UKIO

UK IMAGING & ONCOLOGY CONGRESS 2023

BIR The British Institute of Radiology

CoR The College of Radiographers

IPEM Institute of Physics and Engineering in Medicine

SYNERGY AND SYMBIOSIS:

BREAKING DOWN BARRIERS IN HEALTHCARE

ABSTRACT BOOK

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Proffered papers: Clinical

A5.1 The T1 Ratio Of Marrow (TROM) as a novel tool to identify metastatic from non- malignant marrow lesions of the spine : A pilot study

Neha Nischal[1]; Mahtabossadat Afzali Hosseini[2]; Parham Shojaie[2]; Christine Azzopardi[1]; Karthikeyan P Iyengar[3]; Shahnawaz Haleem[4]; Jonathan Stevenson[5]; Rajesh Botchu[1]

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Objective: The purpose of this study was to analyse quantitative values of normal and abnormal marrow on T1-W images of spine, to propose a ratio for T1 values of abnormal to normal vertebrae and to assess whether this ratio could be helpful in predicting presence of neoplastic lesions in the spine.

Material: 100 randomly selected MRI of lumbar spine without infection, fracture and tumour were selected to form normal cohort. A second cohort of 100 metastasis of lumbar spine was identified. Ratio of T1 value of vertebral body to the T1 value of the inferior vertebral body was performed for normal cohort from T11 to L5. Ratio of T1 value of metastasis to adjacent normal vertebral body was done for metastatic cohort. Data was analysed using standard t-test and kappa was performed for intra and inter observer reliability.

Results: A decline in T1 value of abnormal to normal marrow was seen in patients with metastasis which was statistically significant. We call this the T1 Ratio Of Marrow (TROM). The sensitivity and accuracy with the cut-off value of TROM at 0.7 (92% sensitivity, 97.1% accuracy) is better than at 0.6 (75% sensitivity, 96.2% accuracy) or 0.5 (47% sensitivity, 93.2% accuracy). However lower TROM values are more specific to differentiate benign lesions such as atypical hemangiomas from metastasis.

Conclusion: Using TROM on T1-weighted images can help increase sensitivity and confidence in differentiating neoplastic from non-neoplastic lesions of the spine without the need for additional advanced sequences.

A5.2 Composite dicom image for measurement of angle of femoral version and tibial torsion

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Norfolk & Norwich University Hospitals NHS Trust

Background: Measurement of tibial torsion and femoral version angles can aid in determining the extent of torsional deformity and help in decision-making including the need for de-rotational osteotomy. The use of colour composite overlayed images, produced by merging of multiple CT slices, provides a convenient and efficient method for measuring the angles of torsional deformities.

Method: A software application was developed using Python programming language1 and PyDicom2 and OpenCV3 libraries to produce composite colour images for angle measurements. The slice and series number are noted for right and left femoral versions, and right and left tibial torsions using PACS reporting software. The Dicom study is exported to a local disk drive or send direct to PACS for reporting or use by referring consultant. The Dicom header of composite images are created using the information from the input CT image data, allowing for automated merging with the original CT study upon export to PACS.

Results: The composite images are exported direct to PACS using Dicom services or shared via file sharing services with the requesting orthopaedic consultants. As the Dicom header for the composite images are derived from the original input CT slices they are merged with the main study without any intervention by PACs administrators. An angle measurements tools is provided in addition to those provided by the PACS reporting software.

Conclusion: A dedicated software application provides a convenient and efficient way to measure torsional deformities by overlaying axial CT images to create composite images for export to PACS.

1. Van Rossum, G., & Drake, F. L. (2009). Python 3 Reference Manual. Scotts Valley, CA: CreateSpace. 2. Mason, D. (2011). SU-E-T-33: pydicom: an open source DICOM library. Medical Physics, 38(6Part10), 3493-3493 3. Bradski, G. (2000). The OpenCV Library. Dr. Dobb's Journal of Software Tools.

A5.3 Clinical investigation of a novel ceramic hip resurfacing using radiostereometry

Clare Moody[1]; Martin Downing[2]; James Holland[1]

[1]Newcastle Hospitals NHS Trust; [2]Downing Imaging Limited

Introduction: Radiostereometric analysis (RSA) is a proven imaging method assessing implant stability and survival. As part of an MHRA-approved clinical investigation of the ReCerf Hip Resurfacing Arthroplasty (MatOrtho Ltd., UK), implant stability will be assessed in a subgroup of patients. To ensure high-quality RSA imaging, surgeons and radiographers rehearsed using a cadaver and phantoms. For statistical validation, RSA precision under repeatability conditions was assessed to determine measurement sufficiency of axial subsidence.

