Proffered papers: Education

SP06.1 E-learning for sonographers: Saving Babies Lives

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[1]The Society and College of Radiographers; [2]Health Education England

Background: Saving Babies Lives care bundle version two (SBLv2) has been introduced into maternity units in England, with the aim of reducing perinatal mortality. As part of the package there is a requirement to undertake additional components within third trimester growth scans. Sonographers need to understand the SBLv2 documentation and how to undertake and interpret both uterine artery Doppler and cervical length assessment.

Purpose: We aim to introduce new Health Education England/College of Radiographers e-learning modules on SBLv2 written by and for sonographers. This content is free for NHS, Higher Education and those working with NHS patients. Learning outcomes: * Introduce the new SBLv2 e-learning modules * Explore the basic content of the 4 sessions * Reflect on how the learning materials can be used in clinical practice

Summary of content: An overview of the four sessions will be provided. These include: 1. An Introduction section, which comprises of terminology, a review of growth assessment by ultrasound, safety, consent and communication. 2. Uterine artery Doppler. Within this session there is information about undertaking and interpreting the examination and optimising equipment settings. 3. Middle cerebral artery Doppler. This will have a similar format to the uterine artery Doppler session. 4. Cervical Length Assessment. The session covers technique, equipment settings, normal and abnormal measurements of the cervix.

SP06.2 Embarking on a virtual radiology events and learning meeting: tips to optimise education

Mitesh Naik; Susan Hesni; Sarah Sheard

Imperial College Healthcare NHS Trust

Background: Radiological errors are not uncommon, reported to occur in 3-5% of cases on average (*Lee C.S. et al.*, 2013). The historical 'Discrepancy Meeting', with its somewhat negative connotations, has been renamed the 'Radiology Events and Learning Meeting' (REALM) in recent years by the Royal College of Radiologists (RCR) to shift the emphasis away from a culture of blame and instead encourage learning as a team and also recognise excellence. In the recent worldwide pandemic, meetings have almost universally shifted to the virtual sphere, and REALM is no exception.

Purpose of poster: To provide an overview of the updated standards for radiology events and learning meetings, highlighting changes from previous standards. To describe potential pitfalls when running a virtual REALM and ways to

obviate these. To outline a suggested approach for the delivery of a virtual REALM. To highlight common clinical themes which have arisen in our own REALM, illustrated using anonymised case examples.
Summary of content: The nine key standards identified by the RCR (*The Royal College of Radiologists*, 2020) will be reviewed, with ways to achieve these underscored. With almost a year of experience of running a virtual radiology events and learning meetings, we will discuss our own considerations when planning these including anticipation of technical issues, ensuring anonymity, maintaining interest and encouraging participation. Types of error will also be presented with case examples.

1. Lee C.S., Nagy P.G., Weaver S.J. and Newman-Toker D.E. (2013) Cognitive and System Factors Contributing to Diagnostic Errors in Radiology. American Journal of Roentgenology. 201: 611-617. 2. The Royal College of Radiologists. (2020) Standards for radiology events and learning meetings. [online] Available at: https://www.rcr.ac.uk/system/files/publication/field_publication_files/bfcr201-standards-for-radiology-events-and-learning-meetings.pdf [Accessed 14 December 2020].

SP06.3 Humanising healthcare: positive collaboration between universities and healthcare charities

Sophie Willis[1]; Susanna Glover[2]; Edwin Abdurakman[1]
[1]City, University of London; [2]Senior Services Improvement Officer

Background: Healthcare education can effectively address the needs of the NHS by ensuring that programme delivery is informed by the contemporary experiences of patients. It is well documented that involving patients in the design, delivery and evaluation of curricula can ensure the curriculum is relevant and accountable to patients as well as affording students opportunities to benefit from their unique experience and expertise. However, often challenges arise due to difficulties in identifying patients to engage with. Collaborations between universities and healthcare charities offer one solution and serve to enhance the patient voice in education and contribute to humanising healthcare.
Purpose of poster: To share best practice experiences of a collaboration between Breast Cancer Now charity and City, University of London to embed service user participation throughout the curriculum. To highlight the stakeholder benefits of effective collaborations between charities and universities to enhance student education and patient care.
Summary of content: The poster will convey the following messages for key stakeholder groups via case study examples generated from those currently involved with the delivery of the undergraduate curriculum at City, University of London. How to effectively; 1. Improve patient experience of treatment and care by using patient involvement to better prepare students for clinical practice 2. Enhance education by using patients with lived experience to help prepare students for what to expect in clinical practice 3. Recruit the right students to deliver the excellent care of the future by involving patients in the selection process 4. Prepare patients to lead seminars and develop curricula.

SP06.4 The impact of tradition and national requirements on radiotherapy education

J Guilherme Couto[1]; Sonyia McFadden[2]; Patricia McClure[2]; Paul Bezzina[1]; Ciara Hughes[2]
[1]University of Malta; [2]Ulster University

Background: Radiotherapy education varies considerably across the EU, leading to differences in the competency level Therapeutic Radiographers (TRs). Many factors influence the characteristics of education programmes. However, this study aimed to understand the influence of traditions and national requirements in the design of RT education programmes.
Methods: A thematic analysis of interviews with stakeholders in radiotherapy education (clinical managers, educators, professional association representatives, local and migrant professionals and students) was performed using Nvivo (v.12). Stakeholders were included from Finland, Poland, Portugal and United Kingdom (based on different education characteristics).
Results: The participants (n=30) indicated that the design of the pre-registration degree depends on i) the roles carried out by TRs when they graduate, ii) the potential to take advanced clinical roles in that country and iii) the existence of postgraduate training in the country/region. Political and financial factors also play a significant role. Professional identity varies between countries because of differences in how the radiography specialisms are studied and practised. Education tends to align with this professional identity. European stakeholders perceive the profession as "small" and lacking visibility, resulting in a lack of self-empowerment to improve education. The perception of radiography as a "technical occupation" by other professionals and inter-professional role disputes can hinder the inclusion of topics in the educational programme.
Conclusion: Local workforce requirements is still the primary factor driving programme design. Therefore, the national requirements take priority over a (possible) European-wide standardisation. Tradition influences education, but changes in education can lead to a shift in traditional beliefs.

SP06.5 Competency and Professional Advancement in Computed Tomography (ComPACT): A modified e-Delphi survey to identify CT competencies at different diagnostic radiographer expertise levels

Martine Harris[1]; University of Bradford; Maryann Hardy[2]; Andrew Scally[3]

[1]The Mid Yorkshire Hospitals NHS Trust; [2]University of Bradford; [3]University College Cork

Background: Competency frameworks for diagnostic radiographers are central to assessing performance and defining role accountability. However, there is little research of the knowledge and skills required of individuals entering CT practice (NHS career level 4 or 5), or the developmental opportunities there are in advanced clinical practice and leadership (level 6, 7, 8 or beyond). This paper presents a modified e-Delphi study to gain agreement on CT practice competencies (embracing higher-level capabilities).

Method: The Delphi survey was administered through completion of two structured online questionnaires. Expert panel members were recruited via established CT professional groups, and through social media. For each competency item, experts were asked to indicate whether it was "essential", "desirable" or "not necessary" for practice levels 4-8, with agreement equated with ≥70%.

Results: Survey rounds yielded response rates greater than that required to establish percentage agreement (n=30) using Lawshe's $CVR_{critical}$ values (Ayre and Scally, 2014). Experts provided opinion on 214 diverse CT competency items and added a single competence around communication. Analysis of agreement is on-going. Early results indicate few contradictions amongst the identified competencies and expertise levels. Respondents found it problematic providing opinion at practice level 4.

Conclusions: Although this study is limited by individuals practice reflections, it has accomplished agreed contemporary CT competencies and capabilities that align to the four-tier model underpinning skills mix within this area of practice. The outcome is a robust framework that can be operationalised to define diagnostic CT roles, identify gaps in own practice, and support career progression.

1. Ayre, C. and Scally, A.J. (2014) Critical values for Lawshe's Content Validity Ratio: Revisiting the original methods of calculation. Measurement and Evaluation in Counseling and Development. 47 (1), 79-86.

SP06.6 Challenging the clinical education of diagnostic radiographers to make way for student placement expansions: a reflective exercise

Thomas Welton

Lancashire Teaching Hospitals

Background: Staff shortfalls in diagnostic radiography is everyone's responsibility. With 1 in 9 jobs vacant in England, it is paramount novel methods for increasing student numbers in a safe and efficient way are sought. Although every effort with the higher education institutes, the Council of Deans and Health Education England are made, the obvious bottleneck comes from clinical provision to allow a student to fulfil their clinical competencies for course completion. It is the responsibility of practice-based educators to work with said institutes to develop a fresh way of delivering education.

Purpose of poster: At a large teaching hospital, mechanisms have been found to nearly double student numbers from 10 to 19 students in the last few years while still producing a comprehensive student environment that is both effective and well received by the students. This poster sets out to reflect on the process, outlining positives and negatives of the process and showcase the method in which this was achieved.

Summary of content: Through student testimonials, reflective processes and extensive feedback, this poster has the intention of setting a platform for other hospitals who accept student learning to review their process.

1. The society and college of radiographers (2009) Approval and accreditation board handbook. Available: https://www.sor.org/system/files/section/201110/2009.05.01_AAB_Handbook_SJ_V_1.0.pdf. Last accessed:16 December 2020.

Proffered papers: Service

SP07.1 The collaborative development of a diagnostic radiography programme between a hospital trust and a local university to improve student experience, maximise placement capacity and develop radiographers fit for the future

Hilary Baggs[1]; Rebecca Howell[2]; Linda Bevan[2]

[1]University of Gloucestershire; [2]Gloucestershire Hospitals NHS Foundation Trust

Background: The training of diagnostic radiographers has always been a collaborative approach between academic institutions and placement providers. Traditionally the university has provided the academic theory and the placement has provided the practical experience. This has led to students experiencing a theory/practice gap and

often struggling to link the two experiences together (Bwanga & Lidster, 2019). In addition, placement capacity is a concern and maximising this is crucial to the students experience and success (Hyde and Erret, 2017)
Purpose of poster: To showcase the proposed advantages to the student experience of close collaboration between the university and placement provider. To demonstrate how university and placement provider can work together to produce an innovative programme fit for radiographers of the future. To highlight how placement capacity can be maximised when embracing the 24/7 nature of the radiographer's role.
Summary of content: The poster presents an outline of a collaborative approach between placement and academic institution to design a new degree programme. It shows how the relationship between the university and placement provider began and progressed, and how it is now integral to the success of the degree programme. It highlights the benefit to the student experience by having staff from the clinical environment on the teaching team and members of the academic team working clinically. It also demonstrates how working shift patterns and exploring areas outside of imaging, will maximise placement spaces and encourage final year students to mentor first year students.
1. Bwanga, O & Lidster, J (2019); East African Scholars J Med Sci; 2(7): 367-380 2. Hyde, E. and Errett, S. (2017) 'Building capacity: an evaluation of the use of non-traditional placements in diagnostic radiography education.' [Poster] Presented at the UK Radiological and Radiation Oncology Congress (UKRCO), Manchester, 12-14th June.

SP07.2 The regional development of a cultural support package to improve the lived experiences and cultural transition of internationally recruited radiographers: reflections of a targeted intervention post covid

Kerry Mills; Elizabeth Ladd; Ben Roe
NHS England and NHS Improvement

Background: As part of the national Adapt and Adopt project, a large regional international recruitment drive was undertaken to address significant shortfalls within the radiographer workforce. Working collaboratively with stakeholders and arm's length bodies, the regional imaging team developed and implemented a cultural support package designed to ensure a smooth transmission through the onboarding process and beyond.
Purpose: The cultural support package was designed around a three-phase strategy that focused on a targeted 'before, during and after' intervention. A series of webinars and discussions used appreciative inquiry as a method to explore the lived experiences of international radiographers already working in the UK. The findings were used to influence and guide the development of the support package. Specialist providers were brought into design and provide an online learning resource focusing on both educational and cultural acclimatisation aspects. New recruits' expectations and perceptions was assessed prior to arrival, and this was repeated after three months. An evaluation was then undertaken to identify the effectiveness of the various interventions.
Summary: Ethical international recruitment has successfully supported the regions workforce strategy and provided much needed resources on the ground post covid. This project has been driven by the regional imaging leadership team who have worked with the wider group to ensure successful implementation. The cultural package has served to support both the new recruits and their residing departments during the onboarding process and transitioning phase and it is hoped this investment will ensure positive levels of retention within this
1. King's Fund (2018) Nuffield Trust. The health and care workforce in England: make or break? [online] Nuffield Trust. Available at https://www.health.org.uk/publications/the-health-care-workforce-in-england (Accessed 15 December 2020] 2. NHS (2019) The NHS long term plan [online] NHS England and NHS Improvement. Available at https://www.longtermplan.nhs.uk/ [Accessed 15 December 2020] 3. Richards, M. (2020) Diagnostics: Recovery and Renewal - Report of The Independent Review Of Diagnostic Services For NHS England. [online] NHS England. Available at: <https://www.england.nhs.uk/wp-content/uploads/2020/11/diagnostics-recovery-and-

SP07.3 A joint enterprise between radiology and physics to tackle the backlog of MRI scans caused by covid19 by producing new accelerated scan protocols for oncology patients enabling faster recovery of capacity and avoidance of outsourcing

Dawn Harrop; Rohit Kochhar; Michael Hutton; Steven Jackson; David Buckley; Christopher Moore; Sarah O'Connell
The Christie

Background: diagnostic imaging delays for oncology patients soared during Covid 19 lockdown. Recent studies indicate that a four-week delay in results/treatment can increase mortality in cancer patients by up to 13%. Across all of the imaging modalities nationally MRI scanning has been the slowest to recover.
Method: Analysis of departmental activity to assess which scans occur most frequently. Brain and spine imaging selected against this criteria. Existing imaging protocol parameters exported and investigated off-line to avoid scanner downtime. Out-of-hours sessions conducted testing alterations. Changes made to: signal averages, phase resolution, partial Fourier, parallel imaging, echo train length, RF pulse type, gradient speed, bandwidth, matrix size, concatenations, repetition time. Qualitative review of changes by Consultant Radiologist and Clinical Specialist Radiographers.
Results: New protocols saved up to 24mins per scan totalling 15.5 hours per week. No need to add extra cleaning time to appointments or gaps to allow for social distancing. We were able to offer appointments between 2 & 6 weeks

after cancellation in most cases and reach100% capacity by July. No patients had to be outsourced.
Conclusion: by looking for internal solutions and utilising the specialist expertise of physicists and radiographers hospitals could adopt similar approaches to future MRI imaging demands and avoid reliance on out sourcing and mobile vans which are not always suitable for certain patient groups. Accelerated protocols have provided our centre with a future proof solution should there be an increase in referrals from patients who stayed away from their GPs during covid19.

SP07.4 Patient perceptions and acceptance of whole-body myeloma imaging

Adam Ryder[1]; Caron Parsons[1]; Brendan Greaney[2]; Charles Hutchinson[1]; Charles Doug Thake[2]
[1]University Hospitals of Coventry and Warwickshire NHS Trust; [2]Coventry University

Background: Radiographic skeletal survey (RSS), low-dose whole-body computed tomography (LD-WBCT) and whole-body magnetic resonance imaging (WB-MRI) are all used for diagnosing myeloma. This study explores patient perceptions of whole-body imaging (WBI) and the factors that influence their acceptance from a qualitative perspective.
Methods and Materials: Sixty participants (median age = 58.5), recruited from three NHS trusts and social media, completed an adapted survey with open and closed questions to share their experiences of WBI. A qualitative descriptive approach was used for the interpretation of individual experiences. Thematic analysis was used as the framework for data analysis.
Results: Three themes were identified; the first outlines the factors intrinsic to patients that influence the acceptability of WBI. Myeloma patients understood the need for WBI, although imaging results, bone damage and pain all caused concerns. Theme 2 collated the factors that improve the acceptance of WBI, primarily physical comfort and staff support. The third theme describes barriers to WBI acceptance, including a claustrophobic environment, noise and the duration of the examination. Respondents were averse to the physical manipulation required for RSS and staff being too task focused.
Conclusions: Respondents were highly accepting of the need for imaging, despite associated burdens. Staff interactions can significantly impact patients perceptions of WBI and its acceptance, both positively and negatively. Staff should be encouraged to support service users and the patient should be involved in the choice of imaging, when appropriate. Although WB-MRI can be challenging, with the right support it is achievable for most myeloma patients.

1. Bradshaw, C., Atkinson, S., and Doody, O. (2017) 'Employing a Qualitative Description Approach in Health Care Research'. Global Qualitative Nursing Research 4, 2333393617742282 2. Braun, V. and Clarke, V. (2006) 'Using Thematic Analysis in Psychology'. Qualitative Research in Psychology 3 (2), 77-101 3. Chantry, A., Kazmi, M., Barrington, S., Goh, V., Mulholland, N., Streetly, M., Lai, M., and Pratt, G. (2017) 'Guidelines for the use of Imaging in the Management of Patients with Myeloma'. British Journal of Haematology 178 (3), 380-393

SP07.5 Barriers and facilitators to engaging with health services for patients with breast cancer symptoms or a breast cancer diagnosis during the COVID-19 pandemic

Heather Drury-Smith; Heidi Probst; Julie Skilbeck
Sheffield Hallam University

Introduction: In the UK, breast cancer is the most common cancer, accounting for 15% of all new cancer cases (Cancer Research UK, 2017). In response to the Covid-19 pandemic a national lockdown was introduced in the UK in March, 2020. Since this time there has been a drop in screening and referrals for people presenting with breast cancer related symptoms. There is concern that the delay experienced by some patients with breast cancer-related symptoms may increase the risk that the patient may require more extensive surgery, or in some cases reduce the patient's chances of long term survival.
Aims: To investigate the experiences and actions of women and men (who had breast cancer symptoms) in gaining access to cancer services during the COVID-19 pandemic. A theory around the barriers and facilitators to active self-referral during a pandemic and the service limitations that prevented timely interventions will be developed from the data generated.
Method: As little is known about the personal choices people make about their health during a pandemic; Kathy Charmaz's 'Constructivist Grounded Theory' (2016) using open interviews to elicit understanding has been adopted. Purposive sampling has been employed with those eligible for the study recruited through the Breast Cancer Now patient forums.
Impact: The theory identified on care seeking or care avoidance behaviour developed through this study will be used to inform the public, cancer service providers and GP's on strategies to enhance patient access to services during a pandemic and beyond.

1. Cancer Research UK. (2017) Breast Cancer Statistics, Cancer Research UK. 2. Charmaz K. (2016) Constructing Grounded Theory. A practical guide through Qualitative Analysis. SAGE publication.

SP07.6 Realising the role of the therapeutic radiographer in prehabilitation and rehabilitation

Jo McNamara[1]; June Davis[1]; Daniel Hutton[2]; Hazel Pennington[1]
[1]Macmillan; [2]The Christie NHS Foundation Trust

Background: 50% of all cancer patients receive radiotherapy treatment, delivered by Therapeutic Radiographers (TR's) (1). Prehabilitation prepares people for cancer treatment by optimising their physical and mental health through a needs-based prescription of exercise, nutrition, and psychological interventions. The BMJ note that, although it is a great idea in theory, it is somewhat trickier in practice (2). This can be seen in the literature, where it's well documented that rehabiltation /prehabilitation should be delivered by the multidisciplinary team (3,4), however, there is a notable absence of the TR, who can see cancer patients for up to 8 weeks during radiotherapy. This is a significant missed opportunity.

Purpose: To meet the increased demand for cancer services, new ways of working are essential (5) and TR's should be integral to this workforce redesign and the prehabiltation / rehabilitation agenda. A proposed case study pathway is presented to highlight how the TR's could support prehabilitation / rehabilitation, optimising patient care; whether that be through screening, assessment, monitoring and evaluation, or referral to interventions. As part of this exploration to realise the potential of TR's, a survey of TR's current knowledge, perceptions and confidence levels is presented, identifying workforce development needs.

Summary of content: Prehabilitation and rehabilitation should be integral to the role of ALL the MDT and although emphasis has historically been on surgery, focusing on radiotherapy is key to ensure patients living with cancer have the appropriate support to minimise long term side effects, improve quality of life and overall health.

1. Cancer Research UK. (2020) Retrieved from https://www.cancerresearchuk.org/about-cancer/cancer-in-general/treatment/radiotherapy/about 2. Giles, C. and Cummins, S. (2019) Prehabilitation before cancer treatment. BMJ. Vol. 366. doi: https://doi.org/10.1136/bmj.l5120 3. Macmillan Cancer Support (2020).Principles and guidance for prehabilitation within the management and support of people with cancer. Retrieved from https://www.macmillan.org.uk/healthcare-professionals/news-and-resources/guides/principles-and-guidance-for-prehabilitation 4. Macmillan Cancer Support. (2018) Cancer Rehabilitation Pathways. Retrieved from https://www.macmillan.org.uk/assets/macmillan-cancer-rehabilitation-pathways.pdf 5. Macmillan Cancer Support & NHS Improvement. (2013) Living with & Beyond Cancer:Taking Action to Improve Outcomes (an update to the 2010 The National Cancer Survivorship Initiative Vision). Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/181054/9333-TSO-2900664-NCSI_Report_FINAL.pdf

Proffered papers: Research and workforce

SP08.1 Inspiring the next generation - what are the benefits to the researcher?

Borsha Sarker[1]; Kate Smith[1]; Amy Rebane[1]; Shauni Sanderson[2]; Richard Wakefield[2]
NIHR Leeds Biomedical Research Centre; [3]University of Leeds

In March 2020, the "Be Curious" public engagement event, was cancelled due to COVID19. Researchers were challenged to convert face-to-face stations with equally engaging online content. We chose REFLECTION for children to understand the concept and use of ultrasound. However, this subject can be dry, not only for small children! Reviewing online educational content for the age 6-12 category and available learning resources for physics in ultrasound, provided some home experiments, but not sufficient to engage children to "Be Curious" about Ultrasound. To captivate our audience online for 25-30min, we chose to explain the concept by researching ultrasound in bats, birds and cetaceans and drawing parallels with echolocation in the animal kingdom. We used the platform Zoom, scanning live, multiple objects that a child might recognise and engage with, such as sweets, fruit, plants, flowers, feathers, etc. embedded in jelly and a competition, judged live by Poll. Over 14 days, "Be Curious" hit roughly 150k impressions/views on Twitter of live events, podcasts and other interactive content. An estimated 130 research/academic staff were involved in creating content, collected on Padlet. Our Ultrasound Event was published on YouTube and shared for Medical Ultrasound Awareness Month #MUAM with BMUS. Post event analysis by online survey posed several thought provoking questions, five of which in particular will be explored in this poster. 1. Motivation for taking part? 2. Skills gained/developed? 3. Value of public engagement activities? 4. Be Curious as a stepping stone? 5. Will your Be Curious activity, feature when writing funding bids?

SP08.2 Diagnostic and therapeutic radiography MSc dissertations -- a rich source of clinically relevant research and development

Mike Kirby[1]; Anthony Manning-Stanley[1]; Lauren Oliver[2]; Bridget Porritt[1]
[1]University of Liverpool; [2]Clatterbridge Cancer Centre

The accomplishments of small-scale dissertation research projects are often underestimated. Here we present two recent projects; highlighting their clinical content and worth to inform/encourage radiographers in future studies and

careers. Anthony examined preferences and perceptions of final-year UG diagnostic radiographers regarding advanced practice. Novel findings showed Reporting as the preferred specialist modality with more ambitious anticipated timescales than published research. Lauren designed, developed and implemented a novel, blended e-Learning package for therapeutic radiographers on late effects of pelvic radiotherapy. Pre/post intervention research showed statistically significant increases in staff knowledge and awareness; qualitatively highlighting greater confidence and recognition of professional responsibilities. Both studies have not 'lied idle'. Anthony's was presented at an International Conference in the UK. Three papers are in preparation; outlining qualitative and quantitative analyses of responses and a separate paper examining mathematical stress-testing of the statistical results for such cohort sizes. The work is helping inform curriculum development for future student diagnostic radiographers. Lauren's eLearning tool is now used in clinic, enabling change in staff perceptions and quality of care for patients' late effects following pelvic radiotherapy. Publications will highlight the qualitative and quantitative analyses and a separate paper will demonstrate the eLearning pedagogic background, design and value for other disciplines. The local Cancer Alliance are now using the package as is a newly-established 'Late Effects Clinic' for nurses and other healthcare professionals. These two small-scale MSc dissertation projects demonstrate achievements of both clinical and academic worth and should provide encouragement for future diagnostic and therapeutic.

SP08.3 Research in Radiography

Dorothy Keane[1]; Tracy O'Regan[1]; Lyndsey Callion[2]
1The Society and College of Radiographers; 2Health Education England

Background: To introduce new Health Education England/College of Radiographers e-learning on Research in Radiography. This content is free for NHS, Higher Education and those working with NHS patients.
Purpose: To support anyone interested in embedding research into their role and/or embarking on a clinical academic career. Aimed at all staff who work in clinical imaging and radiotherapy departments (radiographers, assistant practitioners, nuclear medicine technicians, sonographers etc).
Summary of content: A complementary interactive version of the College of Radiographer's Getting into Research: A SCoR guide for members https://www.sor.org/sites/default/files/document-versions/getting_into_research-_a_guide_for_members_of_the_society_of_radiographers.pdf. An overview of the following: an introduction to research, roles in research, the research cycle, clinical trials, patient and public involvement, funding and grants, legal and compliance aspects of research and case studies opportunity to ask questions.

SP08.4 Workforce retention: Why do radiographers leave the NHS and how can they be incentivised to stay?

Julie Nightingale[1]; Rob Appleyard[1]; Trudy Sevens[1]; Stella Campbell[2]; Maria Burton[1]
[1]Sheffield Hallam University; [2]Yeovil District Hospital NHS Foundation Trust

Background: Many radiology and radiotherapy departments are experiencing increasing demand for their services alongside a backdrop of persistently high radiographer and radiologist vacancy rates. Improving retention is a vital component in balancing workforce supply and demand and is gaining importance with policy makers and providers. This study investigates the current leaver profile to explore why radiographers leave the NHS, and what incentives are important in their decision to remain.
Method: Semi-structured telephone interviews (n=44) were used to explore perspectives of radiography managers, radiographers who have left the NHS, and those considering leaving. Purposive sampling ensured representation across radiography disciplines, geographical and organisational diversity, and stages of career. Analysis followed a qualitative framework methodology.
Results: Three themes were consistent across all radiographer groups: 1) Challenging working patterns and the impact on employee health and wellbeing; 2) Lack of flexibility in working terms and conditions; 3) Lack of timely career progression and access to CPD, and the need to feel valued. Radiographers 'loved being a radiographer'; small concessions and changes to workplace culture might be their incentive to remain in radiography. Manager participants recognised the need for flexible working opportunities but this was challenging within current environments.
Conclusion: The three themes (working patterns, flexibility and career progression) were consistently articulated, although some influencing factors varied between radiographer professional groups. Failure to address these recurrent concerns will exacerbate the loss of highly trained staff from the NHS at a time when demand for services continues to rise.

SP08.5 Introduction to the new NIHR (National Institute for Health Research) imaging group and imaging research delivery workstream

Angela Darekar[1]; Louise Shalaby[2]; Stuart Taylor[3]

[1]University Hospital Southampton NHS Foundation Trust; [2]Manchester University NHS Foundation Trust; [3]University College London

Background: A new pan-NIHR Imaging Group has recently been launched. The group's aims are to develop an imaging community across the NIHR, contribute to scientific advances in imaging (including artificial intelligence), develop the imaging research workforce across all professional groups (radiologists, radiographers, medical physicists) and improve the delivery of imaging research across the NIHR infrastructure and NHS.

Purpose of poster: Imaging data is a precious resource that needs to be acquired (and analysed) efficiently and robustly, employing relevant expertise throughout the process (underpinned by appropriate funding), in order to answer clinical questions in a timely manner - thus providing confidence to our partners and patients that consistently high-quality imaging can be undertaken in the NHS to drive research forward. There is a need for this infrastructure to be more visible, connected and agile, and hence consistent and resilient, across the country. This poster will outline the stakeholders, aims and anticipated outcomes relating to the work of the imaging research delivery workstream - highlighting the multidisciplinary approach required to optimise this complex process. Establishing a model framework will help us achieve the wider aim of utilising imaging data, from every centre, to its fullest potential.

Summary of content: Content included in the poster will include an illustration of the complexity of delivering imaging research, an assessment of the current challenges across all modalities and types of research, the primary objectives of the workstream and some of the initial work being carried out to address these issues, including best practice recommendations.

SP08.6 Experiences from the first year of delivery; the degree apprenticeship in diagnostic radiography

Demelza Green; Christine Heales

University of Exeter

Background: Between 2017 and 2019 a Diagnostic Radiography Degree Apprenticeship Standard was developed by a national Trailblazer Group. This Standard was approved and published in April 2019 with the University of Exeter subsequently launching the first diagnostic radiography degree apprenticeship programme in March 2020.

The principle difference between the apprenticeship and traditional undergraduate routes is that apprentice learners are employees of a department with 80% of their time spent working and learning in the employing department. This necessitated a redesign of the conventional undergraduate programme structure with greater emphasis on the opportunities for learning within the workplace. As such, a blended learning approach with clearly defined 'academic' and 'workplace' modules has been used. Furthermore, there is a change in emphasis in some of the key pastoral, disciplinary and other governance aspects when comparing the degree apprenticeship with conventional undergraduate programmes.

Purpose of poster: The aim of this poster is to share initial experiences of the delivery of the degree apprenticeship in diagnostic radiography; so that prospective apprentices, employers and education providers may gain insight into the unique challenges as well as opportunities such a programme provides.

Summary of content: The experiences of the first year of delivery from the perspective of the apprentice, the employer and the education provider will be outlined together with the required changes in delivery method. Individual experiences together with reflection will identify areas of challenge that were encountered whilst also highlighting the benefits of this model of pre-registration education.\

Proffered papers: Patient experience

SP09.1 Establishing pregnancy for patients who are transgender or non-binary

Andrea Brammer

Manchester Foundation Trust

Background: An incident occurred where a male patient attended for a CT scan, which subsequently identified a pregnancy of approximately 15 weeks gestation. During admission to the Trust, the patient had not disclosed their transgender status. The incident was notified to the IRMER team at the CQC and an investigation was completed. Under the Gender Recognition Act 2004, it is a criminal offence to disclose a patient's previous gender without patient consent. This covers individuals who have made an application (for Gender Recognition Certificate GRC) to The Gender Recognition Panel as well as those whose application has had a successful outcome. The investigation

identified that there is no national guidance on the practical aspects for establishing pregnancy status for transgender or non-binary patients. This therefore provides some challenges for the radiology team when attempting to establish pregnancy status as required under the Ionising Radiation (Medical Exposures) Regulations 2017.
Purpose of poster: To share learning and experience for UKIO participants and throughout the radiographic community with a view to generating constructive discussion and guidance.
Summary of content: The poster will contain a confidential summary of the incident and investigation findings, the challenges identified and the changes that the individual Trust made in an attempt to ensure that transgender and non-binary patients are informed of the need to inform a member of staff if there is a possibility that they may be pregnant.

Gender Recognition Act 2004 c. 7. Available at: https://www.legislation.gov.uk/ukpga/2004/7/contents (Accessed: 29 October 2020).

SP09.2 LMP in a gender diverse world

Matthew Noonan; Kate Harrington; Benjamin Stuttard
Liverpool University Hospitals NHS Foundation Trust

Background: On 6th February 2018 IR(ME)R 2017 came into force. One notable change in the updated legislation was a change in the wording of the Employer's Procedures for making pregnancy enquiries to: "for making enquiries of individuals of childbearing potential to establish whether the individual is or may be pregnant or breastfeeding." The purpose of the wording change was to acknowledge and address the needs of a modern and gender diverse population, and in doing so ensuring that the safety of all individuals is maintained irrespective of how they choose to express their gender.
Purpose of the Poster: Our poster shall outline the stages and processes undertaken at our trust in the development and roll out of a SIGE type LMP form. These involved:

- Engagement with several Transgender/ LGBT community based groups
- An initial pilot study to trial the new form to assess Patient and staff feedback and support co-design of the new procedure
- An equality impact assessment
- Development of an awareness poster for patient waiting areas
- Staff training and engagement plan
- Initiation of an audit cycle to monitor compliance and opportunities for improvement

Summary of content: This poster outlines the processes undertaken by the trust in the design of a new style of LMP form and procedure. The form itself shall be included and the rational behind the questions and content of the form shall be included. A copy of the SIGE awareness poster shall also be included.

1. Ionising Radiation (Medical Exposure) Regulations 2017 (SI 2017 No 1322), London, HMSO
2. The Royal College of Radiologists. IR(ME)R: Implications for clinical practice in diagnostic imaging, interventional radiology and diagnostic nuclear medicine. London: The Royal College of Radiologists, 2020
3. Sanders, V., and Pedersen, S. (2018). Improving communication with the gender diverse community in diagnostic imaging departments. Radiogr. 24 Suppl 1, S3 - S6. DOI: 10.1016/j.radi.2018.04.011.
4. The Health Protection Agency, The Royal College of Radiologists, The College of Radiographers. (2009). Protection of Pregnant Patients during Diagnostic Medical Exposures to Ionising Radiation Available at:https://www.sor.org/system/files/documentlibrary/ members/sor_RCE-9_for_web_v2_April_2009
5. Equality Act 2010. (Queen's Printer of Acts of Parliament) Available at: https://www.legislation.gov.uk/ukpga/2010/15/contents
6. Gender Recognition Act 2004. (Queen's Printer of Acts of Parliament) Available at: https://www.legislation.gov.uk/ukpga/2004/7/contents

SP09.3 Working towards Pride in Practice within Imaging

Louise Shalaby
Manchester University NHS Foundation Trust

Background: Pride in Practice is a quality assurance, social prescribing programme developed and delivered by LGBT Foundation. The programme was designed to support primary care services to strengthen their relationships with LGBT patients. Manchester University NHS Foundation Trust (MFT) and LGBT Foundation partnered with an aim to improve the experiences of LGBT people, by ensuring that MFT services can meet their health care needs. The Division of Imaging was one of the departments selected to be involved in a pilot of the programme at MFT.
Purpose: To provide training and accreditation to the department demonstrating a commitment to LGBT inclusivity and to refine the model to be deliverable in Acute services. Enhancing patient experience by improving staff confidence in communicating and understanding the health inequalities and barriers experienced by the LGBT community when accessing health care. Face to face training was delivered from the LGBT Foundation which provided a core group of staff with key information to understand the LGBT+ community, inclusive language and how to provide support and reassurance to patients.
Summary of content:

- To discuss the benefits of Pride in Practice
- The accreditation process:
- Face to face learning
- Evidence available from the departments
- An inclusive culture
- Knowing your LGBT community
- Responsive services and customer care
- Increased the understanding of the diversity of our patients
- The benefits of diversity
- Radiology were awarded a bronze award in the first round of accreditation and are now working directly with the LGBT.

SP09.4 "Knowing the answers gives you hope moving forward": parental views on micro-CT scanning following miscarriage

Ian Simcock[1]; Celine Lewis[2]; Susan Shelmerdine[1]; Neil Sebire[1]; Owen Arthurs[1]
[1]Great Ormond Street Hospital for Children NHS Trust; [2]Population, Policy and Practice, UCL Great Ormond Street Institute of Child Health

Background: Following a miscarriage or stillbirth many parents want to know why their baby died, but do not want an invasive post-mortem examination. Micro-CT is a new imaging technique that can take detailed 3D images of the internal organs to try to find out why the baby died but requires iodine preparation which can cause skin discoloration. Providing some answers as to the cause of the miscarriage can help parents come to terms with their loss and determine whether future pregnancies will be affected.
Purpose of poster: To state the practical and emotional benefits of non-invasive post-mortem micro-CT scanning, as determined by parents who have experienced a miscarriage. The need for a clinical service to be made more widely available was demonstrated.
Summary of content: Details of the topics discussed during the focus groups included benefits of micro-CT, acceptability of the technique, concerns from the group and other areas deemed important to the participants. The overarching theme was the positive impact that micro-CT could make as a diagnostic technique by involving no cutting of the baby, yet providing highly detailed medical images. These can then provide answers to bereaved parents including that there may be no obvious cause of death. All the participants would have chosen the technique had it been offered to them. Within these themes we identified several sub-themes which related to the potential emotional and practical benefits of micro-CT. These groups provided important feedback for this developing clinical service and ensures that our research meets parents' requirements.

SP09.5 The implementation of a pre treatment education seminar for radiotherapy prostate cancer patient

Jacqueline Ogg[1]; Megan Graham[2]
[1]NHS Grampian; [2]Maggie's Aberdeen

Background: Coaching prostate radiotherapy patients to successfully perform pre-treatment preparations and achieve the desired treatment conditions, in keeping with their appointment times and treatment unit scheduling, is an ongoing challenge for therapy radiographers and patients alike. Written information and instruction resources for reading at home are still proving inadequate and failure to achieve the desired treatment conditions can cause increased stress and anxiety for patients. There is also the implication of repeated imaging if the conditions are not acceptable to safely deliver treatment at first attempt.
Purpose of poster: This poster aims to demonstrate the benefits of interactive pre-habilitation sessions for this patient group to help them better understand what is required of them for treatment. It will also explain why the collaboration of NHS and third sector supportive expertise is a more advantageous way of communicating the information than the written resources.
Summary of content: The poster will outline the main challenges that patients and staff experience in the clinical setting, the current interventions being used to address these challenges, the structure and content of the pre-habilitation sessions and the initial outcomes of this new intervention. It will also highlight how collaborative working between NHS and Maggie's professionals working from both the medical and psychological models of healthcare can benefit the same service users and improve their experience of the radiotherapy pathway.

SP09.6 Single centre survey of patient satisfaction during radical radiotherapy for head and neck cancer

Lisa Hay[1]; Philip McLoone[2]; Claire Paterson[1]; Frances Campbell[1]; Aileen Duffton[1]; Sophie Willis[3]

[1]The Beatson West of Scotland Cancer Centre; [2]The University of Glasgow; [3]University of London

Background: Radical radiotherapy (RT) for head and neck cancer (HNC) is extremely challenging for patients. This survey aimed to measure patient's experience and satisfaction during RT.

Method: HNC patients undergoing RT were included. Two surveys were undertaken using questionnaires. The first contained 22 questions with space for free text (distributed December 2019-March 2020). This questionnaire was amended to include 6 additional COVID-19 related questions (distributed June-November 2020). The questionnaires were completed at week 1 and the final week of RT; distributed by the team reviewing or treating the patients. Completed questionnaires were anonymous. Stata v14 was used for analysis. Tests were 2-sided with a p-value <0.05 considered statistically significant.

Results: In total 182 surveys were returned. Distress of attending daily for treatment was associated with distress from wearing the immobilisation mask (Spearman correlation r=0.62, p<0.0001). Distress attending daily and mask distress showed a weak inverse association with overall satisfaction, r=-0.34 (p=0.001) and r=-0.28 (p=0.008), respectively. Patients reporting high levels of distress about attending for radiotherapy, reported higher levels of anxiety about COVID-19 (r=0.40, p=0.005). Written information was received by 95.6% of patients. On a scale of 0 to 10 the median rating of ease at which written information could be understood was 10 (IQR 8-10). Patients who easily understood the written information expressed greater overall satisfaction (r=0.62, p<0.0001). The median overall satisfaction score at the final week was 10 (IQR 9-10).

Conclusion: Despite the difficulties RT for HNC presents, the majority of patients expressed high satisfaction with their treatment experience.

Proffered papers: Chest

SP10.1 Augmenting lung cancer diagnosis on chest radiographs: positioning artificial intelligence to improve radiologist performance

Tom Dyer

Behold.ai

Introduction: Lung cancer is a leading cause of cancer deaths worldwide, with poor survival rates in many developed nations. Many patients rely on early diagnosis of their lung cancer via chest radiographs (CXRs). Studies show that the majority of missed lung cancers occur on CXRs and are visible in retrospect. This study evaluates the role that artificial intelligence (AI) could play in assisting radiologists as the first reader of CXRs, increasing the accuracy and efficiency of lung cancer diagnosis by flagging positive cases before passing the remaining examinations to standard reporting.

Methods: A dataset of 400 CXRs including 200 difficult lung cancer cases was curated. Exams were reviewed by three FRCR radiologists and an AI algorithm to establish performance in tumour identification. AI and radiologist labels were retrospectively combined to simulate the proposed AI-triage workflow.

Results: When used as a standalone algorithm, AI classification was equivalent to the average radiologist performance. The best overall performances were achieved when AI was combined with radiologists, with an average reduction of missed cancers of 60%. Combination with AI also standardised the performance of radiologists. The greatest improvements were observed when common sources of errors were present, such as distracting findings.

Discussion: In this study, we show that our proposed AI implementation pathway stands to reduce radiologist errors and improve clinician reporting performance. Furthermore, taking a radiologist-centric approach in the development of clinical-AI holds promise for catching systematically missed lung cancers. This represents a tremendous opportunity to improve patient outcomes for lung cancer diagnosis.

SP10.2 Improving the accuracy of COVID-19 Chest X-Ray interpretation through online training

Huw Walters; Anita Acharya; Sarim Ather; Jasdeep Bahra; Rachel Benamore; Fergus Gleeson; Julia-Ann Moreland; Alex Novak

Oxford University Hospitals

Objective: The COVID-19 pandemic has demonstrated the need for healthcare professionals to learn quickly and adapt their skills to new challenges. Identification of COVID-19 on chest radiography (CXR) has a key role in patient pathways and is a key skill for clinicians. Report and Imaging Quality Control (RAIQC) is an online platform designed to improve reporting of CXRs. In this multi-centre study, we evaluated the utility of this platform for improving the speed and accuracy of COVID-19 identification on CXR.

Methods: 118 clinicians (72 Junior doctors, 19 ED consultants, 5 radiology registrars, 15 ANPs, and 5 reporting radiographers) from five hospitals were recruited over a 6-month period and underwent online training, consisting of 60 anonymised CXRs over 3 modules. Pre, and post-training assessments of accuracy and speed of reporting were carried out.
Results: All recruits completed the initial assessment with 60 recruits completing all 3 training components. The latter cohort had a mean diagnostic accuracy of 57%, compared to 43% at baseline. Improvements were seen in all healthcare worker subgroups. Junior doctor and Consultant mean reporting time reduced by 27% and 40% respectively after training.
Conclusion: Online training can improve the accuracy and speed of frontline clinicians in identifying COVID-19 on chest radiographs.
Limitations: This study took place in a simulated learning environment, further study is needed to evaluate real-life accuracy of interpretation of COVID-19 Chest radiographs. There may be bias in the results due to the recruits who did not complete training.

SP10.3 Radiation doses by beam direction in interventional cardiology

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Nottingham University Hospitals NHS Trust

Background: Estimating patient and staff dose from X-ray guided procedures in interventional cardiology, and its subsequent optimisation, requires knowledge of the amount of radiation and where on the patient the radiation was delivered [2]. Therefore the amount of radiation at each beam direction and the patient entry point are key parameters for simulations of patient dose or staff exposure to scattered radiation.
Method: This study included all patients undergoing Chronic Total Occlusion (CTO) procedures at our Trust from 2018 to 2019. The data was obtained from the DICOM RDSR event data and was plotted by primary angle and secondary angle. Event dose data was clustered by beam angulation and the average dose per procedure per cluster was calculated according to event type and vessel treatment site [1].
Results: We produced a data set for the average input dose at each beam angulation. The majority of dose, regardless of angulation, is delivered via fluoroscopy. We also showed that the percentage of dose delivered at each angulation for fluoroscopy and acquisition is dependent on the vessel treatment site.
Conclusion: We produced data sets describing the average dose produced during CTO cases at all commonly used views, separated by image capture method (fluoroscopy/acquisition) and vessels treated. This data could be used as an input in models to predict the effect of scattering of radiation delivered at different views to staff and patients. Vessel specific data could be used to optimise room and staff protection.

1. Hartigan, J.A. and Wong, M.A., 1979. Algorithm AS 136: A k-means clustering algorithm. Journal of the royal statistical society. series c (applied statistics), 28(1), pp.100-108.
2. Mettler, F.A., Mahesh, M., Chatfield, M.B., Chambers, C.E., Elee, J.G., Frush, D.P. and Spelic, D.C., 2019. NCRP report no. 184: Medical radiation exposure of patients in the United States (184).

SP10.4 Diagnostic accuracy of automated CT pulmonary angiography analysis in suspected pulmonary hypertension

Pia Charters; William Brown; Jennifer Rossdale; Oliver Slegg; James Willis; Graham Robinson; Rob MacKenzie Ross; Jay Suntharalingam; Jonathan Rodrigues
Royal United Hospitals, Bath

Background: CT pulmonary angiography (CTPA) is often used in suspected pulmonary hypertension (PH) and right ventricular dilatation is a feature. The study purpose was (a) to determine the diagnostic accuracy of a fully-automated machine learning (ML) tool at detecting PH in patients with suspected PH referred to a specialist centre relative to invasive right heart catheterisation (RHC) and (b) to compare with contemporaneous trans-thoracic echo (TTE).
Method: 162 consecutive patients with suspected PH who underwent CTPA and TTE within 12 months of RHC were retrospectively identified (2017-2019). PH diagnosis was made using RHC gold standard. TTEs were graded low/intermediate/high likelihood of PH (British Society of Echocardiography). CTPAs were uploaded to IMBIO's fully-automated ML-derived RV/LV Analysis™ software for ventricular segmentation and calculation of RV/LV diameter ratio.
Results: RV/LV ≥1 was 86% sensitive and 40% specific for PH when scanned within 12 months of RHC, whilst 'high' likelihood TTE was 61% sensitive and 86% specific. In a subgroup analysis of 34 patients with intermediate TTE, 28 had PH at RHC. Applying RV/LV analysis to this cohort correctly identified 82% (23) who were eventually diagnosed with PH. Area under the receiver-operating-curve for RV/LV diameter for PH diagnosis was 0.723 (95th CI 0.609-0.836), p=0.001. RV/LV diameter ≥0.95 achieved 90% sensitivity and 30% specificity and RV/LV diameter≥1.33 achieved 90%

specificity and 39% sensitivity for PH.
Conclusion: In patients with suspected PH referred to a specialist centre, automated RV/LV thresholds may help rule-in and rule-out PH, with diagnostic utility when TTE is 'intermediate' for PH.

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

SP10.6 Faster respiratory diagnosis pathway for GP patients

Myriam Jackson; Christopher Mills
United Lincolnshire Hospitals NHS Trust

Background: The Trust goal of implementing the NOLCP1 and FDS282 has led to the design and implementation of the Faster Respiratory Diagnosis pathway (FReD) which was implemented in June 2019.
Purpose: The pathway objectives includes chest x-rays from GP referrals being reported within 24 hours of being undertaken. Any abnormality, i.e. malignancy (or interstitial lung disease) the patient is referred by radiology for the appropriate CT scan preferably on the chest x-ray day of attendance, or at least within 48 hours. Once the CT has been reported, it is triaged by chest physicians the next working day.
Summary: Results from June 2019 to end December 2020, show that 96% of GP chest x-rays (requested as part of the FReD pathway or upgraded to the pathway) were reported within 24 hours of being undertaken. (Total GP chest x-ray requests 32,000+.). In 2019, 53% of patients had their CT within desired timeframe, which increased to 63% in 2020 (delays were usually patient choice). The CT reports were available to the clinician within 48 hours for 74% of patients in 2019 increasing to 77% in 2020. The FReD pathway has reduced initial chest x-ray to results including CT being available to the chest consultant from 6-8 weeks' minimum to on average 5 days. Feedback from, patients, GPs and the chest physicians have been very positive. We hope to further reduce the time to initial CT and if required to CT guided biopsy. We are looking to model similar formats for other tumour sites.

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

Proffered papers: Clinical oncology – service

SP11.1 Radiotherapy Go Green and Drink Clean

Helen Barnes; Gillian Adair Smith
Royal Marsden NHS Foundation Trust

Background: Many patients receiving radiotherapy to the pelvis are required to drink a pre-defined volume of water each day to achieve a full bladder, often measured in cups. At our Trust, more than 60,000 plastic cups are used annually, by radiotherapy alone. These single use cups are environmentally unfriendly and an alternative solution to provide patients with a personalised reusable water bottle was explored. The project also aimed to improve compliance with bladder filling for radiotherapy, and so the impact on bladder volumes at the time of treatment was investigated.
Method: A grant application was made to the Trust's cancer charity to purchase custom designed water bottles, with 175 ml (1 cup) graduations on an 800 ml bottle. Bottles were given to patients at their pre-treatment appointment, with instructions on how to fill their bladder for treatment. Cup usage was calculated from orders, one-month pre and post implementation. Bladder volume at treatment, as a percentage of the CT planning volume, was recorded for the same time points and grouped into underfilled (≤50%), small (51-80%), optimal (81-120%), large (121-150%) and overfilled (≥151%).
Results: Cup usage halved from 12,000 cups to 6,000 cups. Percentage of bladder volumes in the optimal range increased from 47% to 54% and decreased in all other categories.
Conclusion: The introduction of water bottles increased bladder filling compliance and reduced plastic cup usage by half. The future will involve changing the remaining cups to a recyclable material to further reduce the environmental impact of radiotherapy preparation.

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

Verity Alden-Bennett[1]; Bev Ball[1]; Hannah Nightingale[2]; Pete Bridge[1]
[1]University of Liverpool; [2]Christie Hospital NHS Foundation Trust

Background: Radiation-induced nausea and vomiting (RINV) is a common side effect of single fraction palliative radiotherapy. Patients experiencing RINV have significantly reduced quality of life and a prescription of prophylactic antiemetics, principally 5-HT3 antagonists (Feyer 2011), is recommended. Treatments with a high emetogenic risk may also indicate concurrent dexamethasone. There is little clarity on which patients should receive medication and poor understanding of antiemetic guidance (Dennis 2012).
Method: A retrospective audit aimed to determine the extent to which patients at high and moderate emetogenic risk receiving single fraction radiotherapy were prescribed prophylactic antiemetic medication in line with the current evidence base.
Results: A total of 60 patients were included in the audit; of these patients, 50 were consented for the risk of nausea and/or vomiting. Prophylactic anti-emetics were only prescribed to 28 (46.7%) of all audited patients. Out of the 50 patients who provided informed consent, only 24 (48%) were prescribed an antiemetic prior to their treatment. Of the 32 patients who were not prescribed ondansetron, 10 were already on dexamethasone, 3 were inpatients and 1 patient was prescribed metoclopramide. An analysis of the 6-week post-treatment survival rate revealed that just over 20% (n=22) died before 6 weeks and may have not gained full benefit (Spencer 2018) from their radiotherapy.
Conclusion: Antiemetic prescribing for single fraction patients at moderate to high emetogenic risk at a large regional centre is under-utilised in relation to published evidence. Amended guidance and further audits are recommended to ensure this patient group is best supported.

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

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

Erin Anderson; Karen Pilling; Shahid Iqbal; Rachel L Brooks
Northern Centre for Cancer Care

Background: In response to advice from The National Institute for Health and Care Excellence (2) during covid-19, standard headrests (SHR) were introduced for head and neck radiotherapy. The SHR requires one mould room appointment compared to three appointments with customised head rests (CHR). Previous studies (1) found SHR to be equivalent to CHR at immobilising head and neck patients, particularly if several variations of the SHR exist. This study includes six variations of SHR.
Method: Two groups of ten patients treated between December 2019 and June 2020 were retrospectively analysed by one observer. Groups were stratified according to age, sex and tumour site. One group had CHR and the other had SHR. 547 cone beam computed tomography images (CBCT) were reviewed. A 6 Degree of Freedom match was performed then chin, shoulder and spine position was assessed using dosimetrist drawn structures. Structures out of the tolerance were recorded. A chi-squared test was used to compare the groups.
Results: The chin position count was 21 for CHR and 36 for SHR, p-value 0.046. The shoulder position count was 13 for CHR and 77 for SHR p-value 0.00. The spine position count was 3 for CHR and 21 for SHR, p-value 0.00. This means the headrests compared are not equivalent in terms of set up reproducibility.
Conclusion: Fewer hospital visits reduce patient exposure to COVID-19. However, CHR provides a more reliable level of immobilisation, the radiotherapy service will be reviewed in line with these findings.

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

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

Samantha Brass[1]; Robert Brass[1]; Catherine Holborn[2]
[1]Clatterbridge Cancer Centre; [2]Sheffield Hallam University

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

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

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

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

Amy Taylor[1]; Weston Park Hospital; Nicki Ingram[1]; Weston Park Cancer Centre; Chi Ka Chan[2]
[1]Sheffield Teaching Hospital NHS Trust; [2]Sheffield Hallam University

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

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

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The University of Manchester

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

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

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

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

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

MSK POSTER PRESENTATIONS

P001 Inter observer differences and perception of image interpretation, regarding peri-articular osteopenia of hand radiographs

Anthony O'Connor
University Hospital of North Midlands

Background: when reporting hand radiographs the use of the terminology peri-articular osteopenia can often lead to the patient being referred to rheumatology to ensure athropathy is not the cause of the osteopenia .This term can often be subjective also dependant on imaging equipment (different manufacturers) and algorithms used. Another variant is experience of the reporting author I.E Consultant radiologist, consultant radiographer, or advanced practitioner with various years of experience.
Aims: to see whether there is correlation of the diagnosis of peri-articular osteopenia, due to different manufacturing equipment or level of experience of the reporting author. Also does digital radiography give the appearance of peri-articular osteopenia due to manufacturing equipment and algorithms used.
Method: a retrospective audit of hand x-ray's blind reviewed by 4 reporting authors of various experience and different imaging manufacturers. This is to see whether the correct diagnosis of peri-articular osteopenia is due to reporter experience or the equipment it is obtained from.
Conclusion: the evidence is currently being collated however this could help improve accuracy of reports and subsequently reduced the amount of referrals that are unnecessary to the rheumatology clinic.

Gossec L, Dougados M, Goupille P, Cantagrel A, Sibilia J, Meyer O, Sany J, Daurès JP, Combe B. Gossec L, Dougados M, Goupille P, Cantagrel A, Sibilia J, Meyer O, Sany J, Daurès JP, Combe B. . (2004). Prognostic factors for remission in early rheumatoid arthritis: a multiparameter prospective study. . Ann Rheum Dis. . 63 (1), 675-680. Alenfeld FE, Diessel E, Brezger M, Sieper J, Felsenberg D, Braun J.. (2000). Detailed analyses of periarticular osteoporosis in rheumatoid arthritis. . Osteoporos International. 11 (1), 400-407. Böttcher J, Pfeil A. (2008). Diagnosis of periarticular osteoporosis in rheumatoid arthritis using digital X-ray radiogrammetry.. Arthritis research and therapy. 10 (103), 103.

P002 Intra- and Inter-operator precision errors in paraspinal muscle manual segmentation from MRI

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[1]University of Exeter; [2]National University of Singapore; [3]University of Aukland; [4]Massey University; [5]Singapore Institute for Food and Biotechnology Innovation, Agency for Science, Technology and Research; [6]Bournemouth University

Background: Paraspinal muscles provide stability for the spine, assist in trunk movement and maintain posture and bilateral asymmetry is reported to be a potential indicator of localised spinal pathology and lower back pain (LBP) (Fortin, 2013). While visualisation of paraspinal muscle size can be used as a general estimate of asymmetry, measurement of the cross-sectional area provides the potential to detect smaller changes and measure changes over time. The purpose of this study was to explore the intra- and inter-operator precision errors in segmenting paraspinal muscles from MRI scans.
Methods: 30 Chinese-Singaporean women, mean age 59.7y ±3.9, mean body mass index 22.3kg/m2 ±2.4 were recruited and scanned with appropriate consent and approvals. Images at L3 were used to manually segment the psoas, erector spinae and multifidus muscles using ImageJ (NIH). Three operators undertook 30 repeated measurements on separate days. Intra-class correlations (ICCs) were calculated using SPSS V26.0 (IBM, IL).
Results: ICCs (95%CI) ranged from 0.76 (0.42 to 0.89) to 0.99 (0.98 to 1.0) for intra-operator precision errors and 0.25 (0.03 to 0.51) to 0.79 (0.67 to 0.86) for inter-operator precision errors, with the largest errors seen in the multifidus.
Conclusion: Inter-operator precision errors were greater than the intra-operator errors. The greatest precision errors were seen in the multifidus, which is the smallest of the muscles and it can be difficult to differentiate from the erector spinae in some patients. Operator training and benchmarking is essential to reduce precision errors in paraspinal segmentation for measurements to be widely implemented in practice.

Fortin M., et al. (2013) Factors Associated With Paraspinal Muscle Asymmetry in Size and Composition in a General Population Sample of Men. Physical Therapy, 93, 1540-1550.

P003 Acetabular retroversion and pelvis radiographs

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Dartford & Gravesham NHS Trust

Acetabular retroversion (AR) may contribute to pincer femoroacetabular impingement in patients with hip pain and lead to osteoarthritis of the hip. AR consists of a malorientation of the acetabulum in the sagittal plane. The delay or

the non-diagnosis of AR could have an impact in the overall management of femoroacetabular impingement (FAI). The clinical outcomes are dependent on the correct characterization of lesions. The signs for acetabular retroversion are the crossover sign, the posterior wall sign, and the ischial spine sign. Assessment of acetabular version on anteroposterior pelvic views has gained increasing attention. The identification of radiographic changes in the acetabular orientation (or version) should be included in the standard assessment of hip pain in the young adult with or without risk factors. Assessing acetabular version on plain radiographs is subject to intra and inter-individual error. the sign may overestimate the incidence of acetabular retroversion. A crossover sign is frequently present on well-positioned AP pelvis radiographs in the absence of acetabular retroversion. Femoroacetabular impingement (FAI) is a widely accepted abnormality of the hip, but its relevance remains controversial. This poster demonstrates the signs and discusses their reliability on pelvis radiographs.

1. Direito-Santos B, França G, Nunes J, et al. (2018) Acetabular retroversion: Diagnosis and treatment. EFORT Open Rev. 3(11):595-603. 2. Kappe et al. (2011) Reliability of radiographic signs for acetabular retroversion. International orthopaedics 35(6)817-21. 3. Zaltz I, Kelly BT, Hetsroni I, Bedi A. (2013) The crossover sign overestimates acetabular retroversion. Clin Orthop Relat Res. 471(8):2463-2470.

P004 A pictorial review of non-scaphoid fractures detected on cone beam computed tomography for assessment of suspected scaphoid fractures

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The Mid Yorkshire Hospitals NHS Trust

Background: Wrist injuries are common presentations to the emergency department. Studies (Borel, 2017; Neubauer, 2018) have shown that cone beam computed tomography (CBCT), a low radiation dose technique, is superior to conventional radiography in detecting scaphoid and non-scaphoid fractures. It provides early detection and confirmation of any presence or absence of acute fractures and helps avoid unnecessary cast immobilisation and multiple attendances to the hospital.

Purpose of poster: The aim of this pictorial review is to share our experience in different types of non-scaphoid fracture imaging findings detected with the use of wrist CBCT for suspected scaphoid fractures. In our institution, patients presenting to the emergency department with normal radiographs but high clinical suspicion of a scaphoid injury went on to have CBCT of the wrist during the same attendance. The CBCT imaging was reported within the same day by a MSK radiologist to facilitate forward management. Besides detecting and excluding scaphoid fractures, a number of non-scaphoid fractures were also incidentally identified, which were all radiographically occult on conventional radiographs. Examples of these non-scaphoid fractures include fracture of the radius, ulna, capitate, trapezium and hamate. The use of CBCT allowed prompt diagnosis of these non-scaphoid fractures which can have important implications on patients' management.

Summary of content: This pictorial review outlines some of the identified cases of non-scaphoid fractures in suspected scaphoid fracture wrist CBCT imaging and their subsequent clinical course and management.

1. Borel, C., Larbi, A., Delclaux, S., Lapegue, F., Chiavassa-Gandois, H., Sans, N. and Faruch-Bilfeld, M. (2017) Diagnostic value of cone beam computed tomography (CBCT) in occult scaphoid and wrist fractures. European Journal of Radiology, 97, 59-64.
2. Neubauer, J., Benndorf, M., Ehritt-Braun, C., Reising, K., Yilmaz, T., Klein, C., Zajonc, H., Kotter, E., Langer, M. and Goerke, S. M. (2018) Comparison of the diagnostic accuracy of cone beam computed tomography and radiography for scaphoid fractures. Scientific Reports, 8, 3906.

P005 A retrospective study of the diagnostic yield of ultasound for active synovitis in suspected inflammatory arthritis

Kevin Pinto; Mohammad Naqvi; Sameer Shamshuddin; Proctor Robin
University Hospitals of Morecambe Bay

Background: There is a rising demand for ultrasound scanning of hands & feet in the diagnosis of suspected inflammatory arthritis, including requests where subclinical synovitis is suspected, but no current standard for the diagnostic yield of such studies. The distribution of affected joints varies amongst subtypes of inflammatory arthritis. We aimed to identify the positive diagnostic rate of US hands & feet for active synovitis; in particular, requests for "subclinical synovitis?". We also aimed to identify the distribution of joints involved to propose a more efficient ultrasound examination. A 7 joint examination has been proposed by Backhaus et al. 2009, and we wanted to retrospectively validate this system.

Methods: Retrospective review of all ultrasound examinations of both hands or both feet referred from the Rheumatology service in 2013 and 2019 at a University Teaching Hospital. Requests were divided into those for subclinical synovitis, diagnostic scans or treatment monitoring. Reports were screened for positivity (active synovitis defined as synovial thickening with Doppler signal). The joints affected by active synovitis were also recorded.

Results: 270 requests were identified (50 from 2013 and 220 from 2019). In total 37 (14%) scans were positive for active synovitis. Of 42 requests which stated "subclinical synovitis?", 8 (19%) were positive. Of 37 scans positive for active synovitis, the most common joints involved (frequency ≥5) were the right radiocarpal, right DRUJ, bilateral 1st

to 3rd MCP joints, right index PIP joint and right little finger DIP joint. In only 2 cases was there active synovitis isolated to the DIP joints, without any other proximal joint involvement.
Conclusion: Ultrasound scanning for subclinical synovitis is warranted and has a diagnostic yield for active synovitis is similar to the baseline rate. A limited ultrasound examination could include the radiocarpal, radioulnar, 1st-- 3rd MCP joints, index/middle PIP joint and any other symptomatic joints.

Backhaus, M., Ohrndorf, S., Kellner, H., Strunk, J., Backhaus, T. M., Hartung, W., ... & SÃ¶rensen, H. (2009). Evaluation of a novel 7-joint ultrasound score in daily rheumatologic practice: a pilot project. Arthritis Care & Research: Official Journal of the American College of Rheumatology, 61(9), 1194-1201. Wilkinson, A., Reed, M., & Else, S. (2019). AB1188 AUDIT: IMPACT OF MUSCULOSKELETAL ULTRASOUND USE IN RHEUMATOLOGY CLINICS.

P006 Radiology reporting of osteoporotic vertebral fragility fractures on computed tomography studies: Lessons from local practice

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Musgrove Park Hospital

Background: Vertebral fragility fractures (VFFs) are the most common type of osteoporotic fracture and a powerful predictor of future hip fracture (increased relative risk =2.8)[1]. Radiological identification of VFFs with subsequent referral to local Fracture Liaison Service (FLS) is an opportunity to medically intervene before further fracture.
Audit standards were developed by consensus between The Royal College of Radiologists, Royal College of Physicians, and Royal Osteoporosis Society[2]. 50 consecutive non-traumatic CTs including the thoracolumbar spine in patients ≥70 years old were reviewed.
Purpose: To evaluate local reporting in the diagnosis of VFFs on CT and compare with national practice. To raise local awareness of osteoporotic fractures, improve the quality of radiology reports and communication with referring clinicians.
Summary: 14% (7/50) CTs demonstrated incidental VFFs and 86% were not reported. There was a lack of compliance with all audit standards: although 92% of reports commented on the vertebrae (target 100%), this compared favourably with pooled national results (79%). 0% described fracture severity (target 100%), 14% used the recommended terminology 'vertebral fracture' (target 100%), and 0% recommended appropriate onward referral (target 100%). National performance was 26.2%, 60.1% and 2.6% respectively.
Following local presentation and discussion of results, standard reporting terminology was agreed. An electronic report notification system has been imbedded into the local Radiology Information System. Referrals to FLS have already increased (125 in 4/12 vs. 86 total 2018). This audit has provided impetus to improve the diagnosis and care for patients with osteoporotic VFFs and we will re-audit at 12 months.

1. Adams J, Clark E, Clunie G et al (2017) Clinical guidance for the effective identification of vertebral fractures. National Osteoporosis Society, London 2. Howlett, D., Drinkwater, K., Mahmood, N., Illes, J., Griffin, J. and Javaid, K., 2020. Radiology reporting of osteoporotic vertebral fragility fractures on computed tomography studies: results of a UK national audit. European Radiology, 30(9), pp.4713-4723.

P007 Standing straight: Evaluation of erect knee radiographic positioning

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[1]Mid Yorkshire Hospitals NHS Trust; [2]University of Bradford

Background: Radiographic assessment of the knee is widely used, particularly in the assessment of osteoarthritis.[1] Currently radiographs are routinely undertaken in the erect position however there is no imaging technique protocol within the literature, with supine position advocating central position of the patella.[2,3] It is unclear whether this translates to erect positioning.
Method: An audit of quality was conducted with retrospective and prospective phases. Criteria including patient demographics and presenting complain, patella position, tibiofemoral axis and fibula head position were evaluated. Following the conclusion and analysis of the retrospective phase, a novel imaging procedure was designed, informed by the literature review, and subsequently the prospective phase was completed.
Results: Only patients with a native knee were included in the study. No significant demographic differences were identified in either the retrospective (n=152) or prospective (n=30) phase (mean age: 62 vs 58years; p=0.136, female 59.9% vs 60.0%; p=0.960).
Knee quality in the retrospective cohort was poor with inconsistent centring points and only 38.8% adequately demonstrating the tibiofemoral joint, a centralised patella was not correlated with optimal positioning. The prospective cohort focused on the tibiofemoral axis as a positioning tool and a significant improvement in quality was observed (86.7%; p<0.05).
Conclusion: Adequate positioning should be ascertained by the alignment between the tibia and femur (tibiofemoral axis). Further research and development of internationally recognised standard position is required.