Materials and Methods: ReCerf implantation and rehearsal of marker insertion was carried out on a cadaver. Ten one-millimetre tantalum markers were placed into the pelvic and femoral bone near to the implant. RSA imaging was performed in a routine radiography room using a mobile unit for the second x-ray source. For the phantom, resurfacing implants were fixed to sawbones secured to a perspex base. The phantom was imaged 25 times under typical radiographic variability conditions with up to 10cm translation and 15-degree rotation in any axis between image exams. Precision at 95% confidence of migration was calculated using model-based RSA software (Downing Imaging Ltd., UK).

Results: Good marker insertion patterns were achieved in the cadaver. RSA cadaver imaging determined guide limits of x-ray exposure for sufficient image quality. Precision of axial migration was 0.09mm and 0.08mm for the cup and stem.

Conclusions/Discussion: Using onsite precision assessment and modified routine radiographic practice, high-quality RSA imaging can be performed in our centre. Our CAD model-based RSA method was validated capable of providing sufficiently precise axial migration measurements to assess implant stability. Patient imaging has now successfully commenced.

1. Pijls, B.G., Nieuwenhuijse, M.J., Fiocco, M., Plevier, J.W., Middeldorp, S., Nelissen, R.G. and Valstar, E.R., 2012. Early proximal migration of cups is associated with late revision in THA: a systematic review and meta-analysis of 26 RSA studies and 49 survival studies. Acta orthopaedica, 83(6), pp.583-591. 2. Valstar, E.R., Gill, R., Ryd, L., Flivik, G., Börlin, N. and Kärrholm, J., 2005. Guidelines for standardization of radiostereometry (RSA) of implants. Acta orthopaedica, 76(4), pp.563-572. 3. ISO 16087:2013 Implants for surgery — Roentgen stereophotogrammetric analysis for the assessment of migration of orthopaedic implants

A5.4 CT urography for visible haematuria in the under 50s - is it worth it?

Carina Brolund-Napier[1]; Lucy Boyle[1]; Sophie Watson[1]; Fraser Merchant[1]; Nirav Kaneri1; Mohammed Bilal[2]; Paul McCoubrie[1]

[1]University Hospital Bristol and Weston NHS Foundation Trust; [2]Birmingham and Solihull Mental Health Trust

Background: CT Urography (CTU) detection of upper tract urothelial cancer (UTUC) is reported to be extremely rare in patients under the age of 50 referred with haematuria, with no additional diagnostic benefit when compared with unenhanced CT alone. This study assessed CTU detection of UTUC in adults under the age of 50 referred for initial investigation of visible haematuria (VH), and whether unenhanced CT alone would suffice.

Methods: Retrospective review of 1405 consecutive CTUs of patients aged 16-49 years performed in our tertiary centre between 02/01/2015 and 30/12/2019. We included 757 patients referred for initial assessment of VH with no significant prior urological disease. Our CTU protocol includes an unenhanced phase and a split intravenous bolus enhanced phase. A consultant uroradiologist reviewed all abnormal CTU findings and assessed whether the unenhanced CTU phase demonstrated the abnormality.

Results: Out of 757 CTUs, two cancers were identified in the 40-49 age group; one UTUC and one bilateral renal cell carcinoma case, both evident on the unenhanced CTU phase. 532 CTUs (70.3%) were normal. Proportion of normal CTUs by age group was inversely proportional up to the age of 39. Renal tract calculi were the most common non-malignant finding in 103 patients (13.6%).

Conclusion: In our centre, UTUC is extremely rare (0.1%) in adults under 50 years referred with VH. CTU offered no diagnostic benefit when compared with unenhanced CT. We therefore recommend unenhanced CT as the primary imaging investigation for VH in this patient group, thereby significantly reducing radiation dose, costs and reporting.