1. Felson, D., McAlindon, T., Anderson, J., Weissman, B., Aliabadi, P., Evans, S., Levy, D. and LaValley, M., 1997. Defining radiographic osteoarthritis for the whole knee. Osteoarthritis and Cartilage, 5(4), pp.241-250.

2. A Stewart Whitley and Al, E. (2016). Clarks positioning in radiography. Boca Raton, Fla.: Crc Press.
3. Bull, S. (2006). Skeletal radiography: a concise introduction to projection radiography. Stanley: Toolkit Publications.

P010 Has the introduction of an Advanced Practitioner led service had an impact on radiation dose for fluoroscopy guided lumbar punctures?

Phil Crosthwaite
The Walton Centre

Background: Historically, radiological tasks requiring fluoroscopy such as myelography, barium studies and fluoroscopy guided lumbar punctures (LP) have been performed by radiologists with the assistance of radiographers. As the National Health Service (NHS) evolves, more responsibilities are being inherited by specifically trained radiographers to relieve workload due to a national shortage of radiologists. One step taken by the trust was to train an Advanced Practitioner (AP) in fluoroscopy to perform fluoroscopy guided LPs.
Purpose of poster: This poster presents the retrospective service evaluation undertaken to evaluate and compare examinations performed by radiologists and an AP in terms of dose area product (DAP) and fluoroscopy screening time.
Summary of content: A total of 300 X-ray guided LPs doses were reviewed. 150 LPs performed by radiologists and 150 LPs performed by the AP. Each groups mean was calculated and comparisons made between the DAP and fluoroscopy time made to determine whether there was a significant difference between the two operator groups. The service evaluation revealed that AP-performed LPs had a significantly lower DAP and fluoroscopy time (a mean of 4.21Gycm2 and 0.74min) compared to the radiologist-performed LPs (a mean of 5.72Gycm2 and 0.94min). The review demonstrates that patient care, in terms of radiation dose, is not affected by the introduction of an advanced practitioner. It also highlights the effectiveness of APs in an evolving radiology department.

1. The Ionising Radiation (Medical Exposure) Regulations (2017) (SI 2017/1322).
2. Johnston, G., Crombie, I.K., Alder, E.M., Davies, H.T.O. and Millard, A., (2000). Reviewing audit: barriers and facilitating factors for effective clinical audit. BMJ Quality & Safety, 9(1), 23-36

P011 GP referrals for lumbar spine radiographs

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Dartford & Gravesham NHS Trust

A Trust GIRFT review highlighted that an unusually high number of lumbar spine examinations were performed from a GP referral source when compared to other local and national NHS Trusts. To get a better understanding of the data a retrospective audit was performed to ascertain whether the examinations were justified when compared to RCR and NICE guidelines. The 2016 NICE guidelines for the management of lower back pain in adults state x-ray imaging for low back pain should not be routinely offered without specialist opinion or suspicion of serious underlying pathology. A high referral rate has an impact on department resources as well as the ionising radiation risks if there is little diagnostic yield. This poster will demonstrate the learning from the audit and the subsequent actions.

1. National Institute for Health and care excellence. (2016) Low back pain and sciatica in over 16s: assessment and management.

P012 Non-musculoskeletal findings on musculoskeletal lumbar spine and pelvic MRI; where, what and what to do

Alex Clark[1]; Marcus Brumpton[2]
[1]UHNM; [2]Keele School of Medicine

Background: Non-musculoskeletal incidental findings on musculoskeletal MRI of the lumbar spine and pelvis are common. Some incidental findings can be reported but dismissed as insignificant. Other findings are significant and require follow up or treatment. However, incidental findings are sometimes not seen or when seen their nature and significance may be misinterpreted. This can result in a missed opportunity to deal with significant pathology early or costly over investigation of insignificant pathologies with associated increased patient anxiety. Systematic assessment of the non-musculoskeletal areas on musculoskeletal lumbar spine and pelvic MRI reduces missed diagnoses. Accurate interpretation of these findings should lead to appropriate further evaluation and management.
Purpose of poster: To demonstrate non-musculoskeletal pathology seen on MRI performed to investigate the lumbar spine and pelvic musculoskeletal structures. This will highlight organs that should be inspected for pathology and demonstrates a variety of pathologies describing how they appear on MRI. The significance of each finding will be explained with suggestions for appropriate onward management.
Summary of content: The poster will demonstrate a variety of abnormalities related to the renal, genital and gastrointestinal tracts seen on musculoskeletal MRI. As well as demonstrating and describing the imaging features of

each pathology suggestions will be made about whether further investigation is required, what this should be and if referral to a non-musculoskeletal specialist is required.

P013 Transitional vertebra on MRI of the lumbar spine

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University Hospitals Leicester

Background: Transitional vertebrae are congenital spinal anomalies where a vertebra has indeterminate vertebral characteristics from an adjacent vertebral segment. They can occur at any of the spinal transitional levels but are most common at the lumbosacral junction. The reporting and correct description of these is vital as they can be symptomatic, but more importantly, particularly at the lumbosacral junction, can lead to confusion when describing findings and thus lead to the incorrect level being operated on at surgery. Learning outcomes and application to practice: The purpose of the poster is to describe the different descriptors used for this entity in the lumbosacral spine of patients having a MRI scan of their lumbar spine at one large teaching NHS teaching hospital. We will demonstrate the percentage of patients reported as having lumbosacral transitional vertebrae (LSTV) compared with published literature and compare our descriptors with any national recommendations.
Summary of content: A description of the prevalence of LSTVs in one cohort of patients with the reasons why accurate description is relevant and important in the clinical setting, with a pictorial review of several case studies.

Jancuska, Jeffrey M et al., (2015) 'A Review of Symptomatic Lumbosacral Transitional Vertebrae: Bertolotti's Syndrome', International journal of spine surgery, 9(42). doi:10.14444/2042 Konin, G.P., Walz, D.M., (2010) 'Lumbosacral transitional vertebra: Classification, Imaging Findings and clinical relevance', American Journal of Neuroradiology, 31(10), 1778-1786; DOI: https://doi.org/10.3174/ajnr.A2036 Shaikh, Asra et al. , (2017) 'Prevalence of Lumbosacral Transitional Vertebra in Individuals with Low Back Pain: Evaluation Using Plain Radiography and Magnetic Resonance Imaging', Asian spine journal, 11(6), 892-897. doi:10.4184/asj.2017.11.6.892

P014 Audit assessing the appropriateness of lumbar spine radiography requests in low back pain

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Royal Free London NHS Foundation Trust

Background: NICE and Royal College of Radiology (RCR) guidelines propose a limited diagnostic role of routine lumbar radiography for low back pain in the absence of specific risk factors e.g. trauma, infection, inflammation or suspected malignancy. (1)(2) This definition does not apply to mechanical back pain with radicular symptoms. Furthermore, iREFER guidelines support the use of lumbar radiography in suspected osteoporotic vertebral collapse in the elderly. Our aim was the evaluate the appropriateness of lumbar spine radiography requests in our emergency department with reference to mentioned guidelines.
Methods: We evaluated the lumbar spine radiograph requests for studies performed between 1st January and 1st September 2020 in the emergency department with reference to the guidelines followed by a re-audit between 1st October and 1st December 2020.
Results: A total of 69 lumbar spine radiographs were performed during this period with a modal age range being 80-89 years. 40/69 (58%) of lumbar radiographs were deemed to have an appropriate clinical indication, however 29/69 (42%) of lumbar radiographs had an indication of mechanical back pain with radicular symptoms in the absence of risk factors. 0% of the radiographs performed for the latter indication were reported positive for an acute pathology. A re-audit of this data following presentation of findings to the emergency department demonstrated a significant increase in proportion of radiographs performed with an appropriate indication (85/103 - 82%).
Conclusion: Our audit demonstrates a significant increase in proportion of lumbar radiographs with an appropriate indication, thereby reducing unnecessary radiation to patients.

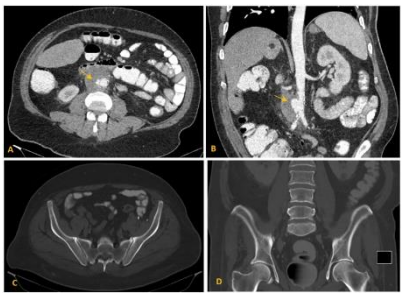
1. Low back pain and sciatica in over 16s: assessment and management. NICE guideline [NG59] Published date: November 2016. https://www.nice.org.uk/guidance/ng59
2. Royal College of Radiologists. iRefer: Making the best use of clinical radiology. RCR iRefer Guidelines v. 8. 2017. https://www.irefer.org.uk/

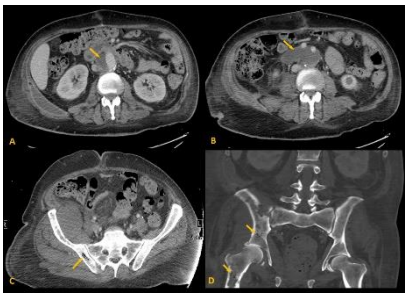
P015 Hip bone osteonecrosis with intraosseous pneumatosis after abdominal aortic aneurysm repair: a case of emphysematous osteomyelitis

Amjad Chamsi Basha[1]; Mohamed Khalifa[2]; Fahad Albadr[3]; Jamal Kaid[4]; Hussein Alsakkaf[4]
[1]University Hospitals Birmingham NHS Foundation Trust; [2]Sulaiman AlRajhi Univesity, College of Medicine; [3]Department of Radiology, College of Medicine, King Saud University; [4]King Saud University Medical City, Department of Radiology

Background: Intraosseous pneumatosis is a rare and often fatal condition characterised by air accumulation in the bone that may be brought about by infection, trauma (surgical or otherwise), degenerative disease or neoplastic processes. Here, we present a case of pelvic emphysematous osteomyelitis following repair of an infected abdominal aortic aneurysm.

Case summary: A 56-year- old Saudi male, known to have diabetes and hypertension, presented to the emergency department complaining of intermittent abdominal pain over the right lower quadrant. The patient was later diagnosed intraoperatively with an infected abdominal aortic aneurysm and treated appropriately. During multiple follow-up imaging studies, the patient was noted to have multiple intra-abdominal fluid collections, as well as intraosseous pneumatosis in the pelvis and right femur. 3 months later, intervention was again required due to patient deterioration and possible aortic graft leakage. Graft abscess was diagnosed and managed.
Conclusion: This case report sheds light on intraosseous pneumatosis and emphysematous osteomyelitis, which is characterised by the former, in addition to signs of an underlying infection or abscess formation.
Learning points: 1. Intra-osseous pneumatosis occurs mainly in the vertebra, pelvis, and femur.
2. A cause for intra-osseous gas must be investigated as the disease can be fatal, regardless of the location.





3. Emphysematous osteomyelitis should always be suspected in cases of intra-osseous gas or osteomyelitis caused by gas-forming organisms. The "pumice stone sign" is considered a pathognomonic sign of EO.[1]
Summary of content: 1. Background information about IO, followed by chronological imaging with legend attached, and learning points.

1. Small JE, Chea P, Shah N, Small KM. Diagnostic Features of Emphysematous Osteomyelitis. Curr Probl Diagn Radiol [Internet]. 2018 Jun 1 [cited 2019 Aug 24]; Available from: http://www.sciencedirect.com/science/article/pii/S0363018818301191

UROradiolgy POSTER PRESENTATIONS

P016 Radium 223 treatment in castration resistant prostate cancer

Harun Jalil; Ali Shah; Ba Anh Tai Din
Nottingham University Hospitals

Indolent progression in the majority of cases, many patients present with or will go on to develop metastatic disease. As a result, prostate cancer accounts for 14% of all cancer deaths in males and is the second most common cause of death from cancer in the UK in males (Cancer Research UK, 2020). Of those with metastatic prostate cancer, it is estimated that 80-90% will have bony metastases which can result in severe pain, fractures, spinal cord compression and a decreased quality of life (Autio and Morris, 2013). Of the current bone-targeted therapies for castrate resistant prostate cancer (mCRPC), Radium 223 has shown the most promise in that it is the only therapy of its type which shows evidence of both anti-tumour action and improved overall survival with a limited side-effect profile as evidenced by the landmark ALSYMPCA phase 3 trial (Parker et al., 2013). Currently, regulatory approval has hampered its application, however, it is likely that Radium 223 therapy will form a key aspect of prostate cancer management in the future. This educational piece will aim to elucidate the mechanism of action, indications, side-effects, efficacy and future direction of Radium 223 therapy in mCRPC.

1. Autio, K. A. and Morris, M. J. (2013) 'Targeting bone physiology for the treatment of metastatic prostate cancer.', Clinical advances in hematology & oncology : H&O. NIH Public Access, 11(3), pp. 134–43. Available at: http://www.ncbi.nlm.nih.gov/pubmed/23598981 (Accessed: 27 August 2020). 2. Cancer Research UK (2020) Prostate cancer survival statistics | Cancer Research UK, Cancer Research UK. Available at: https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/prostate-cancer/survival (Accessed: 27 August 2020). 3. Parker, C. et al. (2013) 'Alpha Emitter Radium-223 and Survival in Metastatic Prostate Cancer', New England Journal of Medicine. Massachusetts Medical Society, 369(3), pp. 213–223. doi: 10.1056/NEJMoa1213755.

P017 Enzalutamide for prostate cancer patients during the COVID-19 Pandemic: A Single Centre Experience

Ming-Te Lee[1]; Mohammed Abdi[1]; Sangeetha Perumal[1]; Iqtedar Muazzam[2]
[1]Diana Princess of Wales Hospital; [2]Hull University Teaching Hospital NHS Trust

Introduction: NICE approved the use of Enzalutamide with androgen deprivation for patients with newly diagnosed metastatic disease to reduce chemotherapy-related toxicity and hospital-admission and exposure to COVID-19. We evaluated the efficacy of Enzalutamide and its side effect profile in a cohort of prostate cancer patients.
Methods: Retrospective case note review was conducted. Data collected include: age, pre-treatment cancer disease burden, pre-treatment PSA level, date of commencement of treatment, PSA nadir value post treatment, time from commencement of treatment to obtainment of PSA nadir, side effect profile as reported by patients and COVID-19

status of the patients during their treatment.
Results: Cohort size = 25. Mean age = 77. 60% showed high disease volume burden, 40% low. Mean pre-treatment PSA value = 516.77. Patient were treated between the months of May and September. Mean nadir PSA value = 76.24. Mean percentage reduction in PSA = 85.25%. 76% (19/25) of the patients had >90% reduction in their PSA. 2 (8%) patients had uptrending PSA despite treatment. Average time taken from commencement on Enzalutamide to PSA nadir = 152.16 days. 92% of the patients (23/25) had downtrend in their PSA. 56% (14/25) of the patient reported side-effects including fatigue, hot flushes, memory loss, loss of concentration, skin rashes, loss of libido, constipation. None were COVID-19 positive.
Conclusion: Enzalutamide could be a viable alternative to prostate cancer patients at higher risk from chemotherapy/exposure to COVID-19 during the ongoing COVID-19 pandemic. Side effects are not uncommon in Enzalutamide usage and warrant further study.

National Institute for Health and Care Excellence. (2014) Enzalutamide for metastatic hormone-relapsed prostate cancer previously treated with a docetaxel-containing regimen. Technology appraisal guidance 316. National Institute for Health and Care Excellence. (2016) Enzalutamide for treating metastatic hormone-relapsed prostate cancer before chemotherapy is indicated. Technology appraisal guidance 377. National Institute for Health and Care Excellence. (2020) Interim treatment change options during the COVID-19 pandemic, endorsed by NHS England. NG161.

P018 Exploring the feasibility and value of a drinking-guide to support patients with their preparation protocol for radical prostate radiotherapy

Jade Clayton[1]; Amy Taylor[1]; Jo McNamara[2]
[1]Sheffield Teaching Hospitals NHS Trust; [2]Sheffield Hallam University

Patients undergoing prostate radiotherapy are required to adhere to local bladder and rectal protocols. Adapting their preparation to meet varying daily treatment times can be challenging and many patients struggle with the protocol. This can be frustrating for the patient and impacts on the quality of their experience. Whilst clinically, any non-adherence to protocol can lead to an increase of imaging frequency, appointment length and strain on clinical scheduling. The concept of a drinking-guide emerged through clinical discussions, perceived as a possible way to support patients to follow protocol. A service evaluation project was undertaken to independently explore Therapeutic Radiographers (TRs) and patient perceptions of the concept of a drinking-guide and address feasibility issues which could influence clinical implementation. Local service evaluation approval was obtained.
TRs were invited via email to participate whilst patient recruitment was through the local prostate support group. The sessions were semi-structured using a guide, audio-recorded, transcribed in-verbatim and thematic analysis was undertaken. Eight TRs including urology Advanced Clinical Practitioners, Information Support and Review TRs attended the focus group. Due to limited uptake in recruitment, a one-to-one patient interview was conducted. Five themes emerged from the focus group: clinical need, benefits, requirements, practicalities and patient perception. Two themes emerged from the patient interview: barriers to adherence and benefits. Overarchingly, there was a strong sense of support and clinical need for the drinking-guide. However, several practical considerations emerged and subsequently a task group was established to develop and trial the drinking-guide prior to any clinical rollout.

P019 Implementation of a hydration diary for patients receiving radiotherapy for prostate cancer

Hannah Mullen; Andrea Sykes; Amy Taylor
Sheffield Teaching Hospitals

Background: For radiotherapy to the prostate, local departmental protocol requires patients to hold 500ml of water in their bladder for 45 minutes. This can be difficult for patients and requires frequent discussions on how to improve bladder holding and their general hydration. To help patients understand and monitor their fluid intake, the concept of a hydration diary was established.
Method: To develop a user friendly and effective tool for patients to record their fluid intake daily, patients and Therapeutic Radiographers views were collected during the design and trial of the hydration diary. To gain initial feedback on its design, the diary was presented to a prostate patients' support group. The group suggested modifications and changes were made to the structure and uses of the diary based on their recommendations. Feedback was also collected from the Therapeutic Radiographers' perspective. The modified hydration diary was trialled on four patients during their radiotherapy treatment and verbal feedback collected.
Results: The design of the hydration diary was amended according to patient and Therapeutic Radiographers' feedback. This collaborative approach helped create a hydration diary which is easy for patients to understand and use. It has been shown as an effective and feasible tool, enabling Therapeutic Radiographers' to discuss hydration levels and fluid intake with the patient.
Conclusions: The hydration diary has allowed collaboration between the service user and the health professional to design a user-friendly booklet. It will increase patient understanding and enable patients and staff to effectively manage hydration levels, aiding bladder filling compliance.

P020 An audit of fiducial marker placement for prostate radiotherapy: can fiducial insertion be performed during a transurethral resection of the prostate(TURP)?

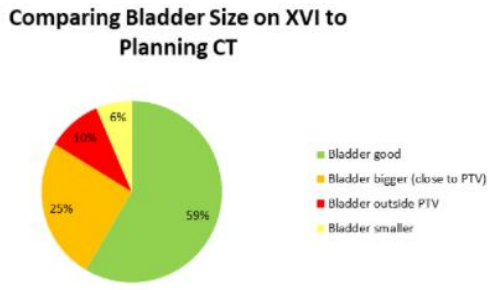
Jacqueline Ogg
NHS Grampian

Background: The insertion of gold seed fiducial markers into the prostate gland is standard practice in our department for patients receiving a course of external beram radiotherapy to the prostate. The gold seed markers are important for the image guided radiotherapy process as they can be easily visualised ensuring accurate prostate gland localisation. Traditionally the gold seed insertion is performed 1 week prior to radiotherapy planning via trans rectal ultrasound guidance. However, where a patient requires a transurethral resection of the prostate (TURP) prior to radiotherapy, could the gold seed insertion be accurately performed at the same time thus reducing the number of patient invasive procedures.
Purpose: The purpose of the poster is to discuss the findings of a local audit which was performed to assess the gold seed placements of patients where insertion was performed at the same time as a TURP procedure. There were 10 patients between January 2018 and February 2019 where fiducial insertion was performed at the same time as a TURP and following data analysis and image review of the seed placement this practice is no longer recommended.
Content: The poster will detail the background of the audit and methodology. CT imaging will be included to present the variations in gold seed insertion if performed during TURP in comparison to the standard TRUS procedure. Data analysis of the results and how this practice is not recommended as a result of the audit.

P021 Retrospective bladder size review for patients receiving bladder radiotherapy

Jasmin Carleton[1]; Samantha Stevens[2]
[1]Nottingham Hospitals University Trust; [2]Nottingham City Hospital NHS Trust

Background: Currently bladder cancer is standardly treated using a VMAT technique. The current imaging protocol is for patients to be imaged days1-3 and then weekly. Current trials (RAIDER) acknowledge the fact that bladder volumes can vary significantly during a patient's course of radiotherapy, this can cause variations in positioning and PTV coverage (1). The current bladder protocol accounts for this by adding at least a 2cm margin around the GTV. The variation in bladder size is causing an increase in the number of rescan/re-plans to make sure the entire bladder is being covered within the PTV.
Purpose: The purpose of this poster is to discuss the variation in bladder filling over the course of radiotherapy and to highlight the need for daily imaging.
Summary: A retrospective service evaluation using a randomly selected sample size of 20 bladder VMAT patients was conducted. All images for the patients selected were reviewed offline in MOSAIQ. Before reviewing the images the number of rescans needed was recorded as well as the reason for the rescan. Additionally, any comments about the image match was also noted.



A total of 265 images were reviewed. Graph 1 shows the inconsistences in bladder filling when compared to the planning scan.
Conclusion: The recommendation from the service evaluation is that daily imaging is required. However, the implementation of adaptive radiotherapy and double voiding needs to be considered as daily imaging doesn't eliminate the issue of bladder variations.

1. Huddart R (2019) A Randomised phase II trial of Adaptive Image guided standard or Dose Escalated tumour boost Radiotherapy in the treatment of transitional cell carcinoma of the bladder Cancer Research UK: Clinical Trials Awards and Advisory Committee Version 3.0

P022 A review of the appearances of prostatic abscesses

Ashley Thorpe; Nick Burns-cox; Angus Maccormick; Paul Burn
Somerset NHS Foundation Trust

Background: Prostatic abscess is an uncommon complication of bacterial prostatitis (Lee, 2016). A prostatic abscess may present with urinary tract symptoms, fever and pelvic pain or can present incidentally or with non-specific symptoms. MRI is useful for making the diagnosis and guiding treatment (Singh, 2011)
Purpose of poster: We present a case series of 23 patients diagnosed with a prostatic abscess at our institution. We review the MRI appearances including diffusion and post contrast sequences. We look at the demographics and risk factors of this patient group, including age and diabetes. We also identify factors which influence choice of treatment,

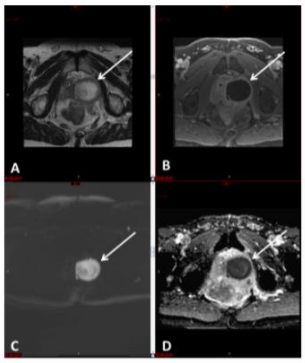


Figure 1: A prostatic abscess showing uniformly high T2 signal internally with a thick low T2 signal wall (A). It demonstrated peripheral enhancment (B) and marked restricted diffusion on the B1400 (C) and ADC map (D)

which may be between antibiotics and trans-rectal or trans-perineal drainage. Additionally we review the existing radiological literature on this topic.
Summary of content: A review of the presentation, MRI imaging appearances and treatment of prostate abscess, based on our case series and literature review.

Lee DS, Choe HS, Kim HY, et al. Acute bacterial prostatitis and abscess formation. BMC Urol. 2016;16(1):38. Published 2016 Jul 7. doi:10.1186/s12894-016-0153-7
Singh P, Yadav MK, Singh SK, Lal A, Khandelwal N. Case series: Diffusion weighted MRI appearance in prostatic abscess. Indian J Radiol Imaging. 2011;21(1):46-48. doi:10.4103/0971-3026.76054

P023 Patterns of spread in metastatic renal cancer: a pictorial review

Sarath Vennam[1]; Giles Maskell[2]; Alison Bradley[2]; John McGrane[2]; Farhan Jarral[3]
[1]Royal Cornwall Hospital / Peninsula Radiology Academy; [2]Royal Cornwall Hospital, Truro, Cornwall; [3]Rotherham NHS Foundation Trust

Background: Renal cancer (RCC) accounts for 4% of all cancers in the UK, with over 13,000 new cases diagnosed each year. (1-4) Up to 1 in 3 patients with renal cancer develop metastatic disease, which has a poor prognosis if left untreated. Although RCC may present with haematuria and constitutional symptoms, it is often an incidental imaging finding. (2,3) Imaging plays a key role in the diagnosis, prognostication and assessment of response to therapy. Metastases from RCC can affect any organ or system but tend to follow distinct patterns. (2) Recognising these patterns of metastatic spread and characteristic imaging findings is important for all radiologists.
Purpose: To illustrate the common patterns of metastatic spread in renal cancer including transvenous, lymphatic and haematogenous routes. Present strategies for optimal imaging techniques and approach to assessing metastatic renal cancer using different modalities. To illustrate interesting and rarer imaging findings in metastatic renal cancer and discuss evolving concepts in our understanding of this disease.
Summary of content: A pictorial review illustrating the commonest patterns of metastatic spread in renal cancer including the transvenous, lymphatic and haematogenous routes. Examples will be presented of rarer manifestations of this disease including soft tissue, visceral and cerebral metastases as well as the late development of pancreatic deposits. The optimal technique for demonstrating RCC metastases with different modalities will be discussed.

1. Cancer Research UK. (2015) Cancer incidence for common cancers. [Online]. 13 May 2015. Cancer Research UK. Available from: https://www.cancerresearchuk.org/health-professional/cancer-statistics/incidence/common-cancers-compared [Accessed: 1 January 2020].
2. Griffin, N., Grant, L.A., Bharwani, N. & Sohaib, S.A. (2009) Computed tomography in metastatic renal cell carcinoma. In: Seminars in Ultrasound, CT and MRI. 2009 Elsevier. pp. 359-366.
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P024 A retrospective cohort study to determine the relationship of apparent diffusion coefficient values of renal cell carcinoma before and after cryotherapy ablation

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The prevalence of RCC is increasing due to incidentally diagnosing renal lesions. Hence, diagnosis and follow up of these tumours are requiring more novel and efficient techniques such as diffusion-weighted imaging (DWI). Likewise, nephron-sparing surgery such as cryotherapy ablation is becoming increasingly used for small lesions. To measure the diffusion of water within the lesion using the (ADC) is of interest before and after the cryotherapy ablation. Can ADC value be used to determine the success of cryotherapy ablation treatment for RCC? was answered with the aim of determining the relationship between ADC values of RCC before and after cryotherapy ablation.
A retrospective quantitative cohort study was used. Quantitative analysis of the ADC values was statistically evaluated. DWI was performed at a single centre using a 1.5T MRI scanner with echo-planar imaging DWI. The participants underwent MRI before and after cryotherapy ablation to the site of the RCC, an ADC value was obtained at this site. There was a statistically significant change in the ADC values from ADC pre ablation to the ADC post-ablation. There was no statistical significance in any of the other outcomes measured. Although a statistically significant change in ADC values occurred between the pre and the post cryotherapy ablation there was no statistical significance in this change and the result of the reference standard. It is therefore concluded that the change of ADC value occurred due to treatment directly to the disease site and does not determine the success of the cryotherapy ablation.

P025 Rare case of interstitial bladder rupture on CT cystography: A pictorial review of traumatic bladder injury

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Background: Traumatic bladder ruptures are most frequently encountered in patients following major blunt force trauma.[1] Extra-peritoneal ruptures are the most commonly encountered type, accounting for 80-90% of ruptures. Intra-peritoneal ruptures are less common, accounting for 10-20%, however are well documented in the literature.[2] Interstitial (or subserosal) ruptures are very rare, with little documentation in the literature.[1,3,4] CT cystography demonstrates excellent accuracy in the evaluation of suspected bladder injury, and has largely replaced conventional cystography as the mainstay of investigation.[1,2,3] On CT cystography, interstitial rupture will demonstrate bladder wall thickening with focal intramural transection of contrast, without extension to intra- or extra-peritoneal space, signifying intact serosa.[1,3]

Purpose: The poster will demonstrate CT cystographic appearances of intra-peritoneal, extra-peritoneal and interstitial bladder ruptures via case series from our institution, with a focus on the interstitial rupture appearances which have rarely been described.

Summary of content: We present a case of traumatic interstitial bladder rupture. Pan-trauma CT was performed in a 60 year old male following fall from 10 feet, showing contained fluid collection adjacent to dome of the bladder with focal mural irregularity at the dome. No pelvic fracture or intraperitoneal fluid. Subsequent CT cystogram showed transection of contrast into bladder wall, with curvilinear configuration producing a layered appearance, and associated bladder wall thickening. No contrast within intra- or extra-peritoneal spaces. Follow up CT cystogram after 11 days catheterisation showed resolution of bladder rupture. The poster will also demonstrate examples of intra- and extra-peritoneal rupture from our institution for comparison.

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P026 T-staging of bladder tumours - A pictorial review

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St Helens & Knowsley Teaching Hospitals NHS Trust

Bladder cancer is the most common tumour of the urinary tract with TCCs accounting for 90% of all bladder tumours. They are staged using the TNM staging system. Accurate staging is important to determine optimal management as it determines the treatment available to the patient. Tumour stage influences prognosis and also determines the modality and frequency of follow up imaging. Learning objectives: To review the T staging for bladder tumours To illustrate various examples of bladder tumours according to T stage.

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P027 Opacification of the renal collecting system during CT urography: A quality improvement project

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Background: CT IVU provides comprehensive evaluation of the upper and lower urinary tracts. Failure to achieve opacification of the entire renal collecting system is a significant limitation of CT IVU, as it limits the diagnostic information. Currently there is no standard CT IVU protocol and this audit evaluates adequacy of collecting system opacification for scans performed at The Great Western Hospital, Swindon.

Methods: Initial data collection comprised retrospective analysis of 30 CT IVU scans using the original split-bolus protocol (95mls total contrast, 7-minute delay between 1st and 2nd dose). Opacification was measured at the renal pelvis, mid ureter (at the level of aortic bifurcation) and distal ureter which were quantified as 100% or <100% opacification. The CT IVU protocol was then changed (110mls total contrast, 9-minute delay between 1st and 2nd dose) and the data was re-audited. The presence of renal tract pathology was also documented. Comparison was then made between the old and new protocols.

Results: When comparing the original vs new protocol, 100% opacification was achieved in the renal pelvis in 100% vs 95%, at the mid ureter 76% vs 80% and at the distal ureter 43% vs 64% respectively. The number of renal tract disease affecting opacification was comparable between the 2 groups.

Conclusion: The new split-bolus protocol has shown overall improved opacification of the renal collecting system when compared to the original protocol. This is particularly evident when assessing the distal ureter.

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GI AND HEPTOBILIARY POSTER PRESENTATIONS

P028 Metastatic rectal cancer and a case of necrotising fasciitis

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Background: Necrotising fasciitis has a high mortality and is fatal if left untreated[1], the most common clinical features are: pain, erythema and swelling[2]. Cases linked to perforated rectal cancers are rare. In this case, the patient had undergone a laparoscopic defunctioning colostomy two months before presentation. Imaging is often conclusive with visualisation of surgical emphysema. Purpose: To illustrate the appearance of perineal necrotising fasciitis on CT images, relate this to diagnostic pelvic MRI images to inform differential diagnosis and management options. Summary: A 65 year old gentleman was diagnosed with a T4N2M1 moderately differentiated adenocarcinoma of the rectum, which was 9cm in axial diameter with multiple pathologically involved pelvic lymph nodes. He presented with bowel obstruction and underwent a laparoscopic loop defunctioning colostomy on 17/1/20. Following 2 cycles of FOLFOX chemotherapy he was admitted to the ward with signs of shock: tachycardia and hypotension, with diffuse pain in his buttocks and a swollen scrotum. On examination he had a distended, erythematous scrotum with necrotic skin in the perineum. Investigations showed a raised CRP (415mg/L) with a neutrophil count of 2.1 (10^9/L). A CT Abdomen and Pelvis confirmed a localised perforation of the rectal tumour with soft tissue emphysema within the scrotum, anterior abdominal wall and perineum. He was treated with broad spectrum antibiotics. Surgeons confirmed necrotising fasciitis of the perineum and he was not fit enough for extensive debridement.

Fig 1: CT axial image confirming

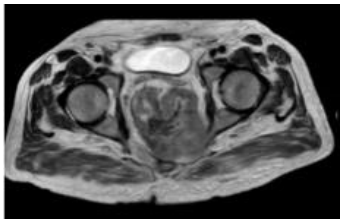

Fig 2: MRI axial image at surgical physema. diagnosis showing a T4N2 rectal carcinoma.