A5.5 Diagnostic efficacy of bi-parametric versus multiparametric magnetic resonance imaging for detection of prostate cancer in Thai patients

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Faculty of Medicine, Khon Kaen University

Background: The bi-parametric MRI (bpMRI) is based on T2-weighted (T2W) imaging and functional sequences diffusion-weighted imaging (DWI). The multiparametric MRI (mpMRI) was composed of bpMRI and dynamic contrast enhancement (DCE). However, the value of DCE MRI in the detection of prostate cancer is still controversial.

Method: Retrospective analysis of 109 men who underwent mpMRI with prostate biopsy from January 2015 to March 2021. The bpMRI examination included T2W, DWI, and apparent diffusion coefficient map (ADC map), then added DCE to the mpMRI examination with masked clinical and laboratory information. Two diagnostic radiologists interpreted both examinations separately. The performance, diagnostic test accuracy, and subgroup analysis were analyzed.

Result: Around one-third (31.2%) of 109 patients were positive malignancies. The diagnostic accuracy of bpMRI was less than mpMRI, especially in the PI-RADS 3 group. The intra-observer agreement between bpMRI and mpMRI was moderate. The inter-observer agreement between the two readers was minimal agreement.

Conclusion: The mpMRI was more accurate in the detection of prostate cancer than bpMRI, especially in the PI-RADS 3 group.

1. Alabousi M, Salameh JP, Gusenbauer K, Samoilov L, Jafri A, Yu H, et al. Bi-parametric vs multiparametric prostate magnetic resonance imaging for the detection of prostate cancer in treatment-naïve patients: a diagnostic test accuracy systematic review and meta-analysis. BJU Int. 2019 Aug;124(2):209-220.
2. Thestrup KC, Logager V, Baslev I, Møller JM, Hansen RH, Thomsen HS. Bi-parametric versus multiparametric MRI in the diagnosis of prostate cancer. Acta Radiol Open. 2016 Aug 17;5(8).

Proffered papers: Standards and service development

B4.1 The acceptability of x as an alternative to physical grids to UK-based diagnostic radiographers

Emma Hyde

University of Derby

Background: Virtual Grid software uses a mathematical algorithm to remove radiation scatter and improve image contrast, without the need for a physical grid. It has been designed to enable radiation dose reduction whilst increasing image quality (Imaging Technology News, 2014; Radiopaedia, 2022). Despite the introduction of Virtual Grid software to the UK in recent years, anecdotal evidence suggests that there has been limited uptake and use. This study set out to investigate the acceptability of Virtual Grid software to UK-based Diagnostic Radiographers, by identifying the enablers and blockers to its use.

Method: Following ethical processes, a small-scale study is being undertaken to collect perceptions and opinions about the acceptability of the use of Virtual Grid software within the UK-based Diagnostic Radiography community. Qualitative data will be collected via online focus groups, which will be audio-recorded and transcribed verbatim. Transcripts will be analysed using thematic analysis to identify enablers and barriers to Virtual Grid software use, with the goal of increasing its' acceptability.

Results: Data collection will be starting in Spring 2023, and early results will be reported at UKIO 2023.

Conclusion: The use of Virtual Grid software has the potential to make a significant impact on radiographic practice, by supporting radiation dose reduction alongside improved image quality. Understanding the barriers and enablers to the use of Virtual Grid may help to support an increase in its acceptability and use.

1. Imaging Technology News (2014) Virtual Grid Adapts Contrast on X-rays to Improve Quality of Exams taken Without a Grid. Available at: https://www.itnonline.com/content/virtual-grid-adapts-contrast-x-rays-improve-quality-exams-taken-without-grid
2. Radiopaedia (2022) Virtual Grid. Available at: https://radiopaedia.org/articles/virtual-grid?lang=gb

B4.2 Implementation of a multidisciplinary team-centred research model in a clinical MRI department

Georgina Hopkinson[1]; Erica Scurr[1]; Geoff Charles-Edwards[2]; Dow-Mu Koh[2]; Christina Messiou[2]; Jessica Winfield[2]

[1]The Royal Marsden NHS Foundation Trust; [2]The Royal Marsden NHS Foundation Trust & The Institute of Cancer Research

Background: Research-active hospitals lead to improved patient outcomes(1,2,3,4). This has been embraced by the College of Radiographers, who reference research engagement from practitioner level in the recently published Education and career framework (5). However, significant staffing shortages across radiology (6,7,8) and clinical sciences (9) plus increasing workload overall(10) are barriers to research and development(11). With a growing portfolio of quality development projects, service evaluations and prospective imaging-led research an efficient model has been developed to integrate research and development into routine workflow in a busy NHS clinical MRI environment. We have completed 16 projects with radiographers or physicists as first or last authors using this method in 2022, shared at national and international level.

Purpose: This poster will provide an overview of the our developed workflow including step-by-step processes and case study examples in a way that could be adapted into practice by others.

Summary of contents: It will offer key learning experiences and share what we believe to be an exemplar model of multidisciplinary integration of quality development, service evaluation projects and research into a clinical MRI department, allowing patients to participate in prospective imaging research during their clinical visits. Our multidisciplinary model relies almost exclusively on existing clinical staff (radiographers, radiologists and physicists) and minimises additional patient visits. The group has demonstrated the value of multidisciplinary research by increasing capacity and capability in multiple areas including research methods, governance, patient recruitment and consent, data curation, data analysis and academic writing as well as reports of increased role satisfaction.

1: Downing A. et al, 2017, High hospital research participation and improved colorectal cancer survival outcomes: a population based study, Gut 2017 Jan;66(1):89-96. doi: 10.1136/gutjnl-2015-311308. Epub 2016 Oct 19 2: Ozdemir B. et al, 2015, Research activity and the association with mortality, PLoS One 2015 Feb 26;10(2):e0118253. doi: 10.1371/journal.pone.0118253. eCollection 2015 3: Jonker, L. & Fisher, S.J., 2018, The correlation between National Health Service trusts' clinical trial activity and both mortality rates and care quality commission ratings: a retrospective cross-sectional study, Public Health 2018 Apr;157:1-6 doi: 10.1016/j.puhe.2017.12.022. Epub 2018 Feb 10. 4: Jonker, L., 2019, Patients admitted to more research-active hospitals have more confidence in staff and are better informed about their condition and medication: Results from a retrospective cross-sectional study, Journal of Evaluation in clinical practice 2019 https://doi.org/10.1111/jep.13118 5: College of Radiographers, 2022, Education and Career Framework for the Radiography Workforce (4th Edition), 12604-CoR-ECF-Interactive-v9a (sor.org) 6: The Royal College of Radiologists. (2021). Clinical Radiology UK workforce census 2020 report. https://www.rcr.ac.uk/publication/clinical-radiology-uk-workforce-census-2020-report 7: The College of Radiographers. (2020). Diagnostic Radiography Workforce UK Census 2020. https://www.sor.org/getmedia/c83fbeca-5d8a-4bdc-98a7-526e49da08bb/CoR_diagnostic_radiography_workforce_uk_census_2020_report_v6 8: Pedersen, M., 2022, What motivates radiographers to start working with research?, Radiography Vol 29, Issue 1, pg 215-220 https://doi.org.10.1016/j.radi.2022.11.003 9: Institute of Physics and Engineering in Medicine, 2021, Report on the 2021 Survey of the Diagnostic Radiology and Radiation Protection Workforce. diagnostic-radiology-and-radiation-protection-workforce-report-on-2021-survey-final.pdf (ipem.ac.uk) 10: NHS England. (2020). Diagnostic Imaging Dataset Annual Statistics release 2019/2020. www.england.nhs.uk/statistics/wp-content/uploads/sites/2/2020/10/Annual-Statistical-Release-2019-20-PDF-1.4MB.pdf 11: Rodrigues J.C.L. et al, (2022), Current pressure on the UK imaging workforce deters imaging research in the NHS and requires urgent attention, Clinical Radiology, Vol 77, Issue 12 Pg 913-919 https://doi.org/10.1016/j.crad.2022.07.015

B4.3 Lessons from leadership in wellbeing for healthcare staff

Reem Hasan; Amelia Staniland; Zosia Hedges; Ally Patten

InHealth

Purpose or Learning Objective: Healthcare is going through one of its most challenging periods in the UK with staffing and attrition a critical issue, so there has never been a more important time to focus on the health and wellbeing of our people. InHealth launched a new wellbeing strategy in 2022 with a wellbeing guardian and champions across the organisation to support this. This study investigates the impact and outcomes across a range of domains 18 months on.