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P030 The role of radiotherapy in radical treatment of rectal cancer during the COVID-19 pandemic

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Background: The COVID-19 pandemic has resulted in immeasurable barriers to healthcare provision. Radical treatment for rectal cancers was affected with cessation of elective operations and measures introduced to reduce patient visits to hospital. Guidance produced by The Royal College of Radiologists (RCR) advised short-course preoperative radiotherapy (SCPRT) to be used to either bridge the gap to surgery or instead of long-course chemoradiotherapy (LCCRT)[1]. This retrospective study reviewed subsequent outcomes.
Method: Patients who received radiotherapy to their rectal tumour from April to July 2020 were reviewed retrospectively at a single centre. Patient demographics, tumour stage, dose/fractionation of radiotherapy and post-operative histology were recorded. They were separated into sub-groups based on their treatment, and whether this was altered due to the pandemic.
Results: 24 patients were analysed.
11/24 had SCPRT as a bridge to surgery. 9/11 proceeded to tumour resection, 8 of which were pathologically downstaged. All had R0 resections.
9/24 had SCPRT instead of LCCRT due to risk of complications. 6/9 underwent tumour resection. Of these, all except one had R0 resections.
4 patients still had long LCCRT due to young age or locally advanced aggressive disease.
Conclusion: COVID-19 has significantly impacted radical treatment of rectal cancer. SCPRT instead of LCCRT resulted in

both pathological downstage and R0 resection in most cases. As a bridge to surgery, SCPRT did not result in disease progression for any patients and is therefore safe.

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P031 Pancreatic cystic incidentals

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United Kingdom use of CT and MRI has increased 42% within the last 10 years. This upward trend is likely to continue and has led to a rise in the identification of incidental cystic pancreatic lesions. Pancreatic incidentals are unexpected, asymptomatic abnormalities that are discovered while screening for other diseases or found while actively searching for other pathology. Their reported prevalence on abdominal imaging is highly variable, ranging from 2-45%. Whilst the majority of these incidental cystic findings in a low risk population are either benign or low--grade indolent neoplasms, a small percentage are malignant and long-term imaging follow-up of indeterminate lesions is often necessary. Different pathological subtypes have distinct features on imaging; therefore a radiologist needs to be familiar with their different appearances to facilitate diagnosis. A 2017 review by the American College of Radiology has provided guidance on this challenging subject.

Purpose: The purpose of this educational poster is to:

- Illustrate the characteristic imaging features of different cystic pancreatic lesions
- Highlight key morphologic features which identify an individual cyst as concerning
- Discuss appropriate imaging surveillance of selected cystic pancreatic lesions.

Summary of poster content: Based on literature review, we will:

- Summarise the recommended diagnostic algorithms for management
- Review the recommended scan techniques
- Present a pictorial review with learning points of the following; major categories of pancreatic cystic incidentals, worrisome morphological features, and ,anagement of pancreatic cystic lesions in the asymptomatic patient.

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P032 Surveillance of pancreatic cystic lesions

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Background: The prevalence of pancreatic cystic lesions (PCLs) is increasing as diagnostic imaging is advancing in quality and resolution. Some PCLs have malignant potential but the rate of malignant transformation is low. Curative treatment for PCLs involves invasive surgery with a high mortality and morbidity rate. Therefore PCLs are often managed conservatively using radiological surveillance. Unlike other conditions, PCLs are watched for many years because the malignant potential does not decrease with time. Although diagnosing PCLs has the potential to highlight the development of early pancreatic cancer, it can also create anxiety for patients.

Purpose of poster: Understanding the experiences and needs of patients living with PCLs under surveillance is important in order to identify opportunities to improve patient experiences during this uncertain period. The aim of this poster is to educate participants about the radiological involvement for PCL diagnosis and surveillance and outline the current difficulties that patients experience following a diagnosis of PCLs.

Summary of content: Educational infographic about PCLs, their radiological appearances and the current pathways that patients may undertake within the NHS. This poster provides the research setting and details of the study population for the first author's PhD research exploring the experiences of patients under this surveillance management.

Conclusion: There is no available research which has explored the patient experiences of PCL surveillance, where the wider body of literature demonstrates unmet needs in similar patient populations. Further investigation is required to understand which intervention/methods improve the experiences of PCL patients.

P033 CT abdomen/pelvis scans efficiency for surgical patients using the national emergency laparotomy audit (NELA) tool emergency care pathway standards

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The term "acute abdomen" defines a clinical syndrome characterized by the sudden onset of severe abdominal pain requiring emergency medical or surgical treatment [1]. Abdominopelvic computed tomography (CT) has assumed an increasingly important role in the evaluation and diagnosis of patients presenting with acute abdominal symptoms and is widely used as an integral part of surgical triage (2,3) .A significant proportion of patients would proceed to surgical intervention and any delay in reaching a diagnosis could be life threatening (4) We used neighbouring trust (Dudley Group NHS Foundation Trust) Emergency Care Pathway as a standard to compare our data against, as it was one of the pathway examples suggested by The National Emergency Laparotomy Audit (NELA) tool carried out by the National Institute of Academic Anaesthesia's Health Services Research Centre (HSRC) on behalf of the Royal College of Anaesthetists (RCoA). The (Dudley Group NHS Foundation Trust) Emergency care pathways criteria: CT scan within 2 hours Report within 1 hours.

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P034 CT and PET-CT findings in primary pancreatic lymphoma

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Background: Primary pancreatic lymphoma (PPL) is a rare subtype of pancreatic cancer and can be challenging to diagnose due the similarities in clinical presentation it has with the exceedingly more common pancreatic adenocarcinoma.

Purpose: We present the clinical and CT/PET-CT findings in a patient with PPL to improve awareness of this rare condition. A 75-year-old gentleman with a background of essential hypertension, hypercholesterolaemia, macular degeneration and a right ear neuroma underwent routine blood tests which detected abnormal liver function (bilirubin 43, ALP 321, ALT 732, GGT 943). The patient complained of dark urine but denied any jaundice, weight loss or night sweats. He underwent an abdominal ultrasound which revealed a 10cm epigastric mass. A CT-CAP was performed revealing a large mesenteric mass contiguous with the pancreas which was directly infiltrating the pancreatic head. There was associated retroperitoneal lymphadenopathy and the distal common bile duct (CBD) was obstructed with a degree of intrahepatic biliary dilatation. A CT-guided biopsy was performed and histology confirmed a diagnosis of PPL (a high-grade B-cell non-Hodgkin's lymphoma). A PET-CT prior to treatment revealed a 13cm metabolically active abdominal soft tissue mass with separate retroperitoneal sites of nodal disease. There was no evidence of skeletal, splenic or subdiaphragmatic involvement. The patient underwent ERCP with biliary stent insertion to relieve the CBD obstruction, followed by R-CHOP chemotherapy to treat the PPL.

Summary: Radiologists should be aware of the imaging findings of PPL and must consider PPL in the differential diagnoses for pancreatic masses.

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3. Rad, N., Khafaf, A., Mohammad, A.H. (2017) Primary pancreatic lymphoma: what we need to know. J. Gastrointest. Oncol. 8(4), 749-757.

PAEDIATRICS POSTER PRESENTATIONS

P035 An audit into chest x-rays taken through A&E on children aged 2 and under

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Background: A&E departments can be stressful environments for children. It is imperative to obtain a radiograph of highest diagnostic quality as possible. However, this is not always straight forward when imaging children. The ideal chest radiograph would have real anatomical markers, four borders of collimation, no visible hands on the film, no

wires or artefacts, no text placed over anatomy, no rotation and image would be taken upon inspiration.
Method: 515 radiographs were analysed over a 2 year period of chest x-rays on patients aged 2 years and under. The imaging referrals were from A&E.
Results: There was variation across hospital sites. Site A achieved 37.68% of radiographs with real anatomical markers; compared to Site B with only 9.62%. Site A achieved 93.12% of radiographs collimated well; compared to site B with 64.85%. Site A had hands on the film on 17% of images and Site B had 8.7%. Wires and artefacts were visible on 21.38% of Site A images and 27.2% of Site B images. Text was placed over anatomy on 2.89% of Site A images compared to 47.28% at Site B. 88.77% of images at Site A and 91.63% were taken on inspiration. 9.78% of Site A and 12.55 % of Site B images were rotated.
Conclusion: Results varied across hospital sites but overall the results identified mostly good practice and an opportunity for positive feedback. Some areas where practice could improve include the use of anatomical markers and image processing in terms of placing text over anatomy.

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P036 Mucopolysaccharidosis (Hunter syndrome) in a child: imaging findings

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Background: Mucopoysaccharidosis type II (Hunter syndrome- HS) is a rare, X-linked recessive disorder associated to mutation of a gene encoding lysosomal enzyme iduronate sulphatase. Enzyme deficiency in turn, leads to intracellular storage of abnormal mucopolysaccharides, causing progressive organ damage.
Purpose of poster: We review the musculoskeletal and neuroimaging findings of HS. HS occurs in 1 per 80,000 male live births and is rare in females. Multisystemic abnormalities follow a continuum, reflecting abnormal deposition of lipids and glycosaminoglycans in tissues. Patients manifest the clinical symptoms of metabolic disease (which varies widely in its severity) by the end of the first, or at the beginning of the second year of life. Progressive mental retardation, physical disability and death before age 20 are hallmarks of the severe form of disease. Symptoms may include coarse facial features and hoarse voice, short stature, frequent respiratory infections, organomegaly, cardiac disease, hydrocephalus, and musculoskeletal abnormalities known as dysostosis multiplex. Enzyme replacement therapy and stem cell transplantation may improve symptoms. A 15-year-old boy with cognitive impairment who had been regularly followed by the paediatrics unit was admitted to our hospital with pneumonia and seizures. Chest CT revealed lung consolidation. Spatulate ribs were seen. Brain MRI showed macrocephaly, hydrocephalus and prominent brain atrophy. Spine MRI depicted deformed vertebral bodies in the cervical spine, and thoracic scoliosis with a T12 hemivertebra, producing a gibbus deformity. Spinal cord compression was present.
Summary of content: Patients with HS exhibit a constellation of structural abnormalities that can be well appreciated on imaging studies.

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P037 Macrosomia and megalencephaly: born a giant with chromosomal mosaicism of PIK3CA mutation

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Background: Somatic mosaicism of the PIK3CA gene is a rare genetic mutation associated with multiple abnormalities, including variable body overgrowth syndromes (macrosomia) and brain disorders [(hemi)-megalencephaly].
Purpose of poster: We present the musculoskeletal/neuroimaging findings of a PIK3CA-related somatic overgrowth variant, in a newborn. A premature (postnatal 34wks) neonate, weighing 4,700gr and measuring 54cm in length had a head circumference of 44cm (all somatometric measurements above 97th centile). In addition to generalized somatic overgrowth, infant boy had hypotonia and prominent forehead, wide nasal base, low-set ears with dysmorphic auricles, and no plantar creases. Cardiac sonography detected an atrial septal defect. Brain sonography at birth and CT examination suggested mild dilatation of lateral ventricles. All repeated brain sonographic examinations showed

bilateral, marked increase of the ventricular volume. Molecular next-generation sequencing identified mutation in the PIK3CA gene (PIK3CA:c.1093G>A), consistent with megalencephaly-macrosomia syndrome. Parents refused ventriculoperitoneal shunt surgery as part of routine care. At 6 months of age, brain MRI disclosed severe hydrocephalus with global reduction of brain mass. Prognosis was dismal.
Summary of content: Overgrowth of tissues is a common feature in a diversity of developmental disorders as well as cancer. PIK3CA gene mutations are numerous, occur in the early stages of development and have been associated with a broad spectrum of paediatric phenotypes. Presenting signs as head and brain overgrowth, with body overgrowth at birth should raise suspicion of PIK3CA-related overgrowth disorders. While molecular analysis will establish diagnosis of somatic mosaicism, imaging investigation may aid in the characterization of overgrowth developmental disorders.

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P038 Reducing the risk of unintended high exposures to paediatric patients in plain film imaging

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Background: Following a CQC improvement notice in May 2016 around an overexposure on a paediatric patient, our department had a major overhaul of paediatric training, protocols and exposures. Final step was the addition of paediatric pre-set exposures to the DR planar imaging rooms for all body parts and ages, mirroring the department's paediatric exposure charts.
Method: Re-assessed paediatric competency on existing staff combined with updating and reiteration of paediatric protocols, parameters and exposure settings. Revamped induction pack for new staff members, with specific paediatric competency sign off. Optimised paediatric exposures, then worked with equipment manufactures to install paediatric pre-sets onto all 9 of our digital imaging rooms. Audited number of high and adult exposures being used on 8 different body parts for paediatric patients up to 14 years of age throughout this process.
Results: Prior to these measures being put in place, initial audits highlighted 14% high and 1.6 % adult exposures being used on paediatric patients. Post paediatric pre-set exposure installation, the number of high exposures reduced to 1.1%, with no adult exposures being used. Where there were no pre-sets on equipment, the number of high exposures had still reduced to 1.6 % but the number of adult exposures remained the same at 1.6 %.
Conclusion: The introduction of paediatric pre-set exposures has been very successful, decreasing the number of unnecessary high exposures significantly. Where equipment is without this application, education and training around paediatric exposures has also meant fewer higher exposures.

P039 Has covid 19 changed children's imaging forever

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Before Covid: parents/carers always encouraged to be involved with examinations. Toys and books available in waiting areas, rewards given after successful examinations Waiting areas always decorated with an appropriate theme depending on the time of year Minimal PPE required Large clinics with a walk in service available every day Patients allowed to attend early, along with family members and siblings. During lockdown: Only acute, urgent and oncology patients imaged, all routine patients and screening cancelled. Patient numbers requiring imaging was very low. Very few Covid positive paediatric patients. Introduction of the recommended PPE changed often. Radiographers became confident in Donning and Doffing, fit testing was a priority. Post lockdown: Parents/carers anxious about attending hospital, resulting in frustration and delay of care and diagnosis Only one parent/carer is allowed to attend with the patient, increasing anxiety Due to social distancing, children are alone for their examination when appropriate, once details have been checked. No toys, distraction aids, or themed decorations in waiting areas that patients have become accustomed to. Pressure from referrers due to backlog PPE has resulted in the `lack of smiles` and interaction from babies. Increased DNA rates, parents/carer contacted prior to appointments Outcomes Reduced job satisfaction due to PPE, interaction with patients and families, being unable to provide a familiar and inviting environment Improved relationships and communication with service users, who now recognise our limitations and respect our decisions Improved control over workflow Children are resilient and cope.

P040 Exploring the experiences of patients with autism when attending the diagnostic imaging department for projection imaging

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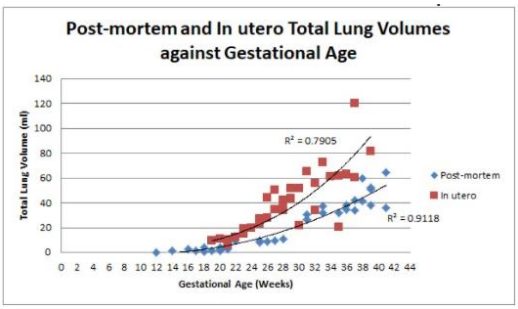
Background: Bjorkman et al. (2016) found that of 46 departments that examined children with Autistic Spectrum Disorder (ASD) none had any existing guidelines for radiographers to assist them in preparing for and undertaking imaging procedures for patients with ASD. Two studies undertaken in the UK explored the experiences of patients with ASD, from the parents' perspective (Brammer; 2016, Bond, 2017.) They recommended improving communication with the children, incorporating further training and development for radiographers and agreeing a process of needs assessment. Research into the experience of children with ASD when visiting an imaging department has yet to be undertaken and therefore a gap in current evidence has been identified.
Method: The participants were parents and their children with autism aged 6-12. Parents completed an online survey via Survey Monkey. From, the survey parents were be asked if their child would willing to participate in the second part of the study with their support and attend an interview. Five children were interviewed to discuss their experiences when attending for diagnostic imaging examinations.
Results: The survey responses will be quantitively analysed in order to discuss the findings. The themes identified from the interviews will be also discussed alongside that of the survey, related to current literature and contextualised in order to identify areas for improvement.
Conclusion: The findings will be used to make a series of recommendations as to how the experience of parents and their children attending for projection imaging can be improved in their future.

1. Bjorkman, B., Berglund G., Enskar K., Fareso M. and Huus K. (2016). Peri-radiographic guidelines for children with autism spectrum disorder: a nationwide survey in Sweden. Child: care, health and development, 43, 1, 31-36. 2. Bond J. (2017). Rising to the challenge. Imaging and Therapy Practice, Nov, p12-17 3. Brammer A. (2016). Reasonable adjustments, the law and the imaging department. Imaging and Therapy Practice, April, p21-25.

P041 Imaging the fetal lung -- comparing normative data from in utero MRI and post-mortem MRI at different gestational ages

Charlotte Hart; Madeline Carling; Elspeth Whitby
University of Sheffield

Objective: The objective is to see if lung volumes at different gestational ages (GAs) are the same when measured on in utero fetal MRI and post-mortem fetal MRI.
Methods: 79 fetal MRI images were accessed. All scans were taken on a 1.5 Tesla Siemens Avanto scanner (Erlangen, Germany) on a T2 weighted SSFE sequence. Using RadiAnt DICOM Viewer (Medixant, Poland) fetal lungs were traced on each slice in the coronal orientation. The areas of each slice were summed and multiplied by the MRI slice thickness to calculate lung volume measurements. Graphs were obtained by plotting volume against GA. Interobserver variation was represented on a Bland Altman Plot.
Results: GA ranged from 12- 41 weeks and 19-39 in post-mortem and in utero cases respectively. 40 post-mortem fetal MRIs and 37 in utero fetal MRIs were measured; two cases were excluded as they had known lung abnormalities. Both post-mortem and in utero values increased with GA. The line of best fit for post-mortem values had the equation: $V = 0.0602g^2 - 1.3014g + 6.3682$, $R^2 = 0.9118$. The line of best fit for in utero values had the equation: $V = 0.0007g^{3.2041}$, $R^2 = 0.7905$.



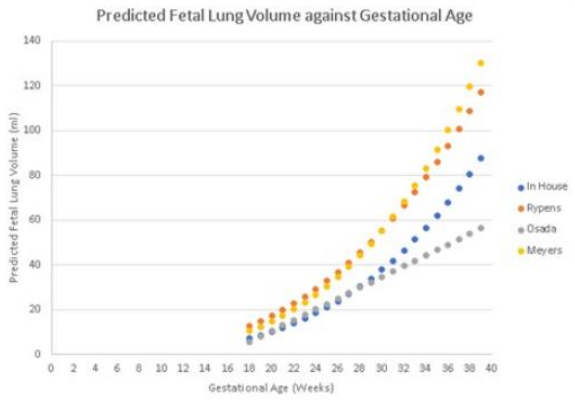
Conclusion: Our results show a clear difference between normative post-mortem and in utero fetal lung measurements on MRI at the same gestational ages. Post-mortem measurements were consistently lower than in utero measurements.

042 The value of in house data compared to published formulae for predicting in utero fetal lung volume on MRI

Madeleine Carling; Charlotte Hart; Elspeth Whitby
University of Sheffield

Objective: To compare in utero MRI fetal lung volumes predicted by published formulae, with in house data, against gestational age.

Methods: The in house data scans were taken on a 1.5 Tesla Siemens Avanto scanner (Erlangen, Germany) on a T2 weighted SSFE sequence. Using RadiAnt DICOM Viewer (Medixant, Poland) fetal lungs were traced on each slice in the coronal orientation. The areas of each slice were summed and multiplied by the MRI slice thickness to calculate lung volume measurements for in house data. Data gathered from Meyers, Osada and Rypens was similarly collected by planimetric analysis. Meyers also used 3D volumetric analysis. Graphs were obtained by plotting volume against GA for in house and published formula values.



Results: We plotted each formula against GA at one week periods from 18 to 40 weeks' gestation, including our own formula. Using this GA range means that each formula has been extrapolated. **Conclusion:** All formulae predict that fetal lung volume increases with GA; our in-house data followed a similar trend to the published formulae. The in-house data trend was most similar to the Rypens trend, however the Rypens values were consistently larger at each GA. In-house values were most similar to the Osada values in the 18-29 week GA period. Knowledge of in house data trends should be taken into consideration when making clinical decisions based on lung volumes.

1. Meyers ML, Garcia JR, Blough KL, Zhang W, Cassady CI, Mehollin-Ray AR. Fetal lung volumes by MRI: Normal weekly values from 18 through 38 weeks' gestation. Am J Roentgenol. 2018 Aug; 211(2):432-8. 2. Osada H, Kaku K, Masuda K, Iitsuka Y, Seki K, Sekiya S. Quantitative and qualitative evaluations of fetal lung with MR imaging. Radiology 2004; 231:887–892. 3. Rypens F, Metens T, Rocourt N, Sonigo P, Brunelle F, Quere MP, et al. Fetal lung volume: Estimation at MR imaging - Initial results. Radiology. 2001 Apr; 219(1):236-41.

P043 Paediatric research radiographers: Great Ormond Street Hospital

Jessica Eaton[1]; Clare Simcock[2]; Ian Simcock[3]; Paula Kelly[4]; Polly Livermore[4]; Owen Arthurs[3]
[1]Great Ormond Street Hospital; [2]Great Ormond Street Hospital; [3]Great Ormond Street Hospital, Institute of Child Health/University College London/NIHR Biomedical Research Centre; [4]Great Ormond Street Hospital, Centre for Outcomes and Experience Research in Children's Health Illness and Disability (ORCHID)

Traditionally, diagnostic radiography has been perceived to be a consumer of research rather than a producer (Gymiah, 2018). Previously, practice was based upon tradition and experience rather than peer reviewed evidence. Meanwhile, continuous technological development, clinical trial participation and advanced diagnostic procedures (Reid & Edwards, 2011) have increased the demands for research radiographers. Can we make a clinical difference? While the number of diagnostic research radiographers increase alongside an increase in the number of doctoral level qualifications (Gambling et al, 2003), they are still in a minority with many departments still facing barriers. These include staff shortages, time constraints, lack of research skills and funding (Ooi, 2012). This poster aims to showcase the opportunities available for research candidates in the Radiology Department at Great Ormond Street Hospital. We outline the training schemes and support networks available to radiographers within the Trust and how this method harnesses the clinical expertise of the profession to provide an evidence-based high-quality imaging service. Learning outcomes include how to initiate a successful research culture, the importance of clear goals, effective leadership, and delivery to the clinical service. In addition, access to a specialized knowledge and skills base is essential when developing professional practice.

Gambling, T., Brown, P., & Hogg, P. (2003). Research in our practice-a requirement not an option: Discussion paper1. Radiography, 9(1), 71-76. https://doi.org/10.1016/S1078-8174(03)00007-5 Gyimah, P. A. (2018). Barriers to Research Utilisation amongst Diagnostic Radiographers in the UK [Sheffield Hallam University]. https://doi.org/10.7190/shu-thesis-00233 Ooi, C.-C., Lee, S. H.-E., & Soh, B. P. (2012). A survey on the research awareness and readiness among radiographers in Singapore General Hospital (SGH). Radiography, 18(4), 264-269. https://doi.org/10.1016/j.radi.2012.06.004 Reid, K., & Edwards, H. (2011). Evaluating the role of the diagnostic research radiographer. Radiography, 17(3), 207-211. https://doi.org/10.1016/j.radi.2011.02.004

P045 Diagnostic imaging: an essential method of diagnosing Cushing's syndrome and disease

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University of Lancaster

Background: Cushing's syndrome (CS), was named after Harvey Cushing (1869-1939), a neurosurgeon who during a case study proved his hypothetical theory that hypoadrenalism was linked, "to minute basophilic adenomas of the pituitary gland," the pluriglandular syndrome became known as CS. His main aims were to improve the survival rates of patients after complex neurosurgical procedures for intracranial tumours and introduced x-ray imaging for the diagnosis of brain tumours. Today's technological advancements in diagnostic imaging have proved to be a vital tool in testing the differential diagnosis and in making a definitive diagnosis.
Methods: As part of a Quality-of-Life 2020 survey on 86 CS members of the Pituitary Foundation UK, 3 questions asked which type of diagnostic imaging examination(s), that they had undergone prior to their diagnosis. The objective being to ascertain, if diagnostic imaging continues to remain vitally important for the diagnosis of CS and Cushing's disease (CD).
Results: 66% of the study population had a CT scan to ascertain the presence of adrenal adenoma(s), and 62% had an MRI to confirm pituitary adenomas. When asked if they had been referred for any other type of diagnostic examinations/procedures for their CS diagnosis, 84% named 15 other types of imaging examinations, (mean = 2, min= 1, max=6). The collective number of examinations was 185.
Conclusion: Results from this survey suggested that diagnostic imaging is one of the 2 essential methods of diagnosing CS and CD, the other is biochemical testing.

Ellis H, (2012). Harvey Cushing: Cushing's diseaseJournal. Perioperative Practice, Sept; 22(9), Pp.298-9.

OBS & GYNAE POSTER PRESENTATIONS

P046 Apparent Diffusion Coefficient and texture may help predict the severity of placental invasion

Hiba Alessa; Elspeth Whitby
University of Sheffield

Background: Placenta accreta spectrum (PAS) causes 7% of maternal mortality (1). Diagnosis is still not definitive. This raises the need for a complimentary approach to assess placental invasion. Diffusion and textural analysis have shown a correlation with some types of tumors (2). The use of radiomics can give a clue into the microstructural feature as significant results were found between normal and abnormal placental disorders (1). Objectives: to evaluate the utilization of ADC and texture analysis in PAS diagnosis.
Methods: A retrospective review of 153 cases. ADC values were obtained from the area above the bladder and the entire placenta on a midline sagittal image by 2 readers. Heterogeneity of the placenta and placental dark bands were also noted. Pathological diagnosis was obtained from medical records. Texture study of a sample size of 33 images was also analysed using radiomics program (LIFEx) by a single reader. Texture and matched ADC results were then analysed.
Results: Total placental ADC is higher in abnormally invaded placentas. The degree of placental invasion showed a correlation with total placental texture. Normal placentas had lower values than invaded placentas. Texture grey level co-occurrence matrix (GLCM)- homogeneity showed an increment level proportional to the degree of placental invasion. Bland-Altman plot showed that regional placental ADC showed an agreement with no potential bias between the 2 readers.
Conclusion: ADC measurements have to be complimented with other MRI signs of placental invasion and texture to aid confidence in the imaging diagnosis.

1. Chen E, Mar WA, Horowitz JM, Allen A, Jha P, Cantrell DR, et al. Texture analysis of placental MRI: can it aid in the prenatal diagnosis of placenta accreta spectrum? Abdominal radiology (New York). 2019;44(9):3175-84. 2. Sarioglu FC, Sarioglu O, Guleryuz H, Ozer E, Ince D, Olgun HN. MRI-based texture analysis for differentiating pediatric craniofacial rhabdomyosarcoma from infantile hemangioma. Eur Radiol. 2020;30(10):5227-36.

P047 Inter-fractional uterus motion during radiotherapy for cervix cancer after ultrasound confirmation of bladder volume

Gillian Bestwick
Gloucestershire Hospitals NHS Foundation Trust

Background: Uterus motion is linked to changes in bladder volume during radiotherapy for cervix cancer. Ultrasound is used in our department to confirm bladder volume is within 100ml of planned volume before each treatment. The inter-fractional movement of the uterine fundus in a group of patients who had ultrasound to confirm adequate bladder volume before treatment was compared to a group of patients who were previously treated without

ultrasound.
Methods: 77 cone-beam computed tomography (CBCT) images from 11 patients with cervical cancer who had undergone ultrasound scans prior to radiotherapy (group A) and a group of 11 patients who had been previously treated without ultrasound (group B) were fused with the planning CT scans. The change in uterus fundus position on CBCT scans compared to the planning CT scans was quantified. Linear regression was used for comparison.
Results: The mean and range of movement of the uterine fundus in group A are smaller but not significantly different than group B (superior / inferior : group A: 0.01 to 1.98 cm, mean 0.54 cm, group B 0.02 cm to 3.61 cm, mean 0.71 cm; anterior / posterior group A 0 cm to 2.50 cm, mean 0.62 cm; group B 0.03 cm to 2.59 cm, mean 0.72 cm). Both groups showed significant increase in uterus motion over the course of radiotherapy.
Conclusions: Confirming bladder size is similar to planned with ultrasound has resulted in a small reduction of uterus movement. Further work is required to investigate other methods of managing uterus motion.
1. Eminowicz, G. et al. (2017) Pelvic organ motion during radiotherapy for cervical cancer: understanding patterns and recommended patient preparation. Clinical Oncology. 122(1), 116-121.
2. Lewis Bestwick, G.L. (2016) Inter-fractional uterine and cervix motion during radiotherapy for cervix cancer. M.Sc. thesis. Sheffield Hallam university.

BREAST POSTER PRESENTATIONS

P048 An audit of the chabner bra breast immobilisation device for large breasted patients who require external breast radiotherapy treatment

Ruth Bees; Becky Milliner; Erika Khan; Jessica Bailey; Jo Bowen; Clare Salmon; Gillian Bestwick
Gloucestershire NHS Foundation Trust

Introduction: Large breasts commonly present both technical and skin toxicity radiotherapy challenges and there is currently no standardized breast immobilisation practice in the UK. Specifically designed radiotherapy bra's have recently been developed to address such challenges whilst improving patient experience and dignity.
Method: To audit the impact of the Chabner bra (CB) on radiotherapy breast immobilisation for large breasted patients with greater than 1.5cm breast tissue overhang in any direction. The following quantitative metrics were collected for 15 patients with no immobilisation device and 15 patients with the CB: average field length, reproducibility and skin toxicity. For patients wearing the CB, 2 additional CT scans were scheduled (Day 0 and between fractions 10-15).
Results: Average field length was 2.1cm less for those patients who received radiotherapy with the CB. When compared to the planning CT scan, the CT day 0 average variation was 0.7cm which increased to 0.8cm at the CT fraction 10-15. Twice as many verification images were taken for patients with the CB. Average discrepancy of 0.57cm and 0.87cm was measured for patients without and with the CB respectively. RTOG2.5 skin toxicity was recorded in 3 patients without the CB and 4 patients with the CB.
Conclusion: The use of a specifically designed radiotherapy bra can significantly reduce field length without increasing skin toxicity. Whilst reproducibility with the CB was slightly inferior, it still met local imaging protocols. Inadequate CB staff training could have attributed to the variations in reproducibility.
1. Montgomery, L., Flood, T. and Shepherd, P. (2020) A service evaluation of the immobilisation techniques adopted for breast cancer patients with large and/or pendulous breasts receiving external beam radiotherapy. Journal of radiotherapy Practice. 26 (1), 1-6. 2. Probst, H., Bragg, C., Dodwell, D., Green, D. and Hart, J. (2014) A systematic review of methods to immobilise breast tissue during adjuvant breast irradiation. Radiography. 20 (1), 70-81.

P049 A comparison of on-treatment breast swelling between 5 fraction and 15 fraction radical radiotherapy treatments to the breast

Samantha Stevens
Nottingham Radiotherapy Centre

Background: Patients referred for radiotherapy to the breast are commonly treated with a dose of 40.05Gy over three weeks. Treating a defined group of patients with a dose of 26Gy over 5 days was introduced due to the COVID-19 pandemic, based on encouraging data from the FAST-Forward trial, in order to reduce patient hospital visits (1). National discussion between the Image Guided Radiotherapy Advanced Practitioners indicated that an increase in breast swelling was noted for those patients treated over 5 days.

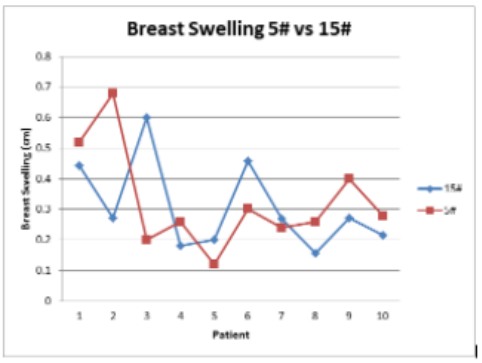

Figure 1: Results for the 10 patients with breast swelling

Purpose: The purpose of this poster is to discuss the actual impact this change in regimen has had on breast swelling. If breast swelling is identified to be a significant issue, further investigation will be needed to identify the dosimetric impact and at what point a re-plan would be required.

Summary: All patients (n=82) had online pre-treatment image verification using 2DMV planar imaging. Patients receiving radiotherapy over 5 days (n=41) had daily image verification and those patients receiving 15 treatments (n=41) over three weeks had image verification days 1-3 and weekly thereafter.

No significant difference in the number of patients suffering breast swelling was noted between the treatment arms (n=10 for both treatment arms).

	Swelling (cm)
Overall population **mean** swelling 5 fractions	0.33
Overall population **mean** swelling 15 fractions	0.31
Population **systematic** swelling 5 fractions	0.16
Population **systematic** swelling 15 fractions	0.14

Table 1: Swelling results for the 10 patients suffering swelling

Table 1 highlights the overall population mean swelling and the population systematic swelling for the 10 patients where swelling was present. T-test analysis shows no statistical significance between the two groups (p=0.4).