Methods or Background: Analysis of quantative and qualitative data gathered over 18 months, looking at how the InHealth wellbeing strategy has influenced the following areas: Improving personal health and wellbeing, professional wellbeing support, environment, managers and leaders, fulfilment at work, relationships and data insights.

Results or Findings: Whilst looking after the wellbeing of staff is not a new concept for InHealth, this refreshed approach galvanises existing work and empowers staff to improve their health and wellbeing, and support each other on this journey. The wellbeing strategy is closely linked with the equality, diversity and inclusion strategy, ensuring a comprehensive and tailored approach. The results show significant improvements in all domains which contributes to mutual benefits for staff and the organisation.

Conclusion: Focusing on the wellbeing of the workforce should be a key priority for all industries, especially in healthcare. Benefits include a healthy and happy workforce, reduced sickness absence, better engagement and greater productivity and performance. This will lead to improved patient care and outcomes. Limitations None

NHS sickness absence rates – NHS Digital Thriving at Work: Stevenson/Farmer review of mental health and employers, 2017 BMA supporting health and wellbeing at work 2018 https://www.forbes.com/sites/nazbeheshti/2019/01/16/10-timely-statistics-about-the-connectionbetween- employee-engagement-and-wellness/?sh=58aada3b22a0 Workplace Burnout Survey | Deloitte US Health, Wellbeing and Productivity in the Workplace | RAND Work-life balance | Mental Health Foundation NHS Health and Wellbeing review, Boorman, 2009 https://www.england.nhs.uk/a-focus-on-staff-health-and-wellbeing/leadership-andmanagement/ Employee engagement, sickness absence and agency spend in NHS trusts, NHS England/The King's Fund, 2018

B4.4 Developing a reporting radiographer service within a private organisation

Siobhan Edwards-Bannon

Practice Plus Group, Portsmouth Urgent Treatment Centre

Background: Radiographer reporting has developed over the last 3 decades however creating a new reporting service within any organisation is challenging. This paper looks specifically at the challenges in developing a reporting service within the private sector, how those have been overcome to establish an in-house reporting service and how this has benefitted the organisation.

Learning Outcomes:

- Clearly outlining the steps taken to create a reporting service
- Understanding the challenges presented
- Understanding the benefits of the reporting service
- Exploring future developments

Summary of Content:

Introduction

- Briefly explaining the organisational structure and justifying the need for investment to develop a reporting service in a private provider of NHS services.

Challenges in implementation

- Education (Considerations of type of course, cost and location)
- Mentoring (finding a mentor without in-house support available)
- Preceptorship (creating a programme)
- Clinical Governance and framework for service (starting from scratch and understanding requirements)

Benefit of the Radiographer Reporting Service

- The value of reporting professionals on the imaging floor
- Staffing recruitment and retention
- Proving value of financial investment

Further Development of the service

- Creating a network
- Establishing reporting capacity to determine ability to increase workload

The Royal College of Radiologists (2022), Radiology reporting figures for service planning 2022, London: The Royal College of Radiologists.
The Royal College of Radiologists (2022), Clinical Radiology job planning guidance for consultant and SAS doctors 2022, London: The Royal College of Radiologists.
The Royal College of Radiologists (2019), CQC Radiology review: where are we now? London: The Royal College of Radiologists.

B4.5 Establishing the size and scope of the imaging support workforce: A first stage analysis of national workforce data in England

Julie Nightingale[1]; Beverly Snaith[2]; Sarah Etty[1]; Trudy Sevens[1]; Shona Kelly[1]

[1]Sheffield Hallam University; [2]University of Bradford

Background: Demand for diagnostic imaging is rising against a backdrop of persistently high workforce vacancies. Recent reports (Halliday et al 2020; Richard 2020) highlight support workers (including clinical support worker and assistant/associate practitioner roles) as a key enabler to unlock capacity and capability, yet there is sparse data relating to the size and scope of this workforce. This research addresses this evidence gap and will be the first comprehensive compilation of imaging support workforce data in England.

Method: Following ethical approval, anonymised data from NHS Electronic Staff Records (ESR) were analysed. The proportions of support workers within the imaging workforce and their employment bandings were analysed at NHS Trust, regional and national level. Data for one region was analysed in detail to establish inclusion and exclusion criteria for the wider dataset; accuracy was checked with other workforce data dashboards.