Conclusion: Data indicates that radiotherapy delivered over 5 days does not cause an increase in breast swelling and no further work is required.

1. Coles CE, Aristei C, Bliss J et al (2020) International Guidelines on Radiation Therapy for Breast Cancer During the COVID-19 Pandemic. Clinical Oncology Vol 32 Issue 5 pages 279-281

P050 Hypofractionated breast radiotherapy implementation as an economic and effective alternative to Brazilian healthcare

Thaise Farias Rodrigues[1]; Beatriz Mella Soares Pessoa[1]; Carlos Eduardo Colares Soares[1]; Alfredo Coimbra Reichl[2]; SensuMed
[1]Universidade Federal do Amazonas; [2]Centro de Controle de Oncologia do Estado do Amazonas

Background: Hypofractionated breast radiotherapy consists of the administration of a larger daily radiotherapy dose in a shorter period of time when compared to the international standard treatment, demonstrating non-inferiority results at follow-up. The satisfactory results presented by the British trials START (2008) and most recently FAST-Forward (2020), support this as a rising option of radiotherapy schedule.

Purpose of poster Outline: Brazil is a country of continental proportions, and although it has a free and unified health system, the population faces obstacles in accessing such services, such as long waiting times, especially in areas highly dependent on infrastructure and technology such as radiotherapy. In some regions, such as the Amazon, geographic issues including long territorial distances, rivers as the main transport routes, and the concentration of health services in the capital also directly impact healthcare access. In addition to reducing the time and costs of treatment as demonstrated previously in the British trials, implementing a hypofractionated breast radiotherapy schedule could contribute to the Brazilian reality by reducing the logistics-related difficulties: since fewer visits to the hospital would be expected, the patient would have less personal expenses related to transportation, which would finally culminate in increased treatment adherence. Such a therapeutic model could also contribute to the reduction of waiting time.

Summary of content: Brazilian healthcare system could potentially benefit from the adoption of the hypofractionated breast radiotherapy model, both by reducing costs to the health system and by increasing patient adherence to treatment, due to reduced treatment time and transportation-related costs.

1. Adrian M. B. et al. (2020) Hypofractionated breast radiotherapy for 1 week versus 3 weeks (FAST-Forward): 5-year efficacy and late normal tissue effects results from a multicentre non-inferiority, randomised, phase 3 trial. The Lancet 395, 1613-1626 Elsevier BV. 2. Bentzen, S.M. Agrawal, R.K. Aird, E.G. et al. (2008) The UK Standardisation of Breast Radiotherapy (START) Trial A of radiotherapy hypofractionation for treatment of early

breast cancer: a randomised trial.. Lancet Oncol; 9: 331-341. 3. Whelan, T.J. Pignol, J.P. Levine, M.N. et al. (2010) Long-term results of hypofractionated radiation therapy for breast cancer.. N Engl J Med; 362: 513-520.

P051 A case of multiple myeloma with plasmacytoma in the breast

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Croydon University Hospital

Background: Breast involvement by Multiple Myeloma is rare and the diagnosis is difficult because of the non-specificity of clinical and radiological features.[1] To our knowledge, only 20 patients with such involvement have been reported in the literature{2}. Clinical and radiological features are similar to other epithelial and lymphoproliferative breast malignancies and the diagnosis frequently depends on biopsy{2}.
Purpose of the poster: To provide the radiological findings seen in a synchronous presentation of osseous multiple myeloma as well as breast plasmacytoma, as reported in 7-19% of patients. {3}
Summary of content: A 41 years old pregnant lady had been attended the hospital for ongoing lower back pain which was thought to be pregnancy-related. Post-delivery, MRI spine demonstrated diffuse bone marrow infiltration, vertebra plana configuration of L1 with large circumferential paraspinal, and extradural mass causing compression of the distal cord and conus. A staging CT scan confirmed the same findings, as well as multiple soft tissue lesions in both breasts. The patient was admitted urgently and posterior decompression and fixation of L1 and L2 were performed. The case was discussed in multi-specialty MDTs. A bone marrow aspirate and paravertebral mass biopsy confirmed plasmacytoma and deposits of plasma cell myeloma. The patient was referred to the breast unit, where mammograms and ultrasound were performed followed by biopsies of the suspicious bilateral breast masses which revealed plasma cell neoplasm. In conclusion, breast plasmacytoma is a rare manifestation of multiple myeloma. The proper diagnosis changed the disease management in this case, and chemotherapy was initiated.

1.Heba O. E. Ali,1 Zafar Nasir,2 and Ahmed M. S. M. Marzouk 2019Multiple Myeloma Breast Involvement: A Case Report HINDAWI Journal Volume 2019 |Article ID 2079439 | https://doi.org/10.1155/2019/2079439 2.Antunes D, Coutinho M, Marques JC (2013) Breast Multiple Myeloma. OMICS J Radiology 2:124. DOI: 10.4172/2167-7964.1000124 3.Thais Rodrigues da Cunha Fischer1 * Fabiana Higashi1 Edvan de Queiroz Crusoe Bilateral breast plasmacytoma: a clinical case report Rev. Bras. Hematol. Hemoter. vol.38 no.2 São Paulo Apr./June 2016

P052 Staging CT in Newly diagnosed breast cancer: Are we following the guidelines

Manal Al-Kaiem; Jia Kuah; Reena Aggarwal; Miaad Al-Attar
University Hospital of Leicester

Background: Staging CT is a valuable test in the journey of patients with breast cancer. Increasingly, oncologists are requesting CT staging on all patients prior to NACT. This approach contradicts recommended guidelines. In addition to the cost implication of such approach, there is the added stress to women waiting for results and extra tests generated. We reviewed our practice and compared it to the European Society of Medical Oncology (ESMO) guidelines. Standard: ESMO recommends Staging CT in: 1-Patients with Clinically positive Nodes 2-Tumours 5 cm or more (T3) 3-Tumours with aggressive biology 4-Clinical evidence of metastasis
Method: Retrospective review of staging CT on patients with newly diagnosed breast cancers between April 2019-2020. Indications for staging CT were compared to ESMO guidelines to assess compliance. 100% compliance is expected.
Results: Our study cohort comprised 70 patients with an age range (29-89 Years). 86% were compliant with ESMO guideline. Metastatic disease was suggested in 14 patients and confirmed in 9 patients (2 patients with T3 tumours and positive nodes, 7 patients with tumours of aggressive biology and positive nodes). Five patients had false positive results and generated unnecessary follow up scans including three CT scans, one MRI and one PET-CT.
Conclusion: Our audit shows 86% compliance with ESMO guidelines. Metastases diagnosed in 9/70 (12.8%) patients. The highest rate of metastatic disease is in T3 tumours.

P053 Adenoid cystic carcinoma of the breast: A rare entity

Archita Gulati; Chandeena Roshanlall
East Cheshire Hospitals NHS Trust

Background: Adenoid cystic cancers are tumours most commonly known for their location in the salivary glands. These are however also found in the nasopharynx, trachea, uterine cervix, skin, lungs, and kidneys as well as the breast. These comprise only 0.1% of all breast cancers.<1>They usually present as a slowly growing breast mass, they have a much more favourable prognosis as compared to other breast cancers.<2> This is also in contrast to the adenoid cystic carcinomas in salivary glands. Metastasis to the lymph nodes or distant organs is rare and wide local excision and radiotherapy with sentinel node biopsy is considered adequate.
Purpose of poster: We present a case of a malignant adenoid cystic carcinoma and review the current literature to

increase awareness of its imaging findings, presentation, and appropriate management and follow up.
Summary of content: We present an overview of the clinical presentation, imaging findings including mammography, ultrasound and breast MRI and the role of MDT in planning further management of these patients.
1. Kulkarni N, Pezzi CM, Greif JM, V Suzanne Klimberg, Lisa Bailey, Soheila Korourian, et al. Rare breast Cancer: 933 adenoid cystic carcinomas from the National Cancer Data Base. Ann Surg Oncol 2013 Jul;20(7):2236-41. 2. Wang S, Li W, Wang F, et al. 36 cases adenoid cystic carcinoma of the breast in China: comparison with matched grade one invasive ductal carcinoma-not otherwise specified. Pathol Res Pract 2017Apr; 213(4):310-5.

CARDIAC / CHEST & LUNG POSTER PRESENTATIONS

P054 Incidence of indeterminate computed tomography pulmonary angiogram (CTPA) examinations during first wave of COVID-19 pandemic in a tertiary center

Hiba Abbas; Chryshane Fernandopulle; Marko Berovic; Hasti Robbie
King's College Hospital NHS Foundation Trust

Aim: To compare the incidence of indeterminate CTPAs between COVID-19 and pre-pandemic periods.
Methods: All consecutive CTPAs performed at King's College Hospital from A+E/inpatient settings were evaluated in two periods: from 01/3/2019 to 15/04/2019 and from 01/03/2020 to 15/04/2020. Positive SARS-CoV-2 RT-PCR results were recorded. One observer scored CTPAs for presence/absence of pulmonary embolism (PE), motion artefact and attenuation of the main pulmonary artery (MPA). Motion artefact was recorded when it was deemed detrimental to diagnostic accuracy. Pearson Chi-squared test was performed to compare motion artefact in COVID-19 vs non-COVID-19 groups.
Results: In the pre-pandemic period, there were 158 CTPAs (N=158, 60 males, median age=59). 17% had PE (n=27/158). Motion artefact and inadequate contrast enhancement were documented in 11.4% (n=18/158) and 12% (n=19/158) respectively. In the pandemic period, there were 238 CTPAs (N=238, 122 males, median age=57). 47.1% (n=112/238) had positive RT-PCR tests. 25.6% had PE (n=61/238). Motion artefact and inadequate contrast opacification were recorded in 39.9% (n=95/238) and 5.9%(n=14/238) respectively. CTPA examinations increased by of 50.6% during the pandemic with 8.6% increase in positive PEs. In patients with COVID-19, there was significantly higher motion artefact (25.2% (n=60) vs. 14.7% (n=35), P<0.001).
Conclusion: There is high demand for CTPAs with higher incidence of PE during the COVID-19 pandemic. Acquiring diagnostic CTPAs in severe COVID-19 can be challenging and the high incidence of indeterminate CTPAs can have adverse clinical outcomes. Careful consideration of factors such as better imaging equipment and enhanced operator training is needed to improve the diagnostic image.
1. Jones SE, Wittram C. (2005) The indeterminate CT pulmonary angiogram: imaging characteristics and patient clinical outcome. Radiology 2005; 237:329–337.

P055 Evaluating the difference in prevalence of acute pulmonary embolism on CT pulmonary angiograms for COVID-19 positive patients between the first and second waves of COVID-19

Henry de Boer; Steven Kennish
Sheffield Teaching Hospitals NHS Foundation Trust

Background: The first wave of the COVID-19 pandemic (April 2020) resulted in many escalations to critical care (CC). Computed Tomography Pulmonary Angiography (CTPA) excludes pulmonary embolism (PE). The cross-infection risks of CTPA scans were justified following a consultant clinician to consultant radiologist discussion at our institution. Evidence subsequently emerged of an increased risk of PE in COVID+ patients and the requirement for a consultant-to-consultant discussion was dropped prior to the second wave (October 2020).
Purpose: To evaluate the number of CTPA scans and positive rates for PEs during the first and second waves and establish whether the risks of cross contamination are justified.
Methods: A retrospective, single centre study evaluated 102 COVID+ patients. CTPAs for COVID+ patients for 21 consecutive days of each wave (from 1st April 2020 and from 15th October 2020) were reviewed for the presence of PEs. Gender, age and referral source were recorded.
Results: 48% of COVID+ patients had PEs on CTPA during the first wave with 16 of 33 patients referred from CC. Only 10% of COVID+ patients had PEs in the second wave with only 5 of 79 patients from CC.
Conclusion: The high positive pick-up rates for PEs in the first wave suggest that CTPA was underutilised. The greatly reduced pick-up rates of PE in the second wave suggests overutilisation of CTPA or earlier anticoagulation of COVID+ patients. Scanning more COVID+ patients puts staff and other patients at an indeterminately increased risk of cross-infection. Can we better risk stratify COVID+ patients?

Fauvel, C. et al. (2020). Pulmonary embolism in COVID-19 patients: a French multicentre cohort study. European heart journal, 41(32), 3058-3068.
Whyte, M. et al. (2020). Pulmonary embolism in hospitalised patients with COVID-19. Thrombosis research, 195, 95-99.

P056 Pictorial review of causes of acute cardiovascular collapse in the COVID-19 era

Lucinda Frank; Dominic Kite; Garrett McGann
Gloucestershire NHS Foundation Trust

Background: Observational publications have suggested an increase in delayed presentation of patients with acute cardiovascular pathology during the COVID-19 pandemic (Joshi et al, 2020). This is thought to be secondary to patient reluctance to attend Emergency departments during the pandemic and public health initiatives changing from early recognition and treatment of chest pain symptoms to staying at home and protecting the NHS. This delay in presentation has seen a rise in the diagnosis of mechanical complications of acute myocardial infarction diagnosed on CT.

Purpose of poster: We present a pictorial review of several significant cardiovascular pathologies presenting to a mid-sized acute institution during the pandemic. We aim to suggest techniques for cardiac interrogation on acute CT to identify these acute and life threatening pathologies which need to be considered alongside acute aortic syndrome as a cause for central chest pain and haemodynamic instability.

Summary of content: We will include CT angiogram images of acute ischaemic ventricular septal defect, acute false aneurysm of the left ventricle, acute papillary muscle rupture and Takotsubo cardiomyopathy. We discuss their key features to aid recognition of these important cardiac findings on acute non gated CT angiogram.

1. Joshi S, Kazmi FN, Sadiq I, Azemi T (2020) Post-MI Ventricular Septal Defect During the COVID-19 Pandemic. J Am Coll Cardiol Case Rep;2:1628-32.

P057 Imaging guided percutaneous lung biopsy: Lessons from 6 years of completed audit cycles

Pia Charters; Lynne Armstrong
University Hospitals Bristol and Weston NHS Foundation Trust

Background: Imaging guided percutaneous lung biopsy (PLB) is a widely performed test for obtaining tissue diagnosis in suspected thoracic malignancy. The procedure is associated with specific complications, including death, thus annual audit is essential to assess outcomes and maintain/improve safe and effective practice. The British Thoracic Society (BTS) has produced guidelines outlining best practice and target complication rates (2003).

Purpose: To assess local performance of imaging guided PLB against nationally agreed standards and previous local performance. To identify trends in practice over 6 years of re-audit.

Summary:

• The number of image-guided PLBs performed locally has tripled since 2013-14 (28-120).
• Complication rates including haemoptysis, pneumothorax and death were within BTS target.
• Increasing the pass-rate to ≥2 has improved diagnostic yield sufficiently (≥90% BTS).
• Documenting the specific time to perform the post-procedure CXR in writing improves accuracy over verbal communication.
• The percentage of CT-guided biopsies performed relative to ultrasound-guided is increasing. This is likely due to a combination of performer preference/skill-set, availability of CT and/or the trend towards biopsying ever-smaller lesions only accessible on CT in increasingly high-risk patients (e.g. emphysema). Furthermore, although the pneumothorax rate remains low, the percentage of patients requiring chest drains is increasing which is likely related to aforementioned factors.
• Although our figures are still within BTS guidelines (2003), PLB has evolved in both the biopsy of small central lesions rather than 'straight-to-surgery' and the histological requirement for core biopsy rather than fine needle aspirate. We propose updating the guidelines to reflect these changes in outcome and safety.

1. Manhire, A. et al, 2003. Guidelines for radiologically guided lung biopsy. Thorax, 58(11), pp.920-936.
2. Callister, M., Baldwin, D., Akram, A., Barnard, S., Cane, P., Draffan, J., Franks, K., Gleeson, F., Graham, R., Malhotra, P., Prokop, M., Rodger, K., Subesinghe, M., Waller, D. and Woolhouse, I., 2015. British Thoracic Society guidelines for the investigation and management of pulmonary nodules: accredited by NICE. Thorax, 70(Suppl 2), pp.ii1-ii54.

P058 Cardiac PET/CT - Evaluation of quality of myocardial suppression using a dedicated cardiac diet

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Background: Cardiac PET is useful in identification and monitoring of diseases causing pathological inflammation of the heart. However, sufficient suppression of myocardial activity is required to distinguish inflammatory from physiological myocardial tracer uptake.[1]

We use a dedicated high fat, low carbohydrate cardiac protocol with a prolonged fast for PET/CT scans performed for the diagnosis of cardiac sarcoidosis.

The aim of this study was to identify if our cardiac protocol was adequately supressing myocardial activity in order that inflammatory cardiac disorders could be confidently diagnosed. Our standard for this study was adequate suppression of physiological myocardial uptake in 80% of patients.[1]
Methods: All patients who underwent PET/CT for a cardiac indication from August 2018 to July 2020 were included. We used qualitative (visual Likert scale) assessment to score uptake as in previous studies.[2] We performed quantitative analyses by drawing ROI around two areas of the myocardium (SUVmax) and compared to background liver uptake.[3]
Results: 21 patients were identified according to the criteria. 14 patients followed the cardiac diet.
100% of patients that followed the cardiac diet demonstrated excellent suppression of myocardial uptake with visual score of 0 and was quantitatively below background liver. Mean myocardial SUVmax was 2.08 in those that followed the diet compared to 3.42 in those that did not.
Conclusion: This study demonstrates that our cardiac protocol provides reliable myocardial suppression in cases of suspected myocardial inflammatory disease. However, this study had a small sample size and prospective audit is necessary to ensure continued efficacy of the technique.

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[3]3Balink H, Hut E, Pol T, Flokstra FJ, Roef M. Suppression of 18F—FDG Myocardial Uptake Using a Fat—Allowed, Carbohydrate—Restricted Diet. J Nucl Med Technol. 2011 Sep;39(3):185-9. doi: 10.2967/jnmt.110.076489. Epub 2011 Jul 27. PMID: 21795368.

P059 Chest x-rays requests in elderly care, are they appropriate?

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Background: According to National Institute for Health and Care Excellence guidelines, diagnosis of pneumonia in hospital is made on the basis of new lung shadowing on Chest X-ray (CXR) which should ideally be performed within 4 hours of presentation. Working in the care of elderly, it was noted that some patients had a documented diagnosis of Community Acquired Pneumonia (CAP) with no radiological evidence on CXR. Additionally, most of CXR requests were found to be inaccurately reflecting the patient's clinical examination. This was noticed whenever the CXR request could not be justified which exposes the patients to essentially avoidable radiation. The aim of our study is to evaluate adherence to the 4 hour rule in suspected CAP, the accuracy of CXR requests and the abandonment of CAP misdiagnosis in normal CXRs.
Method: A prospective review of clerking sheets of patients admitted to elderly care unit. Patients who had a diagnosis of CAP were included. Their diagnosis was then compared to the CXR findings.
Results: 50 patients were identified with a mean age of 81.4. 86% of CXR were done within 4 hours of presentation. 12% had no radiological finding of CAP but were given the diagnosis. Only 46% of CXR requests accurately matched the documented clinical findings.
Conclusion: CXR is a valuable tool to confirm CAP but can also exclude it, therefore it is crucial to review the preliminary diagnosis of CAP after the CXR is done. Finally the request for a CXR must accurately reflect the patient's clinical findings.

P060 Patient compliance with preparation instructions for stress cardiac MR: an audit

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Background: Cardiac magnetic resonance imaging (CMR) and its perfusion modality provides invaluable diagnostic information for the presence of myocardial ischemia (sens 80-90%, spec 70-80%) and its diagnostic performance is at least equivalent to that of nuclear perfusion imaging. The preparation of patients 24h ahead of the CMR is key and entails refraining from drugs such as nitrates, nicorandil, isosorbide mononitrate, dinitrate and caffeine beverages. Preparation malcompliance may result in incomplete physiological response and subsequent inaccurate reporting.
Method: 60 consecutive individuals were scanned in March 2020 in Southampton General (UHS) and their electronic notes were reviewed for their compliance. This practice was compared against the standard Local policy and UHS guidelines in concordance with the Euro-CMR registry [1] and the SCMR-standardised protocol [2]. The standard for each section would be 100%. The results were compared with the prior compliance audit.
Results: The sample percentage that did not adhere to the preparation were 10% for caffeine and 1.6% for nitrates and rest anti-anginal drugs (N=60). The previous audit found adherence issue in 2% for caffeine and 2% for drugs

(N=50).

Conclusion: This audit highlights the need for appropriate preparation to stress CMR reflecting the importance of accurate reports. Additionally, appointment cancellation results in loss of resources (CMR and staffing). Here both audits showed a satisfactory degree of compliance (>= 90%) for both parameters. As a result, we are planning to: 1) change SMS service to specific advice for stress patients, 2) review the information leaflets with the patients representatives and audit for 3rd time.

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P061 Vascular arterial anomaly in Marfan syndrome: imaging findings

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Background: Marfan syndrome (MFS) is a genetic disorder characterized by defective formation of connective tissue. MFS affects 0.01-0.02% of individuals with an equal male to female distribution. Although distinctive signs of MFS are manifest in the skeletal system, the most serious findings involve the cardiovascular system including aortic dilatation, aneurysm formation, aortic dissection, and mitral valve prolapse. Pulmonary artery dilatation, ventricular arrhythmia, and dilated cardiomyopathy may also occur.

Purpose of poster: A 17-year-old male with MFS presented with acute onset of chest pain. ECG yielded atrioventricular conduction delay. Chest radiography revealed an increased cardiothoracic ratio, and CT performed for suspected aortic aneurysm or dissection, readily excluded diagnosis of aortic dissection. Pectus carinatum with marked dilatation of the aortic root was seen. Measurements were obtained at the levels of annulus, sinus, and sinotubular junction. Three cusp-commissure and three cusp-cusp lines of measurement in the axial plane were drawn, and aortic root area was calculated. Cross-sectional aortic root area measured approximately 15 cm2, nearly twice above normal values. In MFS, degeneration of the medial aortic wall involves disorganization and fragmentation of elastic fibers. Progressive dilatation of aortic root predisposes the aorta to dissection and rupture, which can be fatal. Our patient was treated with medical prophylaxis with b-blockers to prevent further dilatation, and underwent reconstructive surgery and grafting.

Summary Background: Patients with MFS may exhibit ongoing dilatation of the aortic root due to defective, intrinsic anatomy of the aorta. A high index of suspicion is required to diagnose life-threatening aortopathy in MFS.

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P062 Large vessel vasculitis for the general radiologist -- if you don't look, you won't see

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Background: Large vessel vasculitis (LVV) is part of a spectrum of primary vasculitides characterised by granulomatous inflammation predominantly involving the aorta and its major branches. Identifying patients with LVV may be challenging, as they often present with a combination of nonspecific clinical symptoms and laboratory results. Imaging features may be difficult to recognise but failure to make the diagnosis can lead to potentially serious complications, such as stenosis, occlusion and aneurysm formation.

Purpose: The aim of this presentation is to describe the imaging findings of LVV including its main variants, giant cell arteritis (GCA) and Takayasu arteritis (TA). Imaging features of LVV overlap with those found in atheroma and secondary vasculitis. Features which may allow distinction include uniform circumferential thickening, hypoattenuation, layered appearance, and involvement of brachial or subclavian arteries. The potential complications of LVV are also presented.

Summary: The identification of LVV may present a diagnostic challenge. Imaging features may allow the diagnosis to be suggested in advance of clinical suspicion. Early diagnosis may help to prevent potentially serious complications.

P066 Utilisation of fractional flow reserve computed cardiac tomography to drive service development of cardiac CT in a large DGH

Peter Chapman; Miguel Cervantes
HHFT

HeartFlow provides an alternative to catheter angiography, which is invasive, expensive and a limited resource, for

primary diagnosis of coronary artery disease (CAD) in patients with stable, recent onset chest pain. HeartFlow provides remote computer analysis of Computer Tomography Coronary Angiography (CTCA) data to create a three-dimensional model of the coronary arteries and model fractional flow reserve (FFR). Our Trust successfully developed a CTCA service and adopted HeartFlow technology - 58 patients underwent CTCA during the period between January and March 2020, the first complete quarter with HeartFlow implementation before the start of the COVID-19 pandemic. Five patients underwent HeartFlow analysis, only one went on to require invasive catheter angiography. The use of HeartFlow FFRCT identifies cases where no invasive interventional cardiology procedure is subsequently required, thus reducing the use of resource intensive invasive procedures and improving patient experience. This best practice abstract highlights the fact that CTCA and HeartFlow analysis should be considered as a non-invasive alternative to catheter angiography in the assessment of patients presenting with stable, recent onset chest pain. The analysis provided by HeartFlow extracts maximum value and information from CTCA data through the use of its models, aiding clinical decision making and therefore reducing the need for and burden on the invasive catheter angiography service.

1. Patel et al., (2020) 1-Year Impact on Medical Practice and Clinical Outcomes of FFRCT. JACC: Cardiovascular Imaging, 13(1), pp.97-105.

P067 Audit on Access to CTPA, Appropriateness of CTPA Requests and Whether Right Heart Strain was Reported

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Background: Pulmonary embolism (PE) is one of the important causes of morbidity and mortality. Computed tomography pulmonary angiography (CTPA) remains the investigation of choice for detecting PE.
Method: Retrospective data was searched on PACS from January 2019 to February 2020 (n=1680). Data exported to excel; RAND formula assigned to each patient to ensure randomisation. Data sorted by RAND formula column from largest to smallest. First 10% (n=168) reports were selected and reviewed. Teaching was delivered locally to clinicians. In the second cycle, retrospective data from September to October 2020 was selected and reviewed (n= 300).
Results: The percentage of CTPA requested and reported within 24 hours was 76.19%. Most of the delays were from between receipt of request and completion of scan. There were only 10.71% confirmed positive PE on CTPA. Alternative diagnoses on CTPA included respiratory infection and lung tumour. Only 48.30% of the CTPA report commented on the presence/absence of RHS. In the second cycle, there is decline seen in time between request and report, to 69.33%. 13.67% confirmed PE on CTPA is seen, showing slight improvement. There is marked improvement in reporting the presence/absence of RHS at 60.33%. Alternative diagnoses included Covid-19, heart failure and lung nodules.
Conclusion: Compared to standards set, there is suboptimal compliance. The likely reason for the fall in performance is due to the Covid-19 pandemic and time constraint from increased disinfection requirements. There is also over-requesting of scans.

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3. The National Confidential Enquiry into Patient Outcome and Death, 2019. Know the Score. London.

DENTAL / HEAD & NECK / NEURO POSTER PRESENTAIONS

P068 A retrospective audit into the satisfactory completion of general dental practitioner's radiology request forms

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Introduction: The majority of General Dental Practitioners (GDP) radiology request forms are hand written. An audit was carried out to obtain reassurance on the effectiveness of communication between GDP and Radiographers. A retrospective audit was conducted of 300 requests over a 12 month period within one dedicated dental hospital.
Aim: The aim of this audit was to investigate whether or not GDPs meet the minimum requirements in requesting radiology request forms and evaluate current referral systems. Determine which fields of interest are frequently incomplete on request forms.
Results: The audit revealed the inadequate completion of request forms by GDPs, 19% (n=558) of 3000 fields were left blank. The results of this study support the need for a redesign of dental radiology request forms within the hospital in which the audit was carried out. The results suggested that it would be beneficial for dental referrers to receive ICE

requesting training and/or IR(ME)R training to increase their awareness of the importance of meeting the standards for requesting examinations and completing requests.

Conclusion: Electronic requesting for radiological examinations is common most modalities; this is not the case for dental requests as the majority are formalised letters or handwritten requests. Electronic requesting for dental radiological examinations should be encouraged or trialled to prove it can improve efficiency of communication between GDPs and operators. There is a significant problem in the lack of completion of GDP radiology request forms.

Department of Medical Imaging and Medical Physics (2019) Radiation Regulations Important Information for Referrers. [guidelines] X NHS Trust. The Ionising Radiation Medical Exposure Regulations (2017). [online] Available at: http://www.legislation.gov.uk/uksi/2017/1322/made[Accessed 4 September. 2019]. The Royal College of Radiologists (2017). iRefer: Making the best use of clinical radiology. 8thed. London: The Royal College of Radiologists.

P069 Can PMCT provide the information required for dental analysis to confirm patient identification?

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Background: The identification of a deceased individual is one of the primary questions that must be answered. This can be complicated for many reasons, such as the circumstances of death and the number of casualties. Odontology is one of the primary identifiers, along with ridgeology and DNA evaluation (Interpol, 2018). Dental identification can be completed by a visual examination of the teeth and comparison with previous dental records. However, the accuracy of this assessment is considerably improved by imaging techniques, particularly if ante mortem imaging is available. Conventional dental radiographs have been a significant element of the dental identification process for many years to identify the presence and position of teeth/dental restorations, as well as to detect trauma and pathology. More recently, the use of Post Mortem Computed Tomography (PMCT) has become common in the general post mortem pathway and in forensic death investigations.

Purpose of poster:

Learning Outcomes:

- Explain the Disaster Victim Identification process
- Describe the options for odontological imaging of the deceased
- Propose an imaging protocol

Application to Practice:

- Demonstrate the set of images that can be used to support dental identification without adding significant time to the imaging pathway.

Summary of content: The poster will present an overview of the Disaster Victim Identification process, the role of odontology in identification of the unknown deceased, the rationale for using dental PMCT for odontological assessment, propose an imaging dataset that demonstrates dental findings satisfactorily and identify limitations with the technique.

Interpol, 2018. Disaster Victim Identification Guide, s.l.: Interpol.

P070 An Evaluation of the Role Imaging Plays in the Investigation of Vocal Cord Paresis

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Royal Cornwall Hospitals NHS Trust

Although many cases of vocal cord paresis are idiopathic, it is important to recognise that a vocal cord palsy can often be a sign (or the only sign) of more sinister underlying pathology, such as malignancy1. For this reason, vocal cord paresis is a common indication for performing cross-sectional imaging in head and neck radiology. There is however no consensus opinion on a particular imaging strategy in this particular context, thus everyday practice widely varies across the UK2. Even the RCR offers no guidance on specific imaging for patients presenting with a vocal cord palsy3. We conducted a retrospective analysis of the imaging undertaken for 226 patients presenting with a clinically proven vocal cord palsy over a ten-year period and discovered differences in imaging strategies even within our own NHS trust. This poster presents the salient findings of our service evaluation and outlines a simple imaging strategy we have now implemented into local clinical practice that offers potential time and financial savings without impacting diagnostic accuracy.

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P071 Cosmetic fillers masquerading as pleomorphic adenoma: A case-based discussion on the implications of the cosmetic industry in our NHS

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East Suffolk and North Essex Foundation Trust

Background: Aesthetic Medicine is a rapidly evolving branch of medicine which utilises non-surgical techniques to enhance the appearance of the skin, face and body [1]. We have seen an exponential increase in demand for such procedures in recent years, as well as the number of practitioners performing them. Little regulation of the industry currently exists and inevitably, in line with increasing procedures, we are seeing increasing complications. Currently there are no established pathways for follow up or management of complications, thus diverting such issues to NHS services.

Purpose of poster: We intend to present a case of a 33 year old patient who presented with a 3 month history of a painless left neck lump. Otherwise systemically well Targeted ultrasound demonstrated a superficial heterogeneous lesion. Histological analysis from fine needle aspiration raised suspicion of atypical pleomorphic adenoma. Subsequent MRI demonstrated similar cystic lesions in the face and both sides of the neck. Further history revealed previously undisclosed cosmetic filler injection, in both cheeks.

Summary of content: The objective of this case report is to demonstrate complications of cosmetic procedures and to raise awareness of this novel diagnosis, to be considered in differential diagnoses. We will discuss the impact of investigation and misdiagnoses on the patients wellbeing as well as the National Health Service.

1. Prendergast, P.M. and Shiffman, M.A. (2011). Aesthetic Medicine. Springer-Verlag Berlin Heidelberg. DOI 10.1007/978-3-642-20113-4.

P072 The out of field CT head protocol: a retrospective audit

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The Out of Field Computed Tomography (CT) Head protocol (OOFH) is aimed at patients with hyperkyphosis, who are unable to fit within the head field of view (FOV). This protocol is not widely known in the radiography community. The aim was to investigate if the protocol was utilised appropriately and effect of the beam hardening artefact and spatial resolution on the image quality. The retrospective audit examined fifty-four OOFH CT scans undertaken between 1/2/19 --1/2/20 across two sites and four GE CT scanners. The audit included: patient demographics, time of scan, scanners used, radiographers, CRIS comments, the dose length product (DLP), Computed tomography dose index (CTDI)vol, if artefact was commented upon in the report. The IQ was assessed using Likert scale by a CT head reporting radiographer and CT radiographer. The protocol was used infrequently, there was a trend in specific radiographer over-usage. The average DLP was 510mGycm and CTDIvol 27.2mGy, indicative of being above isocentre. The was differing effects of the protocol on IQ and occasionally, minimal beam hardening. The differences in appear to relate to atrophy present and could relate to patient positioning. In summary, the presence of the cupping artefact is undeniable in this protocol. In some cases, the beam hardening does decrease the diagnostic sensitivity of the examination. However, the protocol has a clear advantage in providing diagnostic information where other protocols cannot. Further research and training are recommended. Limitations of the audit is it does not account for instances where the protocol was re-selected.

P073 CBCT referrals during COVID -- a clinical case report of undiagnosed dental pain

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The COVID lockdown has created difficulties for patients to access care. The objective of this clinical case report is to highlight the role of CBCT as an easily-accessible, fast, low-dose imaging technique that could have made a difference to some patients when treatment options were limited. At the beginning of the pandemic, a 57-year-old-woman developed pain in the upper right dental quadrant. Following a course of anti-inflammatory medication, limited (non-AGP) dental procedures were performed over time as the pain was not subsiding (UR8 removed in April 2020, the UR7 6 weeks later). In July, the upper molar sockets were cleaned and the UR6 was root-canal treated. In August, the patient was referred to a Maxillofacial Surgeon. 2D imaging suggested periodontitis and bone loss. The sockets had healed but a CBCT referral was done to investigate a palatal swelling and a tiny lump around the UR6-7. The CBCT (JMorita Accuitomo, 60x40mm FOV, 90kV, 5mA, 125microns) confirmed the presence of a large ill-defined radiolucency in the posterior right maxilla communicating with the maxillary sinus floor. The destruction of the

maxillary tuberosity suggested malignancy. From the CBCT scan, the surgeon was also able to plan the optimum 3D location for biopsy. Access to CBCT imaging during the lockdown was fast but non-specialist teams may not have been aware of its usefulness in problem-solving. This report encourages non-specialist clinicians to broaden their knowledge of CBCT which has wide applications in the head & neck and orthopaedics.

P074 Importance of continued compliance of trust guidelines in NG tube placement

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Royal Free London NHS Foundation Trust

Background: The most common serious complication of a nasogastric tube is not identifying a misplaced tube within the lungs(Scott and Bowling, 2015). Those that are unable to aspirate a sufficient fluid are of uncertain positioning, and chest x-ray would be the most cost-effective method for further assessment (McFarland, 2017). When this is performed by an untrained clinician, particularly a junior one, there is reasonable risk of misinterpretation (Tierney et al., 2017). When this takes a prolonged period of time there is a loss of feeding time, and risk of chance of clinical staff self reporting. IT is important to have clear local guidelines and to ensure the correct implementation of these guidelines.
Purpose of poster: The learning outcomes are: - To show the benefit of good local NG placement guidelines to reporting practices - To show the importance of continued audit and local teaching of the guideline
Summary of content: The poster will detail the importance and risks of correct NG tube placement, and present the outcome of three successive audits into the reporting time of NG tube placement confirmation x-rays, showing clear improvement after local intervention, and then regression when the local interventions were no longer followed. The poster will be laid out with the background information and teaching about NG tubes, with further sections on the target standards, methodology, audit results shows pictorially, and the conclusions drawn with the actions taken.

1. McFarland, A., 2017. Journal of Advanced Nursing 73, 201–216.
2. Scott, R., Bowling, T.E., 2015. Journal of the Royal College of Physicians of Edinburgh 45, 49–54.
3. Tierney, M., Sibley, C., Leach, Z., Rutter, C., Pither, C., Smith, T., 2017. PTU-117 Chest xray interpretation of nasogastric tube placement by medical registrars: how safe is it?, in: Gut. BMJ, p. A108.2-A109.

P075 Extended-CBCT imaging pathway to guide interventions during radical radiotherapy to the head and neck

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Background: Head and neck cancer (HNC) patients experience anatomical changes and weight loss during radical radiotherapy; reducing precision of dose delivery to delineated volumes. 3D-imaging allows visual assessment of structures, however, the field of view of a head CBCT alone does not allow acquisition of all volumes. This audit of practice reviews an extended-CBCT pathway which replaced CT verification (CTveri).
Methods: Daily online matching (2DKV-KV) was performed on TrueBeams v.2.7. A post-treatment fraction 16 extended-CBCT was acquired by merging a superior head and inferior thorax scan online, encompassing all planning volumes. Images were assessed offline by a clinical oncologist (CO) to determine if CTveri to verify plan dosimetry was necessary. Electronic pathway tasks tracked the stage of image review and planning interventions.
Results: Seventy-one patients were evaluated between 25th May-7th September 2020, of which 69 had extended-CBCTs acquired and 2 patients had CTveri at the CO's request. Patient and treatment characteristics are displayed in table 1. Median days from acquisition to CBCT image review by the CO was 1 (IQR 0-3). Nine (13%) patients underwent a CTveri based on assessment of the extended-CBCT; 6 of these occurred in the first month. Median days from the CTveri to the verification plan outcome was 2 (IQR 2-4). 4 patients received a plan revision (table 2).
Conclusions: The majority of patients did not require treatment interventions. The process has reduced verification CT's and increased CT resources. Image review is now undertaken by our advanced practitioner radiographer.

Table 1: Patient & treatment characteristics

Number of patients:		n=71
Gender	Male	56
	Female	15
Mean age (range)		62 (37 - 84)
Radiotherapy mean dose (Gy) (range)		64.33 (59.60 - 66.74)
Fractions		30
Treatment: Volumetric Arc Therapy (VMAT)		6MV Photons
Imaging: CBCT Slice Thickness		2mm
Sub-site		**n (patients)**
Hypopharynx		4
Oral cavity		11
Salivary gland		3
Larynx		8
Post Pharyngeal Wall		1
Oropharynx		32
Unknown primary		3
Nasopharynx		2
External auditory canal		1
Sinonasal		6

Table 2: Patient re-scan reasons based on CBCT review

Patient	CT - justification	PTV volume change	OAR volume change	Plan re-optimised	New plan issued Y/N	Fraction plan revision commenced	Treated Sub-site
1	Medic request - concerns regarding dosimetry.	No	No	No	No		Base of Tongue
2	Medic request - concerned by neck flexion. Check dosimetry.	No	No	No	No		Base of Tongue
3	Medic request - dosimetry check. Gaps at shoulders.	No	No	No	No		Oropharynx
4	Medic request - Gaps in shell, set up variation. Shell adjusted by mould room.	No	No	No	No		Base of Tongue
5	Medic request - Gaps in shell at shoulders & chest. Dosimetry check. Shell adjusted by mould room.	Yes	Yes	Yes	Yes	20	Base of Tongue
6	Medic request - Set-up variation and neck flexion. Check dosimetry.	No	Yes	No	Yes	20	Oropharynx
7	Medic request - Gaps in shell at shoulders & chest. Dosimetry check. Shell adjusted by mould room.	No	Yes	No	Yes	10	Tongue
8	Medic request - dose looked closer to brainstem and spinal cord. Dosimetry check.	No	No	No	No		Tonsil
9	Medic request - Disease progression suspected. Dosimetry check.	Yes	Yes	Yes	Yes	9	Soft Palate

P076 Early Diagnosis of Collet-Sicard Syndrome Secondary to Metastatic Lung Adenocarcinoma: A Case Report

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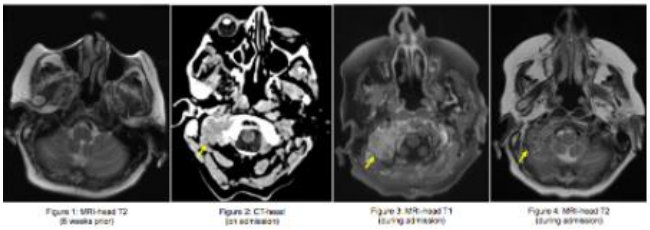
Guy's and St Thomas' NHS Foundation Trust

Case presentation: A 60-year-old woman with treatment-naïve lung adenocarcinoma presented to her GP with a one-week history of headache. She was discharged with analgesia but re-presented with worsening pain. Past medical history include new diagnosis of T4N3M0 lung adenocarcinoma and migraine. The headache involved the right parieto-occipital region and cervical para-spinal muscles. She described intermittent numbness on her right tongue during mastication. Examination demonstrated reproducible pain on palpation but was unremarkable for neurological deficits, visual changes, meningism, and arteritis. MRI-head 6 weeks prior showed no intracranial disease and initial CT-head on admission was reported normal (Figures 1,2). Her pain remained refractory to opioids resulting in a repeat contrast-enhanced MRI-head revealing a large metastatic deposit on the right postero-lateral skull-base with dural infiltration and evidence of Collet-Sicard syndrome (Figures 3,4). She was started on high-dose steroids with symptom improvement and proceeded to have skull-base radiotherapy followed by systemic therapy.



Discussion: Collet-Sicard syndrome is a rare variant of jugular foramen syndrome with involvement of cranial nerves IX-XII. Skull base metastasis is unusual and often occurs in the context of prostate cancer or systemic cancer (1). In our case, the patient presented with radiological Collet-Sicard syndrome with intermittent tongue paraesthesia due to involvement of the glossopharyngeal nerve. This case highlights the importance of MRI in at-risk patients even with a reported normal CT-head. Compared to CT, MRI has better tissue resolution and sensitivity for bone metastasis (2). Furthermore, contrast-enhanced MRI can work-up differential diagnoses (e.g leptomeningeal carcinomatosis) in oncological patients with unexplained

(1) Hayward D, Morgan C, Emami B, Biller J, Prabhu VC. Jugular foramen syndrome as initial presentation of metastatic lung cancer. J Neurol Surg Rep. 2012;73(1):14-18. doi:10.1055/s-0032-1301406
(2) O'Sullivan GJ, Carty FL, Cronin CG. Imaging of bone metastasis: An update. World J Radiol. 2015;7(8):202-211. doi:10.4329/wjr.v7.i8.202

P077 Introduction of radiographer screening for brain metastases in patients with a known primary cancer

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The Christie Hospital NHS Foundation Trust

Background: Brain metastases are a known neurologic complication of cancer with an increasing number of MR brain scans performed each year to rule out the presence of metastases. A large percentage of these scans are for 'screening' purposes either for trial eligibility or maintenance of high risk patients. At the time all scans were reviewed by a radiologist whilst the patient remained in the department.
Method: A clinical audit was undertaken over an 8-month period. All referrals for scans to exclude a new diagnosis of brain metastases were included. Radiographers were prospectively asked to record whether an examination was normal, metastases were present, or whether any confounding pathology was present. Radiographer opinions were then compared with the "gold standard" of the radiologists' final report.
Result: A total of 429 patients were included in the audit. For normal versus abnormal the radiographers demonstrated an accuracy of 91%, with sensitivity 81% and specificity of 94% showing 'substantial agreement'. For the presence of metastases radiographers demonstrated an accuracy of 88%, with sensitivity 98% and specificity of 76% indicating 'substantial agreement'.
Conclusion: Trained radiographers showed a high accuracy in screening MR brains to exclude brain metastases. This lead to a change to the patient pathway as the radiologist is now only contacted in the event a scan may be positive. This change has resulted in improved efficiency in both radiographer and radiologist workflows and patient waiting times reduced.

P078 Thrombosis of the Forgotten Vein!

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Cwm Taf Morgannwg UHB

We present three patients with Internal Cerebral Vein Thrombosis (ICV) whose initial scans were reported as normal. Diagnosis was made by confirmatory CT Venography. On retrospective review of these cases the ICV thrombosis was clear on the non-contrast CT Head, the clinical presentation of these patients was also fairly typical. These 3 cases highlight the importance of being aware of the clinical presentation of ICV thrombosis, once the symptoms are appreciated the signs of ICV thrombosis become clear. Look and you will see! We summarise the location, appearance

and anatomical vascular drainage of the internal cerebral veins. Acute thrombosed veins will be of high density on CT and usually associated with thrombosis of one or both of the transverse sinuses. There can be low density in one or both of the thalami which can be misreported as a glioma.

Kumar, P et al (2017) Deep Cerebral Vein Thrombosis: A Clinical Masquerader. Journal of Clinical and diagnostic Research; 11(4): 16-18.

P080 Imaging of recurrent ischaemic stroke may have implications of a factor V Leiden mutation

Stavroula Theodorou[1]; Daphne Theodorou[2]; Vasiliki Tsaggou[2]; Soultana Papadopoulou[1]; Dimitrios Drosopoulos[1]; Margarita Kitsanou[1]

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Background: Factor-V Leiden (FVL) syndrome, representing gene mutation for coagulation factor-V, is associated with thrombophilia and venous thromboembolic disease. Accumulating evidence indicates that FVL mutation may predispose children and young adults to cerebral arterial ischaemic stroke.

Purpose of poster: We discuss the clinical-imaging presentations of recurrent cerebellar infarction in a young patient with FVL thrombophilia. Demographics show that 3% to 8% of the Caucasian population are heterozygotes of inherited thrombophilia, having up to 10-times increased risk for developing clots, whereas homozygotes have a 50- to 100-fold risk of thrombosis. FVL mutation is associated with an increased risk of stroke especially in women, smokers, and younger individuals. Ischaemic stroke resulting from inherited thrombophilic disorders, however, may involve any arterial territory and often affects multiple territories. The primary aims of imaging patients with thrombophilic disorders are to establish definite diagnosis of a single or recurrent ischaemic event, and to provide clues with regard to possible prognostication, treatment and long-term prophylaxis. A 24-year-old woman with prior history of ischaemic stroke in distribution of the superior cerebellar artery was found unresponsive at her home. On admission she was lethargic and confused with limb ataxia. Brain CT excluded acute haemorrhage and revealed a large infarct, in distribution of the posterior inferior cerebellar artery. MRI/diffusion-weighted imaging confirmed diagnosis of recurrent cerebellar stroke. PCR documented heterozygous FVL mutation. Patient was started on anticoagulants.

Summary of content: Neuroimaging provided strong evidence of recurrent ischaemic stroke in a young patient, raising suspicion of inherited coagulopathy, which prompted appropriate management.

1. Ghalaut P, Duhan J, Chaudhary V, et al (2014). Ischemic stroke in a patienr with heterozygous V Leiden mutation: an uncommon association. Ind J Hematol Blood Transfus 2014; 30:S335-337 2. Hamedani A, Cole J, Mitchell B, et al (2010). Meta-analysis of factor V Leiden and ischemic stroke in young adults. Stroke 41:l599-1603 3. Marinella M, Greene K (1999). Bilateral thalamic infarction in a patient with factor V Leiden mutation. Mayo Clin Proc 74:795-797

P081 Giant arteriovenous malformation with stroke-like presentation: CT and MR findings

Stavroula Theodorou[1]; Daphne Theodorou[2]; Vasiliki Tsaggou[2]; Soultana Papadopoulou[1]; Dimitrios Drosopoulos[1]; Margarita Kitsanou[1]

[1]University Hospital of Ioannina, Greece; [2]General Hospital of Ioannina, Greece

Background: Arteriovenous malformations (AVMs) are congenital vascular abnormalities occurring with a prevalence of 0.68/100,000 patients. When symptomatic, AVMs present before 40years of age. Because AVMs may mimic acute ischaemic or haemorrhagic stroke, angiographic studies are mandatory to establish correct diagnosis.

Purpose of poster: We revisit cerebral AVMs and flag for the attention of radiologists who need to be aware of occasionally misleading, stroke-like case presentations. In the emergency setting, brain CT studies need to be supplemented with angiography (CTA) to depict underlying vascular structural anomaly in detail, and prevent intravenous fibrinolysis that could cause intracerebral haemorrhage and death. Patients with AVMs may present with acute onset of headache, slurred speech, weakness, and seizures. On CT, AVMs may not be readily apparent as the nidus is moderately hyperdense compared to adjacent brain and anomalous, shunting vessels can be obscure. With CTA, diagnosis of AVMs is straightforward, with depiction of the nidus assuming characteristic "bag of worms" configuration, and anomalous feeding and draining vessels. A 47-year-old woman with stroke-like symptoms underwent brain CT. A large, hyperdense lesion resembling brain haematoma with an adjacent subdural haematoma and brain midline shift were initially appreciated. CTA (with maximum intensity projection-MIP and shaded surface display-SSD images) revealed a giant, complex cerebral AVM with markedly dilated feeding arteries and draining veins. There was no haemorrhage or haematoma. MRI confirmed diagnosis of complex AVM. Patient was prompted for neurosurgery consultation.

Summary of content: Brain AVMs may masquerade as stroke and need to be investigated with dedicated angiographic survey.

1. Mirzaa G, Conway R, Graham JM, et al (2013). PIK3CA-Related Segmental Overgrowth. In: Adam MP, Ardinger HH, Pagon RA, Wallace SE, Bean LJH, Stephens K, Amemiya A, editors. GeneReviews. Seattle (WA): University of Washington, Seattle 2. Mirzaa G, Timms AE, Conti V, et al (2016). PIK3CA-associated developmental disorders exhibit distinct classes of mutations with variable expression and tissue distribution. JCI Insight 1(9):e87623 3. Park HJ, Shin CH, Yoo WJ, et al (2020). Detailed analysis of phenotypes and genotypes in megalencephaly-capillary malformation-polymicrogyria syndrome caused by somatic mosaicism of PIK3CA mutations. Orphanet Journal of Rare Diseases 15:205

P082 Under Pressure!

Stuart Baines[1]; Dale Binley[2]; Rhian Rhys[2]; Shawn Halpin[2]
Cwm Taf Morgannwg UHB

Caroticocavernous fistulas (CCF) represent an abnormal communication between the carotid circulation and the cavernous sinus. Radiology plays a vital role in suggesting the diagnosis within the correct clinical context. We aim to radiologically classify the 'Direct' and Indirect' CCF. We will detail the typical clinical presentation which includes isolated cranial nerve palsies which traverse the cavernous sinus (CN's 3, 4, and 6) and proptosis. We also aim to provide a systematic process for reviewing a CT Head scan that gives the reporting radiologist/radiographer the best chance of suggesting the CCF diagnosis.

P083 Rare aortic arch and circle of Willis variants and their implications in clinical practice

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Barts Health NHS Trust

Background: Variant aortic arch anatomy is common with only 75% of the population having "normal" anatomy. Aortic arch variants have important associations with congenital heart disease and implications for the course of surgical and interventional procedures. Circle of Willis (CoW) anatomical variants are equally prevalent and have implications for the maintenance of intracerebral perfusion, with complete CoW associated with lower risks of intracranial haemorrhage following thrombolysis as well as implications for neuro-interventional approaches.
Purpose of poster: We aim to describe a variety of aortic arch and circle of Willis anatomical variants identified on aortic arch and intracranial CT angiography, including their implications for clinical practice and the likely embryological origins and their associations. Such examples include right sided aortic arch, agenesis of the left common carotid artery with the left internal and external carotid arteries arising from the aortic arch, duplicated MCA, aberrant right subclavian artery with concurrent common origin of the brachiocephalic and left common carotid artery, left vertebral artery origin from the aortic arch with contralateral vertebral artery dominance, hypoplastic and accessory intracranial arteries.
Summary of content: This educational poster will include CT angiographic imaging of these anatomical variants of the aortic arch and the circle of Willis, subsequent changes seen in the remaining vasculature, the proposed embryological origins of the underlying vessels and the importance for cerebral perfusion and pre-surgical/interventional planning. The ultimate aims are to provide a greater insight for the UKIO delegate of these variants, leading to improved recognition and ultimately to better patient care.

P084 Sensorineural hearing loss? The curious case of the cavernous malformation

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Barts Health NHS Trust

Background: Superficial siderosis (SS) is a rare condition in which there is deposition of haemosiderin within the subpial layers of the central nervous system, which can lead to sensorineural hearing loss (SNHL). Cerebral cavernous malformations (CCMs) may present with headache or neurological deficit. Atypical locations can easily baffle the uninitiated radiologist, and knowledge of emerging imaging techniques can significantly aid in diagnosis and patient management.
Case presentation: A 32 year old male presented to the emergency department with a four week history of intermittent headache with recent progressive SNHL. Computed tomography (CT) showed an 8mm hyperdense nodule adjacent to the frontal horn of the right lateral ventricle. Dual-energy spectral CT indicated the lesion had a combination of calcification and haemorrhage. Magnetic resonance imaging (MRI) also demonstrated susceptibility artefact and blood products in the lateral ventricles and susceptibility artefact along cerebellar folia, suspicious for SS, with no other lesion to account for the SNHL.
Learning points:
1) Clinical and radiological manifestation of CCMs and SS.
2) Use of dual-energy CT to aid diagnosis of CCMs.
3) SS is a potential cause of SNHL.
4) Susceptibility- and T2-weighted imaging are most sensitive in detecting SS.
5) If SS is suspected, complete imaging of the neuroaxis should be undertaken to find the underlying cause.
Summary: Our educational poster will describe an unusual case of a CCM leading to SS and unilateral SNHL, with CT, dual energy CT and MRI images, and highlight important learning points for the radiological diagnosis of both entities.

AI / IMAGING TECHNOLOGIES POSTER PRESENTATIONS

085 Diagnosis of normal chest x-rays using an autonomous deep learning algorithm

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Behold.ai

Background: Deep Learning (DL) algorithms demonstrate great potential to assist radiology departments in managing capacity and improving diagnostic accuracy. Chest X-rays (CXRs) are frequent and complex diagnostic imaging tests, with a significant proportion reported as being normal.
Purpose: To evaluate the suitability of a DL algorithm for identifying normality as a rule out test for fully automated diagnosis in frontal adult chest X-rays in an active clinical pathway.
Materials And Methods: This multi-centre study included 3,887 CXRs from 4 distinct NHS institutions. A Convolutional Neural Network (CNN) was developed and trained prior to this study and used to classify a subset of exams with the lowest abnormality scores as High Confidence Normal (HCN). For each radiograph, ground truth (GT) was established using two independent reviewers and an arbitrator in case of discrepancy.
Results: The DL algorithm was able to classify 15% of all exams as HCN, with a corresponding precision of 97.7%. We show 0.33% of exams were incorrectly classified as HCN, with 84.6% of these exams identified as borderline cases by the radiologist ground truthing process.
Conclusion: We show a DL algorithm can achieve a high level of precision as a fully automated diagnostic tool for reporting a subset of CXRs as normal. The removal of 15% of all CXRs has the potential to significantly reduce workload and focus radiology resources on more complex exams. To optimise performance, site-specific deployment of algorithms should occur with robust feedback mechanisms for incorrect classifications.

P086 Exploring the impact of artificial intelligence software on radiographic practice- a triage tool for radiographers

Richard Tucker; University of Derby; Josie King
Nottingham University Hospitals NHS Trust

Background: Artificial Intelligence (AI) has been at the forefront of technological advances in radiology, becoming a popular tool in supporting reporting backlogs. The focus of AI in radiology has been aimed at the role of the radiologist. The role of the radiographer's integration of AI is just gathering momentum and has not been fully explored. This audit aims to explore the potential impact of an AI application on the radiographer's role, and how AI could be used in clinical practice.
Method: A pre trained AI programme was applied retrospectively to 40 mobile CXR's acquired over 1 month at one trust. 20 images were selected for analysis, pseudo anonymised and stored in a viewing test bed. Radiographers (n=15) were asked to analyse the CXR without the AI overlay and denote whether they thought the CXR was normal or abnormal. The same radiographers viewed the images again, this time with the AI applied and the same questions asked.
Results: This poster will present the findings of the audit and highlight any significant changes in the responses the radiographers gave.
Summary: Areas that will be explored are the radiographer's detection of abnormality accuracy, confidence in escalating findings if the image was abnormal (highlighted by human or AI), and who the radiographers chose to escalate their findings too. The hypothesis is to test whether AI can be safely used supporting the radiographer for escalating urgent findings for faster and timelier decision making.

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P087 Exploring diffusion-weighted imaging (DWI) within magnetic resonance cholangiopancreatography (MRCP) for the detection of pancreaticobiliary cancer

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NHS Scotland

The Scottish Government (2019) states that early detection of cancer can reduce premature death and have a positive effect on overall life expectancy. As cancer is becoming a growing concern in the UK, it is important to acknowledge any method that will help improve its detection[1]. MRCP is used for cancer pathways according to NICE Guidelines (2019)[2]. MRCP is a magnetic resonance imaging (MRI) examination that investigates pancreatic-biliary disorders.

Some pitfalls of MRCP include respiratory artefact and gas and debris mimicking pathology[3]. MRI uses a unique tool called DWI. DWI provides information about the microstructural characteristics of tissues by detecting the motion of water molecules in the body[4], this can be seen in the image below. DWI can provide valuable information which can aid and evaluate detection of pathologies and carcinomas[5]. GG&C does not routinely include DWI in a MRCP protocol; a literature review was carried out to assess if DWI could help in the detection of pancreaticobiliary cancers.

[1]THE SCOTTISH GOVERNMENT, 2019. Scottish referral guidelines for suspected cancer. Scotland: Community Health and Social Care Directorate. [viewed 15.10.2020]. [2]NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE, 2018. Pancreatic cancer in adults: Diagnosis and management. England: National Guideline Alliance. [viewed 14.10.2020]. [3]GRIFFIN, N., CHARLES-EDWARDS, G. & GRANT, L.A., 2012. Magnetic resonance cholangiopancreatography: the ABC of MRCP. Insights Imaging. 3(1), pp.11-21. [4]BITTENCOURT, L., MATOS, C. & COUTINHO, A.C., 2011. Diffusion-Weighted Magnetic Resonance Imaging in the Upper Abdomen: Technical Issues and Clinical Application. Magnetic Resonance Imaging Clinics of North America. 19(1), pp.111-131. [5]YAO, X., KUANG, T., WU, L., FENG, H., LIU, H., CHENG, W., RAO, S., WANG, H. & ZENG, M., 2014. Optimization of MR diffusion-weighted imaging acquisitions for pancreatic cancer at 3.0T. Magnetic Resonance Imaging. 32 (7), pp.875-879. [6]MAAROUF, R.A., ZIDAN, D.Z. & EL-SHINNAWY, M.A., 2013. The added value of diffusion-weighted MR imaging to MR cholangiopancreatography in differentiating malignant from benign extra hepatic biliary strictures. The Egyptian Journal of Radiology and Nuclear Medicine [online]. 44(4), pp.719-726. [7]KANG, K.M., LEE, J.M., SHIN, C.S., BAEK, J.H., KIM, S.H., YOON, J.H., HAN, J.K. & CHOI, B.I., 2013. Added Value of Diffusion-Weighted Imaging to MR Cholangiopancreatography With Unenhanced MR Imaging for Predicting Malignancy or Invasiveness of Intraductal Papillary Mucinous Neoplasm of the Pancreas. Journal of Magnetic Resonance Imaging. 38, pp.555-563. [8]PARK, H.J., JANG, K.M., SONG, S.H., KIM, Y.K., CHA, M.J., CHOI, S.Y. & MIN, K., 2017. Value of unenhanced MRI with diffusion-weighted imaging for detection of primary small (<20mm) solid pancreatic tumours and prediction of pancreatic ductal adenocarcinoma. Clinical Radiology. 72(12), pp.1076-1084.

DOSE / RADIATION PROTECTION / IMAGING TECHNOLOGIES POSTER PRESENTATIONS

P088 Erect versus supine lumbar spine radiographs: experiences in the clinical environment regarding quality, dose and pathology

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Background: Radiography of the lumbar spine is traditionally performed supine,[1] although there is inconsistency in acquisition techniques within the literature. Previous work has focused on the dose reduction opportunities of PA imaging[1,2] but this study sought to incorporate this with the functional outcomes of weightbearing to implement a standardised PA and lateral erect technique.

Method: A retrospective audit and prospective acquisition phase compared patient demographics, image quality and pathological outcomes for supine and erect radiographs of non-trauma lumbar spine. Effective doses were calculated using PCXMC.

Results: There were demographic differences between the 144 retrospective and 50 prospective examinations (mean age: 65 vs 57yrs; $p<0.05$. mean BMI 29.1 vs 32.3; $p<0.05$) although gender profiles were similar (female 70% vs 73%; $p=0.728$). Effective dose was on average 30.6% lower for the PA examination ($p<0.05$), although a mean 14% increase was evident in the lateral dose ($p=0.492$). Image quality and intervertebral disc space visualisation was improved in the erect position and it also provided evidence of a leg length discrepancy in 14% of patients.

Conclusion: This small-scale evaluation has demonstrated that the erect position can facilitate dose reduction, image quality improvements and pathology not appreciated on supine examinations. Further evaluation and optimisation is required prior to adoption into standard practice.

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2. Alukic, E. & Mekis, N., 2019. Lumbar spine radiography: lower organ dose with the use of the PA projection. Radiation Protection Dosimetry, pp. 1-6.

P089 Tip apex diameter in dynamic hip screw fixation. Audit to assess practice at an acute general hospital

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Dynamic Hip Screw(DHS) is a procedure used in orthopedics for the fixation of extra-capsular neck of femur fractures. A complication of this procedure is the screw cut out from the femoral head, the prognosis of which is observed through the tip apex distance which is the distance from the tip of screw to apex of the femoral head. A distance of less than 25mm shows a good prognostic value. The purpose of this audit was to see if the principle Tip apex distance were effectively put into practice at a local DGH. A retrospective study was performed using the local NOF audit data for the hospital. 60 Cases over a period of 7 months from January 2018 to July 2018 were assessed. The TAD of each case was measured individually by using intraoperative imaging available on PACS. The measurements were calibrated to minimise projection and magnification errors. Each case was followed up using medical records to look for any postoperative complications. Grade of performing surgeon and intraoperative radiation time was also recorded. The

results of the audit showed 10% of fixation had a TAD greater than 25mm irrespective of the grade of performing surgeon. The audit emphasises the principal of TAD in improving the outcome for patient and reducing the chance of a cut off.

1. Trigkilidas, D., Murphy, G. and Wallace, D., 2010. Tip to Apex Distance in DHS Fixation. An audit of practice at a district general hospital. The Internet Journal of Orthopedic Surgery, 16(1). 2. Baumgaertner MR, Curtin SL, Lindskog DM, Keggi JM (1995) The value of the tip-apex distance in predicting failure of fixation of peritrochanteric fractures of the hip. J Bone Joint Surg Am 77: 1058-1064.

P090 Minimising radiation dose in computed tomography of kidneys, ureters and bladder (CT-KUB)

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Computed tomography of the kidneys, ureters and bladder (CT KUB) is the gold-standard imaging investigation to assess patients with acute renal colic.(1) It has a sensitivity of 97% and specificity of 95% for the diagnosis of urinary stones, which is a common presentation amongst younger patients (2). The main disadvantage, is that the scan imparts ionising radiation to such patients. One way to reduce the radiation dose is by optimizing the field of view (FoV) of the scan as recommended by Royal College of Radiologists and included in the British Association of Urological Surgeons guidelines (1,2) Extending further than these limits unnecessarily irradiates the patient with no further diagnostic yield. Standards used :The Royal College of Radiologists recommends the FOV for a CTKUB should be from T12 to the the symphysis pubis(1,2). Radiation dose (DLP) for each scan should be less than or equal to 460 mGy cm as per the National Diagnostic Reference Levels (NDRLs)(4) Targets:100% of the CT KUB scans should be commenced within two vertebral levels above the superior border of the kidney and 100% of the scans should have DLP with in National Diagnostic Reference Levels (NDRLs) .

1-Tsiotras, A., Smith, R.D., Pearce, I., O'Flynn, K. and Wiseman, O., 2018. British Association of Urological Surgeons standards for management of acute ureteric colic. Journal of Clinical Urology, 11(1), pp.58-61. 2-Maguire, J. and Gray, K., 2015. Computed tomography (CT) kidneys, ureters and bladder (KUB)–how low can you go?. Clinical Radiology, 70, p.S12. 3-Royal Coll. of Radiologists, London (United Kingdom);, 1998. Making the best use of a department of clinical radiology Guidelines for doctors. 4-National Diagnostic Reference Levels (NDRLs) from 19 August 2019 [Internet]. GOV.UK. 2020 [cited 19 November 2020]. Available from: https://www.gov.uk/government/publications/diagnostic-radiology-national-diagnostic-reference-levels-ndrls/ndrl 5-Rodger, F., Roditi, G. and Aboumarzouk, O.M., 2018. Diagnostic accuracy of low and ultra-low dose CT for identification of urinary tract stones: a systematic review. Urologia Internationalis, 100(4), pp.375-385. 6-Lumbreras, B., Donat, L. and Hernández-Aguado, I., 2010. Incidental findings in imaging diagnostic tests: a systematic review. The British journal of radiology, 83(988), pp.276-289. 7-Xiong, T., McEvoy, K., Morton, D.G., Halligan, S. and Lilford, R.J., 2006. Resources and costs associated with incidental extracolonic findings from CT colonography: a study in a symptomatic population. The British journal of radiology, 79(948), pp.948-961.

P091 A comparison of two peak skin dose calculators embedded within patient dose management systems: Implications for clinical management

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Introduction: Two commercially available patient dose monitoring systems were compared to evaluate their reported patient "Peak Skin Dose" for interventional cardiac procedures.
Method: 20 patients with the highest peak absorbed dose to skin on System1 were obtained; the recorded values were converted to a Reference Point Air Kerma (RPAK) value and used for comparison with System2, which measured peak air kerma to skin. Coordinates were obtained for each patient to find a primary and secondary angular position for the peak skin dose, and the positions produced by each system compared.
Results: There is a mean systematic difference of over 0.5Gy between the two software packages when comparing the calculated maximum skin air kerma PSD from System1 and the Worst Case RPAK from System2. It was found that 40% of the primary and 10% of the secondary angle position calculated in System1 lie within System2's position range.
Conclusion: We have shown that there is a mean systematic difference between these two systems. This difference is enough, for high peak skin absorbed dose patients, to change the management of patients so local services must understand their models to properly implement patient management. Neither system is incorrect, but these differences show that a deeper understanding of the analysis limitations is required to properly inform post-procedural high-skin dose follow-up procedures.