Results: Data related to Imaging Services from 137 NHS Trusts in England demonstrated wide variations. In the pilot region presented (22 Trusts) the support workforce as a proportion of the wider workforce was a mean of 27.8% (SD = 9.3), with wide variations in utilised grades. Data differed from workforce data dashboards and resources.

Conclusion: Known data recording inaccuracies within the ESR system resulted in discrepancies between the different workforce data dashboards. However, this census provides vital evidence of the scope and scale of the support workforce which is the first step in a multi-method research programme to determine how they can best contribute to imaging delivery, improving the patient experience and reducing health inequalities.

1. Halliday K, Maskell G, Beeley L, Quick E. NHS. Radiology GIRFT Programme National Specialty Report. November 2020. https://www.gettingitrightfirsttime.co.uk/wp-content/uploads/2020/11/GIRFT-radiology-report.pdf
2. Richards M. NHS England. Diagnostics: Recovery and Renewal, October 2020. Independent Review of Diagnostic Services for NHS England . Prof Sir Mike Richards. https://www.england.nhs.uk/publication/diagnostics-recovery-and-renewal-report-of-the-independent-review-of-diagnostic-services-for-nhs-england/

Proffered papers: Radiotherapy technical

C5.1 Literature review: Is there a clinical need for carbon ion radiotherapy in the UK?

Ellie Light; Pete Bridge

University of Liverpool

Background: The biological characteristics of Carbon Ion therapy can lead to lower grade toxicities and increased tumour response. This has led to Kirkby et al (2020) proposing that the UK would benefit from a heavy ion centre. There has, however, been limited discussion of patient cohorts, associated side effects and overall benefit to treatment. This review aimed to investigate the potential clinical benefits of a heavy ion centre.

Method: A search of the literature was conducted using PubMed and Science Direct with the search term "Carbon ion therapy". A critical review of the evidence was performed to evaluate the current clinical use of carbon ion therapy through analysing the associated toxicities, overall survival (OS), local control (LC), progression-free survival (PFS) and the incidence of secondary cancers.

Results: After critical appraisal with CASP, data was extracted from 81 papers. The findings indicated that carbon ion therapy has proven to be a more clinically effective treatment for malignancies such as nasopharyngeal tumours, chondrosarcoma and chordoma, inoperable bone and soft tissue sarcomas, non-small cell lung cancer, liver cancer and prostate cancer. More work is needed to strengthen the evidence base for some other tumour types.

Conclusion Carbon ions show promising survivorship along with few adverse effects for some tumour sites, suggesting strong clinical gains for a carbon ion facility. Whilst other malignancies have shown promising data, higher quality evidence is needed to establish value for them.

1. Kirkby, K.J., Kirkby, N.F., Burnet, N.G., Owen, H., Mackay, R.I., Crellin, A., Green, S. (2020) Heavy charged particle beam therapy and related new radiotherapy technologies: The clinical potential, physics and technical developments required to deliver benefit for patients with cancer. Br J Radiol. 93(1116):20200247

C5.2 Using ProKnow to audit post implant dosimetry of I-125 prostate brachytherapy implants: DVH comparison with Oncentra Prostate and Variseed

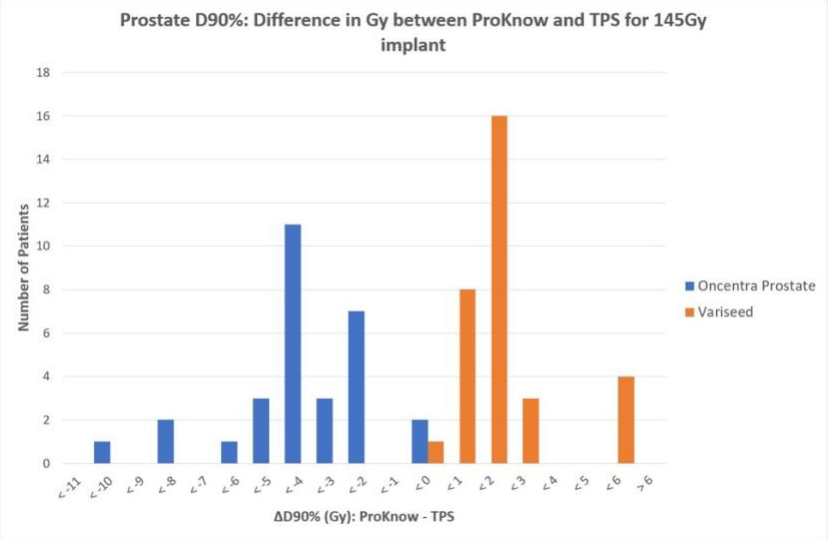
Daniel Emmens[1]; Katie McHugh[2]