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2. Balter S, Hopewell JW, Miller DL, Wagner LK et. al. (2010) Fluoroscopically guided interventional procedures: a review of radiation effects on patients' skin and hair. Radiology 254(2), pp. 326-41
3. Greffier et al (2019) Experimental evaluation of a radiation dose management system-integrated 3D skin dose map by comparison with XR-RV3 Gafchromic© films, Phys Med, 66;77-87
4. Bryan Lemieux, Leslie Anaskevich, Jie Zhang (2019) Validation of DoseWise Portal for Peak Skin Dose Estimation.

P092 Challenges of optimisation / rollout of a dose management tool across mutli-modality, multi-vendor equipment inventory

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Alliance Medical Limited

Background: In recent years' optimisation within diagnostic imaging has become a primary focus of all practitioner's / service providers. Optimisation affects many aspects of imaging selection of equipment, commissioning of equipment, development of protocols, definition of patient pathways and selection of the patient protocol at the time of exposure. To assist with dose management and optimisation there are a number of tools available. DoseWatch (GE Healthcare) is an enterprise wide solution that enables collection and analysis of patient radiation dose data and analysis across multi-facility, multi-modality, and multi-vendor imaging environments.

Purpose of poster:

Learning Outcomes:

• Explain the challenges of optimisation in an organisation with multiple imaging locations
• Demonstrate the use of a dose management system across multi-vendor equipment
• Highlight the challenges of implementing a system across multiple multi-vendor systems.

Application to Practice:

• Demonstrate a realistic and achievable approach to radiation dose optimisation and monitoring in an organisation with multi-vendor imaging equipment in multiple locations.
• Highlight positives and negatives of this approach

Summary of content: The poster will present an overview of the rationale for the adopting a dose management system that we implemented across a number of CT and PET CT systems, a critical review of the limitations of the technology for our organisation including different IT solutions / approaches that were required, a review of the successes, challenges and lessons learnt.

P093 Identifying predictors of patient radiation dose during uterine artery embolization

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Introduction: Radiation dose reduction during uterine artery embolisation (UAE) is critical for this reproductive-age patient population to minimise the risks of radiation-induced effects.[1-3] The aim of this study was to identify the predictors of radiation dose which can be controlled and optimised for patients during UAE.

Method: A total of 150 patients between June 2018 and August 2019 were included in this study. Demographic and clinical information such as age, body mass index (BMI), total number of fibroids, total fibroid volume and dosimetric measurements on Dose Area Product (DAP), Air Kerma (AK) and fluoroscopy time were recorded. Total digital subtraction angiography (DSA), total conventional roadmap (CRM), total last-image hold (LIH) and total fluoroscopy were calculated from the dose report. Multiple linear regression analysis was used to identify the independent predictor variables of total dose (DAP) using a regression model.

Results: 120 out of the 150 patients had symptomatic fibroids and the reported median total fibroid volume was 176 cm^3 and median total number of fibroids was two. Total DSA, total CRM and total LIH were identified as the determinants of dose for UAE ($p < 0.05$) and together accounted for 95.2% of the variance.

Conclusions: This study identified the key imaging predictors of dose for UAE. Total DSA, total CRM and total LIH were shown to have a greater impact on the outcome DAP compared to other demographic or dosimetric measurements. Optimisation of these predictors during future UAE procedures can facilitate radiation dose reduction to the pelvis and reproductive organs.

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P094 Increasing awareness of DRLs in routine clinical practice

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Background: When using automated systems for transferring dose information directly from X-ray equipment into a database, radiographers and physicists may become less actively engaged with examination doses. For many years, dose information has been manually recorded for each exam by radiographers while physicists used subsets of these data to calculate the appropriate quantities for establishing local DRLs. In this way, reviewing dose was an integral

part of performing X-ray examinations but the process was time consuming and transcription errors did occur. We introduced an alternative that involves all radiographers in the process of using and reviewing DRLs without adding significant work.
Purpose: To demonstrate an approach for periodic awareness-raising activities which highlight local DRLs and provide data for rapidly assessing whether examinations are consistently exceeding the established values. **Summary:** The poster will provide an overview of departmental dose awareness weeks, including the tools used to collect data and the application of the binomial test to determine whether DRLs are being consistently exceeded.

P095 Audit on optimising CT KUB imaging in investigation of renal colic

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Non-contrast CT KUB is the initial imaging modality for suspected renal colic. Given it is a commonly performed procedure in an emergency setting, radiation dose exposure considerations are essential. Our audit looked to evaluate CT KUB techniques with the aim of minimising unnecessary scan length and ionising radiation exposure. There were two standards used; firstly the upper pole of the highest kidney was set as the superior scan limit and secondly, excess scan length above the upper pole of the highest kidney should be <10% of total length of scan. In June 2020, 50 CT KUB scans of adult patients were reviewed retrospectively, specifically assessing the percentage of slices above the upper pole of the highest kidney (overscan slices) relative to total scan length. Of these, 28% of CT KUB studies showed an excess scan length >10%, with a mean percentage overscan length of 16.8%. Studies within the superior scan limit and below correlated with decreasing overscan. Our audit demonstrated that excessive overscanning was secondary to inconsistent CT KUB techniques. Having a standardised protocol with a superior scan limit appropriately set for CT KUB investigations would allow for patient dose to be minimised without compromising on diagnostic adequacy.

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P096 Radiation Safety Awareness Amongst Foundation Doctors

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Background: Clinical practice has seen a logarithmic rise in the use of radiation-based imaging modalities. Foundation doctors are responsible for requesting a large proportion of imaging and should do so in accordance with the Ionising Radiation (Medical Exposure) Regulations 2017 (IR(ME)R) (DoH, 2017). However, prior studies have demonstrated that awareness of radiation legislation and radiation exposure is poor amongst this cohort of doctors (Khan et al., 2019). Our study aimed to assess radiation safety awareness amongst Foundation Doctors and the impact of an interactive teaching intervention.
Methods: A 10-question multiple choice questionnaire was distributed to Foundation Doctors. Questionnaires were provided in both paper and electronic formats to maximise uptake. Questions assessed knowledge of 2 core domains: radiation legislation and radiation exposure of common radiological investigations. Participants were asked to complete the questionnaire before and after the interactive teaching intervention. Responses were collected and quantified for data analysis.
Results: 44 responses to the pre-teaching questionnaire and 11 responses to the post-teaching questionnaire were obtained. The teaching intervention was associated with a global improvement in scores across the 2 core domains. Foundation Doctors awareness of radiation legislation improved from 52% to 90% after the teaching intervention. Similarly, the proportion of correct responses in the question domain of radiation exposure improved from 57%to 67%.
Conclusion: Foundation Doctors have a limited baseline understanding of radiation legislation and radiation exposure associated with common radiological investigations. Radiation safety training should be incorporated into the Foundation Programme curriculum to ensure IR(ME)R compliant practitioners and improved patient care.

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P097 An audit to assess and to improve knowledge about radiation risk amongst junior doctors at a small UK district general hospital

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Northern Lincolnshire and Goole NHS Foundation Trust

Methods/Background: According to the Royal College of Radiologists (RCR), in order to perform Ionising Radiation (Medical Exposure) Regulations (IR(ME)R) practitioner functions, all personnel need to be trained appropriately. Requesting staff cannot perform assessment of relative risks without maintaining knowledge of radiation risks. Participants were asked to answer questions pertaining to knowledge regarding radiation risks before and after a teaching session delivered online.

Data was collected via questionnaire containing 2 question sets; 5 questions pertaining to knowledge of effective radiation dose of common investigations (CXR, AXR, etc) and 7 questions regarding their corresponding estimated increased risk of malignancy. Data collected in both surveys were compared against each other and also with pre-defined audit standards.

Audit Standards:

1) Doctors should achieve 80% knowledge of effective radiation dose of common investigations.
2) Doctors should achieve 80% knowledge of estimated increased risk of malignancy of common investigations.

Results:

1) Response rate = 52%
2) 60% of respondents were FY1s, 40% were SHOs.
3) There is significant improvement in the percentage of questions answered correctly in both question sets after teaching (P value <0.05 for both question sets)
4) Both pre-defined standards were not achieved (72% and 70% respectively).

Conclusion:

1) There is a knowledge gap in radiation risk amongst junior doctors compared to audit standards.
2) Teaching sessions are beneficial in closing this knowledge gap.
3) Further intervention may be necessary to improve radiation awareness in junior doctors.

Limitations:

1) Small sample size.
2) Response rate was lower than expected.

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P099 Establishing whether placing lead-rubber inferolateral to the light beam diaphragm reduces dose to radiosensitive organs during an abdominal x-ray: a phantom-based study

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Background: Dose reduction is important in radiography. Use of contact lead shielding is historically controversial, and recent guidance suggests ceasing its use.(1) This increases need to discover if other novel dose-reduction methods have clinical potential. Our study draws from shielding applications seen in fluoroscopy and a study in which dose reduction to radiosensitive organs was noted with a similar intervention.(2) Our study aims to address limitations noted within this prior study, whilst applying the intervention to a different anatomical area.

Method: Thermo-luminescent dosimetry chips were calibrated and then placed in organ-representative locations within a CIRS Atom phantom. A standardised abdominal x-ray was obtained, both with and without a lead-rubber sheet fixed inferolateral to the light beam diaphragm at the cranial end. Doses at organ locations were recorded.

Results: Statistically significant (P<0.05) mean dose reduction was noted in organs located anatomically superior to the lead-rubber intervention. Organ-specific dose reduction was variable, with up to 53% observed. No significant dose reduction was noted in organs anatomically inferior to the intervention. This held true across a range of clinically relevant exposure factors.

Conclusion: The dose reduction to radiosensitive organs anatomically superior to the lead-rubber substantiates the previous findings with more robust methodology, suggesting that this easily applied method of dose reduction may be worth further exploration. Despite doses involved being small, the engrained radiographic principle of 'as low as reasonably practicable' exists and this is certainly a practicable design alteration. A more robust attachment method is required before clinical use could be considered.

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COVID-19 POSTER PRESENTATIONS

P101 Audit on the quality of chest X-rays before and during the COVID-19 pandemic

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Background: This is a retrospective analysis of a randomised set of chest X-rays. Both cycles were carried as a result from noticing, in our trust, that chest x-rays were mainly antero-posterior projections.
Method: A random sample of 200 chest X-ray, from January 2019 to December 2019, were taken from PACS. These were subdivided by requesting department into 50 from A&E, Inpatient, Outpatient and primary care respectively. The type of projection, whether posterior-anterior (PA) or anterior-posterior (AP), was reviewed. In the second cycle the same method was used and a further random 200 chest x-rays were sampled- 50 from each aforementioned subset- in 2020 during the COVID-19 pandemic. Standards were as follows: 75% of inpatient and A&E chest X-ray requests should be done as PA projections. 95% of outpatient and GP chest X-ray requests should be done as PA.
Results: In the first cycle, 40% of A&E and inpatient requests were PA projections. Whereas outpatient and GP requests were 95% and 100% PA. The re-audit showed a 10% increase, to 50%, in the number of PA films in A&E. However, both inpatient and outpatient saw a fall below the standard to 14% and 88% respectively.
Conclusion: Despite taking measures to improve the quality of chest X-rays there was, overall, a decrease in the number of PA films. This was put down to, upon discussion with the radiographers, the effects of COVID-19, namely time constraints due to increased disinfection requirements and generally more unwell patients who cannot stand for PA projections.

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2. European Guidelines on Quality Criteria for Diagnostic Radiographic Images. European Commission 1996.

P102 Airway, Breathing, Covid-19? Adapting resuscitation training in the Radiology Department to ensure patient and staff safety in the Covid-19 Pandemic

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Background: Cardiopulmonary resuscitation (CPR) is an integral part of modern healthcare provision. First responders can have a significant impact on patient outcomes. National resuscitation training courses are not currently tailored to radiology departments, thus in 2019 Radiology Specific Resus Training (RSR) was launched at Imperial Healthcare Trust to aid radiology staff in responding to deteriorating patients and perform effective resuscitation. RSR is a bespoke course blending elements of adult and paediatric resuscitation training focusing on scenarios more likely to occur in the radiology department. Following excellent feedback and unprecedented demand for further dates RSR was deemed a success. However, Covid-19 quickly put a stop to face to face teaching and presented a number of other challenges, the RSR course has needed to evolve.
Purpose: As the Covid-19 pandemic has significantly altered guidance on resuscitation training, we reviewed the RSR course to meet these unique challenges. By adjusting resuscitation techniques to ensure staff safety, as patients in the radiology department often have unknown Covid status, and using alternative teaching mediums to allow distance learning. To understand the challenges of creating a new e-RSR course with blended e-learning & small group practical session to meet the requirements of the Covid-19 pandemic.
Summary of content: Background - why resuscitation skills are vital to our radiology staff - unique challenges of RSR in the Covid-19 pandemic Course content and delivery methods - RSR scenarios and conversion into distance e-learning course with condensed practical component Skill confidence assessment methods - course feedback, adaptations and future plans.

P104 Initial experiences of a new regional ESWL service during a global pandemic

Sam Crompton; Jodie Prynn
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A GIRFT report in 2018 (Harrison, 2018) and NICE guidelines (NICE, 2019) recommended regional, fixed site lithotripsy units which would service a region and allow access to both elective and emergency ESWL for urinary tract calculus <20mm. In the South West peninsula, trusts' were serviced by a mobile lithotripter which did not allow access to

emergency treatment, as such a new fixed site peninsula service was developed. The introduction of this service was due to commence in April 2020, however due to the Covid19 pandemic, this was delayed until August. The ongoing pandemic introduced further difficulties in the initiation of the service, many of which would have been faced by healthcare services globally and of which are outlined by the discussion paper from the Nuffield Trust (Edwards, 2020). The primary benefit from a Covid-19 viewpoint of the ESWL service was reduction in the number of Ureteroscopy procedures that were required, and additionally a new pathway that would ensure reduced admissions to surgical wards, instead moving directly to treatment and pain relief at home, in line with the NHS long-term plan for same day emergency care (NHS, 2019). Initially, patients from the local area were accepted, to enable optimisation of the processes, from referral to discharge. After 6 weeks of treatments, the service was opened up to trusts across the peninsula. In the first three months, 96 different stones have been treated across 83 different patients. 69 of these stones have been successfully cleared, and 11 requiring or opting for ureteroscopy.

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P105 The impact of covid-19 on workplace for reporting radiographers and radiologists

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Southern Health and Social Care Trust

Background: COVID-19 has caused challenges to the delivery of healthcare services never experienced before. Home working became a major theme in UK public health guidance.

Purpose of poster: This study assessed the extent and experiences of home working among radiologists throughout Northern Ireland and reporting radiographers throughout the UK during COVID-19. The following outcomes will help contribute to the planning of imaging services. 31 questionnaires were returned, 71% from reporting radiographers and 29% from radiologists. 52% were set up to work from home, 48% were not. Of the 48% a third expressed a desire to be set up at home. Those home working were asked to define the percentage of time working from home, 44% were working from home 80-100%. Several questions were asked regarding motivation and communication and professional relationships. Responses were positive however slow broadband speed featured as an issue for reporting the more complex multi-planar examinations. Most responders preferred a combined approach, where home reporting offered less distraction whereas perhaps two days clinical work in department could also ensure professional relationships were maintained.

Summary of content: The poster includes (i) introduction describing the environment and pressures on imaging services as a result of COVID (ii) rationale, aims and objectives (iii) methods describing how the qualitative data (e.g. survey questionnaires) were gathered and analysed (iv) results clearly displaying the key findings (v) conclusions and potential implications for best practice.

P106 Implementing an audit programme within a busy imaging department during a pandemic

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University Hospitals of North Midlands NHS Trust

UHNM Imaging dept. attained accreditation for QSI in 2020; however feedback for submission in 2021 mandates evidence of a continuous audit programme for all modalities, insufficiencies within the re-audit process were noted to not fully demonstrate completion of the audit cycle and therefore continuous quality improvement. Each modality identified several key performance indicators (KPI's) imperative to their areas with regards to quality and patient care to include local or national targets to measure against in the form of audit. For each KPI a QSI domain was also identified, fulfilling the long term objective that audit evidence would exist across all QSI domains. A KPI spread sheet was devised. Each KPI's have an associated audit registration form to evidence results of audits, any improvement interventions required and re-audits. Having named responsible links for each audit was deemed necessary to create personal responsibility for the continuous audit cycle so that re-audits are captured at the frequency required, a traffic light system would facilitate links to be notified in a timely manner. This is a large piece of work made especially challenging due to the pandemic because of staff shortages and a huge backlog of requests. Yet it could be argued that quality and safety is as important as ever, getting the foundations right supports and strengthens services provided especially important when they are under such strain. Measuring quality on a continuous basis is imperative to identify early on whether improvements are needed maintaining high standards of care and mitigating risk for patients.

P107 Change Management: UK government response to Covid-19 and the PPE crisis

Josie Cameron
NHS Lothian

Introduction: Acute respiratory infections (ARI) are the leading cause of illness and mortality caused by viral infections worldwide and are extremely contagious and can spread rapidly1. Infection prevention and control provides the best way to address this. The Department of Health (DH) has a strategic key role during a pandemic. A previous exercise2 designed to test the NHS response seven weeks into a pandemic highlighted that adequate equipment, intensive care beds and personal protective equipment (PPE) needed to be prioritised.

Main: In the initial stages of the pandemic stockpiles of PPE were inadequate and were prioritised to supply staff working directly with covid-19 patients in hospitals. Hand washing and good respiratory hygiene was considered adequate for other healthcare professionals (HCP). The UK government relied on change management techniques3, 4 to approach the transformational change required during the initial stages of the pandemic, using coaxing and positive assertions and appealing to the credentials of the scientific advisers. 'Stay Home, Protect the NHS, Save Lives' was a key message which became too successful as the public avoided the NHS resulting in an increase in excess deaths not associated with Covid-195. Being in a situation where there was a requirement to rationalise PPE subjected other HCP and patients to the virus.

Conclusion: Collegial relationships in advisory committees are too close and other scientific advisors with no vested interests should appraise the scientific logic applied6. A report should be commissioned and published to evaluate the government response to Covid-19 and the PPE crisis.

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P109 The trials and tribulations of a new clinical supervision framework in the covid-19 era

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NHS Taysdie

Background: With the challenges that COVID-19 presented it was recognised that an existing local clinical supervision framework needed to be overhauled. The new framework was devised to support recently qualified practitioners and newly appointed staff to support transition in their professional development during the Covid-era.

Method: A supervision framework was devised to give structure to a fourteen week induction period. Ten supervisors and six supervisee's new to the process completed a written account following Gibbs reflective cycle (Gibbs 1988). This was designed to structure their experiences at the end of the induction, identifying areas of learning. Reflections were then transcribed and themed using an inductive content analysis in the thoughts and feelings, and evaluation sections of the cycle (Kyngäs 2020).

Results: Analysis of the themes revealed positive and negative attitudes towards the process at the onset, with feelings of nervousness and eagerness to engage. Upon evaluation, themes revealed more positive attitudes towards the experience after fourteen weeks, with recognition from participants that the supervision framework was useful, provided structure, and enabled touch points to identify learning or pastoral needs for both supervisors and supervisees.

Conclusion: Some barriers to the process were identified and needed managerial support to resolve, particularly providing time and IT facilities to better facilitate the supervision. Overall the experience was shown to be positive and the majority of those involved found the experience empowering. A suitable clinical supervision framework has been devised that has stood the challenges of COVID and will be incorporated in future inductions.

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P110 Managing the Covid 19 pandemic: the educator's perspective

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Background: The Covid 19 pandemic meant the closure of Higher Education Institutes (HEI) with immediate effect in the first weeks of March 2020. Leadership teams within these institutions had to then rapidly plan for the delivery of thousands of hours of online or blended delivery over the spring and summer terms of 2020. The main issues that a

Diagnostic Imaging UG programme had to deal with will be covered to present how an HEI institute in the South West delivered safe, high-quality education throughout both national lockdowns
Purpose of poster: This will present the steps that an HEI in the South West of England took to plan, prepare and deliver a number of undergraduate healthcare-related programmes (with particular focus on Diagnostic Radiography) from both the senior leadership perspective and from an operational level.
Summary of content: This will cover the following areas: Initial student and staff communications (how the HEI kept in contact with staff and students) Student and staff well-being measures (Use of personal tutors/signposting) Training of staff in online delivery methods and pedagogy (What was identified as critical training) Teaching quality and assurance of any changes required Changes to teaching (Use of PPE/staff teaching bubbles and the implementation of a new simulated Bucky assessment for stage two students who were pulled out of their stage one placement). The road to recovery for making up time for clinical placements (Plans for the future and how assessments and clinical competencies will be met)

P111 Converting to exclusive online learning during the COVID-19 pandemic - The experience of the London School of Radiology

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Background: The London School of Radiology has used a bespoke online platform since 2016 to remotely deliver monthly regional teaching sessions which demonstrated the advantages of increased flexibility, improved accessibility and the ability for subsequent review of the recorded content. This facility was provided as an adjunct to face-to-face teaching by streaming and recording the live training events. From March 2020, as a result of the COVID-19 pandemic, all teaching and training events were converted to online delivery using Microsoft Teams. To date, we have successfully delivered over 50 training sessions both synchronous and asynchronous, for all levels of registrar training, covering both clinical and non-clinical elements of the radiology curriculum and have also produced a curated set of training sessions for the Part 1 FRCR examination. Moving online has provided additional benefits of accessibility to teaching material, allowing trainee to revisit content multiple times at a time convenient to them.
Purpose: This presentation outlines the challenges faced in carrying out a regional teaching programme remotely, the solutions that were implemented and a review of the future directions and suggestions for improving the remote learning experience.
Summary: The COVID-19 pandemic has rapidly accelerated the uptake and implementation of remotely delivered teaching and training sessions across the country. While there are numerous challenges to overcome, there are several.

P112 Coronavirus (COVID-19) e-learning

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[1] HEE; [2]The Society and College of Radiographers

Background: To introduce a programme for the health and care workforce that contains key information from Health Education England e-Learning for Healthcare's catalogue of content as well as curated materials from other trusted organisations. The programme is freely available to UKIO colleagues in the UK and overseas.
Purpose: This programme has been created by Health Education England e-Learning for Healthcare (HEE e-LfH) in response to the Coronavirus (COVID-19) global pandemic. The programme includes key materials to help the health and care workforce respond to Coronavirus.
Summary of content: e-learning courses relating to the prevention and treatment of Coronavirus in primary care and community settings. Resources for diagnostic radiographers and other professions including nurses, midwives and AHPs, doctors, medical students, pharmacy staff, support workers and volunteers.

EDUCATION AND WORKFORCE POSTER PRESENTATIONS

P113 Perceptions of final year undergraduate radiography students in a Higher Education Institute in the South West of England around barriers for raising concerns on unprofessional practice of qualified healthcare staff

Maria Hoyono Ndoho; Amreena Javaid; Lynsey Palmer; Angel Chiu; Julie Mills (supervisor)
University of Exeter

Background: The Mid Staffordshire NHS Foundation Trust Public Inquiry highlighted the importance of incident

reporting in health care.(1) However, research following to the Freedom to Speak up Review still found students are generally hesitant to speak up.(2,3,4,5,6) There is qualitative research studying barriers for raising concerns, predominantly in nursing, but there is a gap in literature for diagnostic radiography students. This research sough to explore perceptions of final year undergraduate radiography students in a Higher Education Institute in the South West of England around barriers for raising concerns on unprofessional practice of qualified healthcare staff. Results from this research could be used to improve teaching on raising concerns by integrating relatable students' viewpoints, along with understanding its necessity, into the curriculum.
Method: Qualitative study, 6 participants taking part in an online semi-structured interview (due to covid19). Interviews were later transcribed and thematically analysed (method of identifying and analysing patterns (themes) within the data). (7,8)
Results: Themes found resonate with previous research undermining hierarchy, fear of repercussions, doubt about valid concerns, negative inter-professional impacts. New finding mature students find the process of raising concerns of unprofessional practice less stressful, some due to previous working experience.
Conclusion: Participants have strong theoretical knowledge about the process of raising concerns and its significance for the quality of care. However, radiographer students may not adhere to the reporting process because fear of repercussions. There is a need for improvement in practical skills of the process itself deliver by the university to better support radiographer students.
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P114 Progress Testing: Engaging apprentices radiographers with this method of assessment

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University of Exeter

Background: Progress testing is widely used within medical education but not in other healthcare programmes. It is not known how this method of assessment will be received and perceived by learners from such programmes. The aim of this study is to investigate the perceptions of diagnostic radiography degree apprentices when assessed using this method.
Method: This programme commenced in 2020; within the first year there are three formative and one summative progress tests. Following each test, apprentices were invited to complete a questionnaire. Following the summative test, volunteers were recruited for a focus group; which was informed by the previous questionnaire data [1]. The focus group was conducted by an independent research assistant ensuring anonymity of the participants.
Results: Initial feedback indicated that there was good understanding of the concept and benefit of this form of testing (100% agree / strongly agree, n=25, response rate 86%). The response rate declined as the year progressed, although this positive perception was maintained by those who did respond (100% agree or strongly agree, n=6, response rate 21%). The focus groups provided more granular detail about their experiences and what support they feel would benefit them through this process.
Conclusion: The results suggest that the apprentices understand and appreciate the rationale for this form of assessment. Their experiences have also been valuable for providing insight into how best to tailor support specifically for this type of assessment method.
[1] Ethical approval for this study has been granted by the Higher Education Institution.

P115 Introducing Progress Testing into a pre-registration radiography degree apprenticeship programme

Christine Heales; Demelza Green; Annette Gillett
University of Exeter

Background: Progress testing is long established within medical education but has not been applied widely in other

healthcare programmes. The principle of progress testing is that regular assessment is undertaken of all content, even that which has not yet been taught. This encourages learners to engage with all material as it could be assessed at any point, and removes any tendency towards 'learning for the test'. In other words it promotes deep learning.
Purpose of poster: The aim of this poster is to outline initial experiences of introducing this assessment method within a pre-registration diagnostic radiography apprenticeship programme.
Summary of content: This poster will provide an overview of the rationale for progress testing in general, and for its use within this degree apprenticeship programme. The reasons for its use within a particular area of the curriculum will be given together with an explanation of the particular marking strategy used. A description of the logistical challenges of moving to this mode of assessment will also be provided together with an overview of the quality assurance process. Finally; insight into the perceptions of the learners themselves [1] (both initially and on-going) during their first year of being assessed by this method will also be outlined.
[1] Ethical approval for the collection and dissemination of feedback data has been granted by the Higher Education Institution.

P116 Preventing 'never' events: Can bespoke training prepare student radiographers for initial commenting on NG tube placement radiographs?

David Smith
Sheffield Hallam University

Background: The placement and use of NG tubes is, in many hospitals considered part of everyday practice. Feeding through a malpositioned NG tube however, is considered a never event. This educational intervention study explored the feasibility of introducing NG tube position check training into the undergraduate curriculum to prepare students for commenting on NG positions by radiographers as a basic competency.
Methods: An image bank of 30 validated chest x-ray images taken to confirm the position of a placed NG tube was created. For each image, participants indicated NG tube position as satisfactory/unsatisfactory/unsure. A structured teaching session was then delivered and participants were retested with the same test bank (randomised order). The students' accuracy, sensitivity and specificity were then established pre and post intervention.
Results: 32 final year students of diagnostic radiography from one higher education institution consented to take part in the study. Following removal of an image from the test set that was subsequently found to be 'ambiguous', the participants demonstrated a 23% increase in accuracy (to 75%), 3% improvement in sensitivity (to 97%) and 23% increase in specificity (to 73%) following the training intervention.
Conclusions: The study demonstrated that accuracy of pre-registration radiographers with respect to commenting on the position of an NG tube on a chest x-ray can be improved through structured teaching. While very high post-intervention sensitivity was achieved, the lower accuracy and specificity rates following the training session suggest further experience and training is likely required to achieve proficiency.
1 National Institute for Health and Care Excellence. (2017, August 08). Enteral tube feeding - NICE Pathways. Retrieved June 06, 2019, from https://pathways.nice.org.uk/pathways/nutrition-support-in-adults/enteral-tube-feeding.pdf 2 Roe, G., Harris, K., Lambie, H., & Tolan, D. (2017, June). Radiographer workforce role expansion to improve patient safety related to nasogastric tube placement for feeding in adults. Clinical Radiology, 72(6), 518.e1-518.e7.

P118 The perceived impact of different types of clinical and academic partnerships at postgraduate level in radiographic image interpretation training: An exploratory survey

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Background: Clinical and academic partnerships have long been used in undergraduate radiography training. Mentoring postgraduate image reporting students it is apparent that levels of clinical/academic input is varied across different academic institutions. There is a paucity of literature relating to postgraduate clinical and academic collaboration.
Aims and Objectives: To explore the cross section of academic institutions and their clinical and academic partnerships to provide image reporting postgraduate education.
Method: Cross sectional survey distributed to all academic institutions in the UK who deliver postgraduate image interpretation training. Survey will explore % clinical and academic time, practicing clinical expert teaching, image banks available to students within the academic setting and formal partnership agreements.
Outcome: UK wide map of postgraduate image reporting institutions and associated clinical and academic partnerships. Perceived impact of collaboration to the trainee image reporter outcome. (results currently being collated so not fully concluded)
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content/uploads/2020/11/diagnostics-recovery-and-renewal-independent-review-of-diagnostic-services-for-nhs-england-2.pdf 4. Sigsworth, J. (2009) Bridging the gap between research and practice. Nursing Management; vol. 16 (no. 2); p. 20-22

P119 Are newly qualified diagnostic radiographers sufficiently prepared for independent working in the operating theatre

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[1]Imaging Department, Leighton Hospital, Crewe; [2]Keele University; [3]

Background: The operating theatre has been identified as a challenging working environment for newly qualified radiographers, who are bestowed a leadership role in the theatre multidisciplinary team as radiation protection advocate. Despite having this essential role to fulfil, a systematic literature review revealed that there is very little research available regarding experiences of newly qualified radiographers working in the operating theatre and preceptorship that they receive, when compared with other heath professions. Therefore the aim of the study investigated the preparedness of radiography students for working independently in theatre and to investigate the support they received in this crucial transition time.
Method: An online questionnaire was used containing both open and closed questions using a self selection sample.
Results: The operating theatre was identified as being an extremely challenging working environment due to its hierarchical structure and tribal silos. Most participants felt unprepared and lacked confidence working in theatre as a newly qualified radiographer. Three main factors were identified as reasons for lack of confidence. These were experience and support, identity and theatre culture.
Conclusion: Having a formal structured effective preceptorship would build confidence in novice radiographers and enhance collaborative working relationships between imaging and theatre departments improving radiographer job satisfaction and patient care.

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P120 Improving medical student confidence and knowledge in "on-call" radiology scenarios

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The Great Western Hospital NHS Trust

Background: A 2018 survey of 150 junior doctors from 29 UK medical schools found more than three-quarters (77%) of junior doctors wished they had experienced more radiology teaching in their undergraduate curriculum1. A group of Clinical Teaching Fellows at The Great Western Hospital ran a radiology workshop for final year medical students, designed to simulate radiology requests a Junior Doctor may make whilst on-call. The aim was to improve confidence and knowledge in requesting scans, as well as interpreting and presenting plain-film radiographs.
Methods: The workshop ran for sixteen final year students and included teaching in chest, abdominal and musculoskeletal plain films as well as scenario-based simulation. Confidence in requesting scans and plain-film interpretation/presentation was assessed before and after the workshop using a pre and post-survey. Knowledge was assessed with an 11 question quiz before and after the workshop (pre and post-quiz).
Results: The percentage of students who felt either confident or very confident in the following domains were compared pre vs post workshop respectively: plain-film interpretation (43% vs 94%), presenting plain-films (25% vs 81%) and requesting imaging (38% vs 75%). Furthermore, the average pre and post-quiz score increased from 55% to 82% respectively.
Conclusion: The workshop improved overall confidence and knowledge in interpreting, presenting and requesting radiographs.

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P122 The role of a Radiographer clinical champion in hospital design

Clare Simcock
Great Ormond Street Hospital for Children NHS Foundation Trust

As the demand on clinical Radiology services increases, hospitals need to continually expand to meet this demand. Original design footprints are often exceeded with building works becoming the next option to enable expansion. It is important that Radiographer's play a pivotal role in ensuring that future hospital design is appropriate. Senior Radiographer's and managers are often asked to comment on plans or sign off on the design for new clinical areas. However there is little education to help undertake this task and enormous pressure to meet the deadlines associated with these projects, which are pivotal to the future proofing of delivery of Radiology services. Real clinical engagement and the opportunity to contribute to a multi-disciplinary design process will enable these projects to be successful. Purpose of poster To provide evidence of the importance of working collaboratively with the built environment team. To support clinicians in understanding the importance of involvement throughout redevelopment projects within their institutions. Summary of content: background, experience including current design and proposed new design and how we got there, and project results.

P123 Introduction of CT academy for workforce development

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Alliance Medical Limited

Background: Effective training is essential to ensure safe and efficient work practices support all imaging requirements. Training schemes should be developed to demonstrate competency and provide assurance that any imaging undertaken is completed safely, effectively and within legislative guidelines. When Covid-19 pandemic hit the UK, all areas of healthcare provision were thrown into unprecedented situations and a dramatic rise in diagnostic imaging particularly Computed Tomography (CT) and chest x-ray arose. As part of our response to the national response to support the country, we had an urgent requirement to facilitate effective training of radiographers within the organisation to undertake CT rather than MRI or PET-CT

Purpose of poster:

Learning Outcomes:

- Demonstrate a pathway that facilitates effective training in an unusual situation
- Highlight all considerations; clinical examination requirements, radiation protection and medicines management
- Raise awareness of challenges that can be encountered when implementing a fast track training programme

Application to Practice:

- Demonstrate a practical pathway that can be implemented for workforce development.
- Highlight positives and negatives of this approach

Summary of content: The poster will present a comprehensive overview of the CT Academy that we added to our training portfolio. It will include the rationale for the project, pathway development including governance of and impact on the workforce, an overview of the pathway detailing all different elements; also, the support mechanisms in place and the monitoring processes utilised; and a review of the successes, challenges and lessons learnt.

P124 Kicking down the doors of higher education to kick start a new career in health for mature students

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Mature learners are a valuable addition to Higher Education(HE) and the health workforce demonstrating high motivation in their learning(1). It is often the case that they are are disadvantaged at school and/or college by learning difficulties not previously identified(2) creating a barrier to continuing education and the careers they desire(3). As part of its Widening Participation agenda(4) the University of Liverpool offers a unique mature learner's Foundation programme leading to degree courses in Medicine; Dentistry; Veterinary Science; Dental Therapy; Diagnostic Radiography; Occupational Therapy; Physiotherapy; Orthoptics; Radiotherapy and Nursing. The programme is delivered in conjunction with two local partners: Birkenhead Sixth Form College & Carmel College-St Helens, where expertise in support for students with learning needs is recognised in their "Outstanding" Ofsted reports (5) (6). Data is now available to track progression of these students over a ten year period to demonstrate transition into year 1 of their respective health profession routes and through to graduation. Results show a gradual increase in recruitment to the programme over the last five years with an average 90% transition rate into year 1. The ten year data set shows 77% of students taking the AHP and Nursing routes successfully complete their degree studies with 64% achieving either a 2:1 or 1st class Honours degree. 74% of students taking the Medicine, Dentistry or Veterinary Science routes successfully complete their degree studies. Conclusion: the programme is successful at supporting mature students into HE and the workplace but more is needed to reduce degree attrition rates.

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P126 Pre-admission clinical visits: A review of online prospectuses in radiography and operating department practice

Jane Saunders; Elizabeth Shute; Brittany Livesey; Siham Souleyman; Marcus Elkington; Gemma Burke; Victoria Cadman; Julie Nightingale
Sheffield Hallam University

Background: Professional body statistics suggest that radiography student attrition is concerning [1]. 'Wrong career choice' is commonly cited by students who leave, therefore securing an observational clinical visit prior to admission may be influential. This study analysed online prospectuses (OLP) to investigate whether pre-admission requirements included a clinical visit.

Method: All UK universities offering diagnostic radiography, therapeutic radiography, and operating department practice (ODP) were included. Two student researchers reviewed pre-admission experience requirements in OLP entries (Dec 2019). This included requirements for a clinical visit, and support for arranging visits. The Head of Student Recruitment adjudicated on any unclear or contradictory information, and updated decisions following Covid-19 restrictions (May 2020).

Results: 58 courses were analysed (38 Universities). 60% of courses required/strongly advised clinical visits (n=35/58), yet most of these (60%) did not assist in arranging visits. Eight universities supply clinical visit 'evidence' forms, suggesting that the visit informs the admissions decision. Radiography courses were more likely to require a visit than ODP courses, where 52% did not mention a visit (n=13/23). Only 31% of the 58 OLP entries assessed were rated as helpful/ very helpful by the student researchers.

Conclusion: While most radiography courses require a clinical visit, few support the applicant to arrange it which may disadvantage some applicants. OLPs present a confusing picture for applicants who may be researching several Universities and professions. This may inadvertently dissuade some from pursuing their application. Collaborative approaches to the development of a clinical visit policy for applicants to these professions are recommended.

1. College of Radiographers. Approval and Accreditation Report for 2018-19

P127 Degree apprenticeships for the Radiography profession; are clinical departments ready?

Trudy Sevens; Julie Nightingale; Nancy Ali
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Background: Degree apprenticeships for the allied health professions are a relatively new concept with apprenticeship standards for diagnostic and therapeutic radiography and sonography being recently approved for delivery. Employers are central to the success of apprentices by embracing the positive impacts they can offer, however recent studies highlight there is still a lack of understanding around radiography apprenticeships. This study investigated diagnostic and therapeutic radiography and sonography managers' intentions to embrace degree apprenticeships.

Method: An online questionnaire survey was used to capture quantitative and detailed qualitative data relating to employers' perspectives on degree apprenticeships. Participants (n=17) were recruited through social media and advertisements in professional journals and websites. Framework analysis methodology was used to amalgamate numerical and textual data.

Results: Almost all the participants were planning to employ apprentices and thought they would increase the diversity and sustainability of the workforce. Three themes were identified; challenges and required facilitators, the differences between apprentices and traditional university students and work based learning mentor support. Concerns were raised about the cost of apprentice training however, encouragingly, none of the participants identified extreme challenges to the implementation of degree apprentice posts.

Conclusion: Recommendations were formulated to increase awareness, understanding and employment of apprentices. These included a need for further clarity on the role of mentors, guidance on the split between academic and practice education and ensuring there were strong collaborations between clinical departments and higher education institutions. With careful implementation, apprenticeships will offer radiography support worker career development and other widening participation opportunities.

P128 The value of pre-application clinical visits and online resources in informing career choices

Julie Nightingale; Nancy Ali; Elizabeth Shute; Marcus Elkington; Gemma Burke; Victoria Cadman; Rachel Ibbotson
Sheffield Hallam University

Background: Clinical visits are a mandatory part of the admission process for most radiography courses but not for operating department practice (ODP) where observation visits are challenging to secure. However the Covid-19 pandemic interrupted the delivery of visits for all prospective students and alternatives are needed. This study investigates stakeholder perceptions of the 'ideal' clinical visit, and the potential for documentary style videos/online simulations as an alternative.

Methods: A qualitative study design using thematic analysis explored participants' experiences of clinical visits and alternative resources. Six focus groups (were conducted, two with radiography managers and practice educators (n=5). Four focus groups included 25 first year students interviewed prior to their first clinical placement (fourteen therapeutic radiography, five diagnostic radiography and six ODP students).

Results: Four themes were constructed, namely: informing career choices, the clinical visit experience, the value of clinical visits and virtual alternatives. Clinical visits affirmed rather than inspired career choices. The best timing for a visit was before admission interviews and optimal duration was a full day. Interacting with current students was the most valued aspect. Simulated visits provided in-depth information about the professional role and allowed replay, but some participants found the videos uninspiring.

Conclusion: Clinical visits were deemed 'vital' to radiography student career choices, yet ODPs who could not access visits were comfortable with simulations. Simulated visits are a safe option amidst the pandemic and a sustainable, cost-effective method for the future. Simulations must capture the dynamic and patient-centred nature of practice to accurately inform career choices.

CLINICAL ONCOLOGY POSTER PRESENTATIONS

P129 Value of a Therapeutic Radiographer Clinical Fellow

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Macmillan Cancer Service

Introduction: Therapeutic radiographers are a small profession, with approximately 3000 posts in 2019(1). However, they are a key healthcare professional (HCP) in cancer services as approximately 50% of all patients will receive radiotherapy(2) and that figure is set to rise to 60% by 20253. The workforce will need to expand and develop to support the growth of demand for cancer services. It is predicted that a 45% increase in therapeutic radiographers is needed by 2029 (4). The challenges in recruitment and retention has been well documented (5, 6,7) and it has been recognised that to improve cancer services therapeutic radiographers should extend their scope of practice (9, 10) and new ways of working are needed(11). Therapeutic radiographers make up 20% of the non-surgical oncology workforce(9) and there has been some progress in workforce redesign with more roles undertaking duties traditionally carried out by medics such as independent prescribing. However, there is more work to be done as many HCP, don't fully understand the radiographer profile (12) and the diversity of roles they have the potential to undertake. Barriers remain, ranging staff shortages and lack of support to some cancer jobs being limited to nurses only.

Method: To raise the profile and address some of the challenges outlined HEE, supported by SCoR and Macmillan, funded 2 therapeutic radiographer clinical fellows.

Results: The fellows designed a range of initiatives: virtual careers events, 'I am a therapeutic radiographer ...' campaign, Girl-guides and schools engagement, and Intelligence gathering in current advanced.

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Accelerating workforce redesign | Health Education England 12. Andersen, E.R. Letter to Editor: To all therapeutic radiographers and radiation therapists - Let the world know that we exist! Radiography 2019; 25(1)

P131 Implementation of an electronic permit to work/clinical status system in a radiotherapy environment

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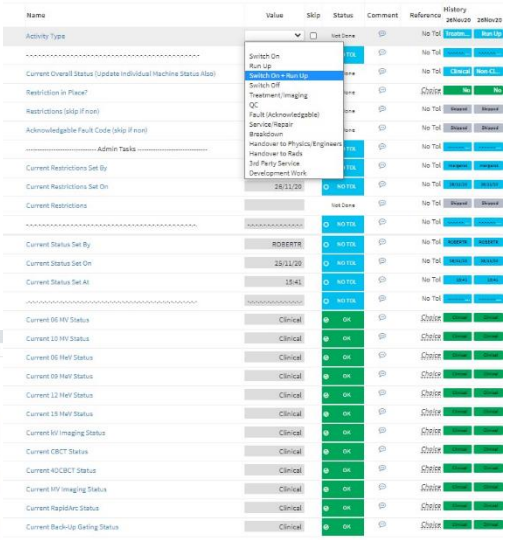
Imperial College NHS Trust

Introduction: An electronic Permit to Work (PtW) \ Clinical Status (CS) system was implemented using open-source software (QATrack+, 2018) alongside an in house developed web application GUI.
Method: QATrack+ functions by creating "Tests" (individual items e.g. 6MV Status). "Tests" are organised into "Test Lists" and assigned to each machine. Data is stored back to the QATrack PostgresSQL database. CS & PtW are set via "Test Lists" for any changes (Activity/Staff) with PtW importing the CS data. As these are machine specific a web-app was created to present the data in user friendly web interface. An SQL query was created using Python to create a table of the most recent data for "Tests" based on unique "Test ID". Data is extracted based on "Test List ID", allowing data to be grouped for each machine type (i.e. Linacs) then further grouped by "Unit Name" to create a row per machine. Not all machines have the same functionality (i.e. Electrons, FFF) the data extraction is modified such that if there is no entry for a machine it is set to N\A. The data is then passed to a HTML file which to create the GUI for the web-app which creates the structure of tables and applies various formatting such as colour co-ordinating the table items based on values to further improve the functionality of the GUII.
Conclusion: QATrack+ offers a solution for the implementation of electronic PtW/CS. However, the usability can be inefficient and benefits additional interfaces for data presentation.



QATrack+. 2020. Welcome To Qatrack+'s Documentation! — Qatrack+ V0.3.0 Beta Documentation. [online] Available at: [Accessed 26 November 2020].

P132 Halcyon versus truebeam: a patients experience

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Hull University Teaching Hospitals NHS Trust

Background: The aim of our small study was to establish if the patients preferred the Halcyon or Truebeam Linac for their prostate Radiotherapy as measured by their patient experience.
Method: 30 patients were selected and two questionnaires designed to encompass information on the aesthetics of the Halcyon/Truebeam and a free area text box for comments. The questionnaire was given to the patients after their first fraction on each of the machines. The cohort was split to start on each machine and swap over half way through treatment which allowed for unbiased direct comparison. The last fraction questionnaire was given to the patients after their appointment and was designed to see if our patients had a preference to the machine they had their treatment on.
Results: The P value was not statistically significant in any of the questions and this is part due to our limited sample size. However, patients experience feedback comments supported the theory that their overall experience was better on the Halcyon. 60% of patients had a preference to what machine they had their treatment on with 89% of this group having a preference to the Halcyon machine.
Conclusion: The questionnaire comments highlighted what patients' value in their overall experience. These were effective staff interactions, care and communication and support in their anxiety with new situations rather than the specification of the machine. Their invaluable input supports the importance of patient involvement in service improvement.

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P133 F18-FDG PET CT uptake time audit

Suzannah Patel
Paul Strickland Scanner Centre

Background: The Standard Uptake Value (SUV) can help to differentiate between benign and malignant tissue in PET CT. The accuracy of the SUV may be affected significantly by the tracer uptake time. The uptake time should ideally be 55 - 75 minutes, in keeping with the European Association of Nuclear Medicine (EANM) guidelines for Oncology.
Method: 200 consecutive patients' records were audited between 6 July and 21 July inclusive. The time of the administration of radiotracer and the scan time were recorded, along with which scanner (Siemens Biograph/ GE VCT), scanning protocol and number of bed acquisitions. Notes and scanned images entered onto Soliton were also audited for comments to see whether a reason had been given for an increased uptake time.
Results: The uptake time for both scanners were 95% and 92% respectively.
Conclusion: It was evident from the data that the acquisition delays were caused by subsequent patients requiring vertex to knees or vertex to toe protocols. There was no evidence to suggest that these patients were scanned late due to being injected too close together. Due to a lack of notes scanned in on the documentation, it was difficult to assess reasons for delays. Recommendations include dedicated vertex to knee/toe slots to ensure better compliance.

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P134 Rapid Response by a Specialist Cancer Trust to support the UPH Study SIREN

Maria Maguire; Emma Whitby; Douglas Elkin; Sue Green; Erin Bennett; Gillian Heap; Nagesh Kalakonda; Sheena Khanduri
The Clatterbridge Cancer Centre NHS Foundation Trust

Introduction: The COVID-19 pandemic provided the NHS with huge challenge across all healthcare sectors. The need for research has never been stronger. The SIREN study, follows healthcare workers for at least a year and studies their immune response to the virus causing COVID-19. CCC as one of the largest networked cancer centres has the infrastructure to provide a rapid response in answer to the call to support SIREN.
Method: The Centre has a hub and spoke model so has a framework for cross clinic working over different sites within the Trust under one organisational umbrella established for standard of care and trial delivery thus maximising recruitment potential with staff support in place. CCC already had a weekly COVID Research Response Meeting in place, led by the Clinical and Operational Directors of R&I. The R&I Team have an agile staff structure with a robust delivery team already in place to support complex cancer research studies supported by Research Practitioners, Data Managers and Phlebotomy and laboratory staff. CCC has configured the Edge system to provide a single integrated system linking governance, to study information that is easily reportable. This in tandem with new Research Officer Posts who provide autonomous support for non-interventional studies means that CCC could set-up and deliver at pace.
Outcome:
• 23 days to open the study
• 6 days from site opening to first participant recruited
• 46 days to reaching target recruitment of 152 (10% of total staff)
• 110 days to reach an extended recruitment target.

P135 Differentiating between Neutropenic and C. Diff Colitis in a patient with Mycosis Fungoides on Immunotherapy (Brentuximab)

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Case presentation: A 61 year old man with Mycosis Fungoides was admitted with decreased nutritional intake and mobility. He received two cycles of Brentuximab, with the last cycle one-week prior to admission. He was treated for skin sepsis and supported with intravenous hydration and enteral nutrition. Whilst he was an inpatient, he developed febrile neutropaenia, transaminitis, and watery diarrhoea. Initial stool culture was negative for C. diff toxin and serologies were negative for hepatitis viruses, CMV, EBV, and HIV. He continued to deteriorate with rising inflammatory markers. Several days later he had a positive C. diff toxin and was started on fidaxomicin. Initial CT-AP showed dilated large bowel but no evidence of colitis. Due to ongoing deterioration, he had a repeat CT-AP two-days later which showed pancolitis with toxic megacolon. He continued to deteriorate and died in intensive care.
Discussion: The learning points have been divided into two: 1. Clinical correlation: This gentleman was on antibiotics and a proton-pump inhibitor known to cause pseudomembranous colitis. Neutropenia and typical symptoms would further increase clinical suspicion. Early empirical antibiotics should be considered in high-risk patients despite initial atypical radiological features and negative stool culture. 2. Differentiating between neutropenic and pseudomembranous colitis on CT: C. Diff infections typically have the accordion sign, bowel wall thickening, free fluid (ascites) in up to 40% of cases, and rectal involvement in 90-95% of cases. Neutropenic enterocolitis on the other hand may demonstrate thickening of the caecum, intramural bowel gas, bowel wall thickening, and ileus.

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SERVICE DELIVERY AND INNVOATION POSTER PRESENTATIONS

P136 Percutaneous biopsy procedures audit project

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Mid Cheshire Hospitals Trust

Background: Percutaneous image-guided biopsy is a common procedure in radiology departments today (1). In the past 2 decades, imaging techniques and biopsy equipment have progressed to enable safe and accurate diagnosis in a less-invasive way (2,3). The documentation of image-guided procedures is a very important practice. Adequate documentation of biopsy procedures, including the number of passes and samples obtained and the size of the needle used, can guide the team in case of inadequate sample for pathology diagnosis. Based on these data, the team can decide if they should repeat the same procedure or go for something else.
Audit-Cycle: Target: 80-90% of specimens which are adequate for histological/cytological diagnosis (4,5). Reports of biopsy procedures should include(target:100%) (6): The site/organ biopsied The biopsy technique The size of the needle The number of samples obtained
Method: Retrospective analysis of the cases underwent imaging guided biopsy last month.
Results: Initial results showed that only72%of the biopsy samples were adequate for pathology assessment (Target-not-met) The site of organ biopsied and the technique used were mentioned in100%of the procedures(Target-met) The size of needle and number of samples were mentioned in75%of the cases.(Target-not-met)
Conclusion: The results were discussed in the radiology department audit meeting. Obtaining multiple samples from different sites was encouraged. A template for biopsy procedures covering all the essential items that needs to be documented was introduced*. Re-audit results: The percentage of adequate samples for pathology assessment has increased from 72%to88%. Thanks to the introduced template, 100%of the reports included the essential data (biopsy-technique, site-biopsied, needle-size and samples-number). *

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P137 Initial experiences of remote scanning

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Background: Siemens Syngo Virtual Cockpit is a remote scanning interface available on its MRI systems allowing a connection to be made between scanners and a remote user. Thereby enabling remote access to scanners for comprehensive scanning support regardless of physical location. In the age of COVID-19, remote working has increased across all walks of life, and potentially the use of a remote scanning system could provide some benefit to support short term staffing cover, reduce extra people within departments when training, and utilise clinical expertise of those vulnerable staff shielding away from the clinical setting.
Purpose: Remote scanning was set-up across one static location with 3 MRI scanners and at the home of the company's MRI Clinical Lead. Over this time the system was used to test its functionality and performance under real world conditions. Its main use within the department was to support training and skill mix amongst staff, as well as protocol management. Testing remote access from a home location with standard broadband capability was conducted to check accessibility and performance. Remote scanning presents potential benefits but comes with important considerations around working relationships, human factors and cognitive limitations, as well as how it impacts on the profession and patient.
Summary of contents: This poster provides an overview of how remote scanning works in the clinical arena. It will provide a summary of benefits and limitations, make recommendations for wider implementation, and pose some interesting challenges to discuss as a profession.

P138 A review of cone beam extremity CT in an acute NHS trust

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Background: Cone-Beam CT (CBCT) is a technology that allows cross sectional imaging with equivalent demonstration of fracture in extremities as Multi-Detector CT (MDCT) with lower radiation dose, as well as weight bearing exams of lower extremities.[1,2,3]
Method: A CBCT scanner was utilised at an acute NHS Trust for 1 year. All extremity CT exams performed during this period were reviewed and categorised by scanner and body region examined. All dose information was recorded in mGy*cm and analysed via T-test in R.[4]
Results: Of 728 extremity CTs performed August 2019 to September 2020, 296 were CBCT examinations. Most common areas scanned were wrists (44%), followed by ankles (27.7%), knees (20.5%) and elbows (7.8%).
CBCT wrist doses (M= 44.99, SD= 6.57) were significantly lower than CT (M= 103.87, SD= 107.19) ($t(318)= 8.881$, $p < .0001$). CBCT ankle doses (M=76.45, SD = 20.45) were also significantly lower than CT (M= 119.44, SD= 59.84) ($t(200)=3.888$, $p < .0001$). All elbow and 98% of knee exams were performed on MDCT scanners. Slight movement artefact was reported on the CBCT weight bearing ankle scans.
Of patients that had extremity CBCT, 7 also had MDCT on the same region without any changes in casting or orthopaedic hardware (5 wrists, 1 knee, 1 ankle). The CBCT doses for these exams (M= 53.3, SD = 9.83) were significantly lower than equivalent MDCT doses (M= 106, SD= 30.9) ($t(6) = 5.1189$, $p < .005$).
Conclusion: CBCT is widely applicable for cross sectional scanning of extremities with lower dose than equivalent extremity MDCT

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P139 Ultrasound in spinal distractions - Improving patient services

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Background:
• MAGec rods are a type of spinal growing rods used for treatment in patients with early onset scoliosis. They are used as an interim treatment, where lung development may be compromised, before full fusion scoliosis surgery when the patient is skeletally mature.
• Patients undergo an initial operation and the rods are then distracted in follow up clinics every 3-6 months. It is a non-invasive technique using magnets to lengthen the rods.
• The follow up clinics took place in the children's x-ray department with fluoroscopy screening.
Change of practice:
• A few Radiographers who were trained to use Ultrasound started to offer ultrasound instead of fluoroscopy during

follow up distractions.
• A MAGec specialist trained the Radiographers in image interpretation and the parts of the inserted rods.
• One Radiographer was trained initially and cascaded on to two others.

Advantages:

• Eliminates the use of ionising radiation and adheres to the ALARA principle. Especially as children are more radiosensitive and the patients often have lots of x-rays.
• Allows more flexibility when booking the clinics as the 10 day LMP rule does not have to be considered for females of child bearing age.
• Allows accurate measurements in real-time so the surgeon can assess the length of distraction and its efficiency.
• Ultrasound machine is portable and also allows us to work around the patient.
• Increased job satisfaction.

Conclusion: The use of ultrasound has many advantages over fluoroscopy and the change has allowed us to deliver the best practice for our patients.

P140 The devil is in the detail; the ground up implementation of a national blueprint strategy for cross sectional imaging

Kerry Mills; Elizabeth Ladd; Ben Roe
NHS England and NHS Improvement

Background: A national blueprint strategy was devised in response to one regions approach in the restoration and recovery of imaging services post covid. During the implementation phase, this region invested in a dedicated imaging leadership team and employed a ground up methodology to ensure a targeted response in driving the agenda forward.

Purpose: As part of its strategy, two separate short-term interventions were introduced. The first addressed the shortfall in the radiographer workforce through a significant international recruitment drive. The second was in direct response to the increased demand for cross-sectional modality scanning and involved providing post graduate education throughout the region. There are four key areas that were deemed essential in this approach: establishing a functional regional diagnostic imaging workforce action group and working collaboratively with arm's length bodies such as HEE and SCoR. The responsiveness of the HEI's involved in the demands for post graduate education in a post pandemic world. The leadership team having key skills and experience in strategic leadership, operational management and academic policies and procedures.

Summary: The success of this project has been driven through a strong leadership team who have enabled and facilitated the right conversations with the right people at the right time. Working from a ground up approach has allowed radiology managers to directly steer each intervention in alignment with their specific service recovery plans. This project has enabled strong foundations to be laid and solid collaborative working partnerships to be formed from which future projects will emerge

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P141 An audit of CT extravasation rates and management

Samantha Moncur
The Walton Centre

Background: Most CT examinations require the use of Contrast Media (CM) for optimum visualisation of vessels and organs. Automated power injectors allow the CM to be injected at higher flow rates than can be achieved by hand. Although this is good for image quality, regular use of injectors, alongside high flow rates in CT can increase extravasation risks by up to 0.25%. Extravasation is the leakage of intravenously (IV) administered CM into the surrounding soft tissues of the limb. Risk factors include puncture site, age and the use of an existing cannula. Patients with poor venous access or pre-existing conditions such as diabetes or lymphoedema have an increased risk of serious injury.

Purpose: To determine if extravasations in CT are recorded correctly and to establish if we are adhering to the local management protocol. To use this data to compare our management plan and extravasation rate to national guidance and literature.

Summary of content: Results show that rates are low, indicating efficient risk assessment. There were no major complications or referrals to plastic surgeons, suggesting satisfactory management of extravasations. Literature shows that most complications occur with contrast volumes of 100mls or more. As there are no current CT protocols at this

Trust that use more than 80mls of contrast, major complications are unlikely. A locally agreed protocol is in place for the management of CM extravasation in CT in line with RCR and ESUR guidelines. Images demonstrating complications of extravasation are included.

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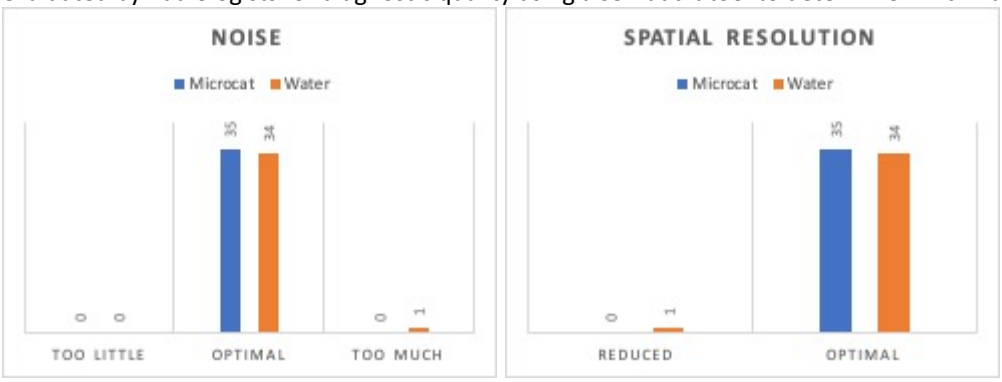
P142 An audit to compare the diagnostic image quality of dual-energy Computed Tomography (CT) scans using water instead of Barium Sulphate oral contrast

Shelly Kainth; Cherith Desmeules; Vicki Major; Rakhee Vaja; Andrew Gogbashian
Paul Strickland Scanner Centre

The use of Barium Sulphate is recommended in oncology follow-up CT scans however, the pandemic stopped this in our department. Water was used as a neutral oral contrast instead to reduce patients time spent in the department. Many patients express Barium Sulphate as unpleasant and intolerable. Both contrasts provide different diagnostic information, and it is unclear if Barium Sulphate is required for all cancers. A group of 35 patients with the seven common cancers; breast, colon, lung, melanoma, ovarian, renal and testicular were selected. Each patient had CT scans pre-pandemic with Barium Sulphate and post-pandemic with water totalling 70 scans. These scans were evaluated by Radiologists for diagnostic quality using a self-audit tool to determine which had greater benefit.



Results show Barium Sulphate has greater optimal noise, optimal spatial resolution and acceptable diagnostic quality for CT scans compared to those with water. All Barium Sulphate scans had optimal noise and spatial resolution with water scans demonstrating too much noise and reduced spatial resolution in 3% of cases. Results demonstrate evidence suggesting that water used as oral contrast provides similar diagnostic quality CT scans questioning its use in all cancers. The use of Barium Sulphate for follow-up CT scans may not be necessary for all cancers. Water provides similar results adequate enough to determine the nature of oncology disease thereby limiting the amount of time patients spend in department and improving their experience. Due to a small study, it is difficult to ascertain if Barium Sulphate is required for all cancers.

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P143 A prototype interpretive layer (PIL) to enable safe and effective independent patient image access

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Introduction: The pandemic has precipitated a move towards remote interaction and communication with patients. Mechanisms already exist for patient to access to their radiological images1 and reports.2 A previous study by the authors identified risks and benefits associated with this process.3 This follow up study identified requirements for enabling those benefits and mitigating the risks.4

Methods: Patients and clinical experts were surveyed in order to identify perceived benefits and risks of sharing images with patients. Thereafter, semi-structured interviews were undertaken with participants from both groups in order to identify barriers and facilitators for this process.

Results: The interviews identified several requirements for safe and effective patient access to their images. These informed the design of a PIL which should include: a disclaimer/warning as not all patients will want to see their images or they may be upset by them; supporting information to help patients to understand their images -such information may include: flagging of key images/abnormalities; previous imaging/normal images for comparison; labels -- to indicate anatomy and for orientation; a copy of the report and the report in layman's terms; links to trusted information and the patient's care plan; interactive elements such as query and feedback mechanisms. Finally, security measures are required.

Conclusion: Respondents identified several requirements for consideration in sharing images safely and effectively. Further work is required both to assess the effectiveness of this strategy in practice and to identify appropriate mechanisms via which to deliver it.

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P144 Quality of CT scan requests in trauma patients: a single-centre clinical audit

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Inclusion of clinical information with radiology requests improves interpretation accuracy, clinical relevance and confidence of the reporting radiologist.(1) The Royal College of Radiologists (RCR) guidance on trauma radiology in severely injured patients sets the standards and outlines the importance of an annual audit to assess the adequacy of image requesting in the trauma setting.(2) The purpose of the clinical audit was to assess the quality of clinical information provided in computerised tomography (CT) scan requests for major trauma patients. We conducted a retrospective clinical audit to assess the quality of trauma CT scan requests at a major trauma centre in the United Kingdom. The first 100 patients admitted as major trauma calls in 2019 were included in this study, irrespective of age, gender or severity of injury. Trauma CT scan requests should include the following clinical information: 1. Haemodynamic stability, 2. Suspected injuries, 3. Visible injuries/Findings on examination, and 4. Mechanism of injury. The audit findings were held against a 100% standard outlined by the RCR guidelines. (2) Of the 100 CT requests analysed, 6% included information on whether the patient was haemodynamically stable, 43% made reference to the suspected injuries, 72% included information on visible injuries or findings on examination and 92% of requests included information on mechanism of injury. The findings of this audit demonstrate that key clinical information is

often omitted from trauma CT scan requests and outline room for improvement. This may adversely impact patient care by reducing interpretation accuracy and causing unnecessary exposure to ionising radiation.

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P145 Playing it safe: communication of important findings

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Background: The 2007 National Patient Safety Association identified that for critical and significant unexpected results, safety nets should be established with 'fail safe alerts' (1). Since, the Royal College of Radiologists (RCR) have published multiple documents relating to alerting systems. The most recent sets out standards to promote the provision of a high quality and most importantly safe service to patients (2). The document states that a radiologist should flag a report which has 'urgent, critical, significant, unexpected and actionable findings, which he/she feels may not be acted upon in a timely manner'.

Purpose of poster: Following a recent audit at our institution it was highlighted that over a 2-month period a very high number of reports had been coded to alert the clinical team. We also had anecdotal feedback from clinicians stating that 'too many reports had alerts on them' and suggestions that this was diminishing impact. This led to a second audit to determine if our department was using the failsafe alerting system appropriately. We hope to present our results in order to open up discussion about these systems and present adaptations to maintain their power.

Summary of content: Poster divided into two: 1. Our audit and results as a way to introduce the topic and 2. Adaptations (main part of poster, in pictorial display) that we feel may help other centres establish local guidelines for safe communication of important findings.

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P146 Patient preparedness for MRI - An evaluation of the perceptions of different resource types

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University of Exeter

Background: There is increasing interest in how best to prepare patients for MRI where there may be an association with feelings such as claustrophobia. The range of resources is expanding, ranging from leaflets, written websites, videos, and apps. This study aimed to explore how well three types of resources are perceived to prepare individuals for MRI.

Method: Freely available resources (with appropriate permissions) were evaluated to ensure comprehensive and broadly equivalent content. The resources selected were a website, a video and an app. A mixed methods questionnaire was designed, piloted and refined, and then opened to consenting volunteers (students and staff) from within the institution following appropriate ethical approvals.

Results: 30 complete responses were received (age range 18 to 60). The average participant ratings (out of 5) in terms of how informative they found the resources were: website: 3.9 (range 2--5, standard deviation (SD): 1.9), video: 4.3 (range 2--5, SD: 0.8), app: 3.6 (range 1--5, SD: 1.0). The app was ranked as least preparative (57%, n = 17) and the video as the most (53%, n = 16). 23% (n = 7) felt the website was the most useful and 30% (n =9) the least. Thematic analysis suggested that all resources provided some benefits for some participants, perhaps reflecting different learning styles.

Conclusion: Results suggest the best approach is having a selection of resources in different formats thereby meeting the needs of a diverse population.