[1]Maidstone and Tunbridge Wells NHS Trust; [2]Cambridge University Hospitals NHS Foundation Trust

Background: A group of NHS Trusts would like to use the ProKnow software to audit post implant dosimetry for prostate patients receiving brachytherapy with I-125 seeds. Comparisons will be made between Trusts and against RCR minimum standards[1]. The impact of using ProKnow for this audit depends upon differences between its own DVH calculation engine and the participating Trusts' treatment planning systems' (TPS). An NHS task group has looked at these differences for EBRT, but brachytherapy plans have steeper dose gradients and higher maximum doses.

Method: Dosimetry from post implant CT scans was calculated for patients prescribed 145Gy using the Oncentra Prostate (v4.2.3) or Variseed (v9.00.30) TPS. The volume of the prostate and the D90% to the prostate was calculated. Structure sets and dose cubes were exported to ProKnow where each parameter was recalculated.

Results: The average prostate volume calculated by ProKnow was 0.8cc larger than Oncentra Prostate (n = 30, range: 0.3cc to 1.4cc) and 0.05cc larger than Variseed (n =32, range: -0.41cc to 0.19cc). This difference in volume leads to differences in measured values for D90% to the prostate between Oncentra and ProKnow, with ProKnow measuring 4.3Gy lower (range: -10.5Gy to -0.4Gy). Differences are smaller between Variseed and ProKnow, with ProKnow measuring 1.7Gy higher (range: -0.9Gy to +5.8Gy).



Conclusion This work will allow us to compare the dosimetry of prostate I-125 implants between centres while being aware of differences between ProKnow and various TPS DVH calculation algorithms.

1. The Royal College of Radiologists. *Quality assurance practice guidelines for transperineal LDR permanent seed brachytherapy of prostate cancer.* London: The Royal College of Radiologists, 2012.

C5.3 National survey to review radiotherapy centres image verification audit process

Louise McHugh; Xin Wang; John Rodgers; Gillian Court; Vicky Hughes; Cynthia Eccles

The Christie NHS foundation Trust

Background: The national guidance on image guided radiotherapy (IGRT), On-Target (2008) and On-Target 2 (2021), highly recommend implementing an audit process for selecting images at random, assess image quality and quality of analysis. To date, there is a paucity of literature on the development and implementation of an effective audit process for radiotherapy (RT)imaging.

Method: To gain a national overview of current RT imaging audit practice, a survey was created consisting of 16 short questions and disseminated by email to RT service managers of 59 UK RT centres.

Results: There has been a 53% (n=31) response rate with 36% (n=11) of centres confirming they carry out routine image verification audits. 29% (n=9) carryout adhoc audits, 19% do not carry out any form of RT image audit and one centre describes a process in place which they do not classify as an audit. Audits were undertaken by radiographers (n=11) and occurred anywhere from monthly to annually

Conclusion: Our survey reports the first evaluation of RT audit processes in UK centres. Further analysis is required to define the audit scope and objectives of an RT image verification audit at our institution. Using the description detailed in the survey responses, from centres undertaking routine RT imaging audits, we intend to implement local audits to confirm compliance with departmental protocols. The results may also help inform other centres in the development and implementation of an RT image audit process

C5.4 Implementation of the Integral Quality Monitor (IQM) for patient specific dosimetry

Laura Smith; Mekala Chandrasekaran; Rachel Barlow; Nael Khater; Claire Birch

University Hospital Southampton NHS Foundation Trust

Background: Patient specific dosimetry (PSD) of complex planning techniques require measurements that are resource and time intensive using the current phantom-based system within our radiotherapy department. This project aimed

to implement IQM (iRT Systems GmbH, Germany) for PSD of all volumetric modulated arc therapy (VMAT) and stereotactic plans using locally derived action levels, to improve efficiency of the PSD workflow.

Method: Following system commissioning, small leaf position errors were introduced into a range of treatment plans and resultant IQM signal deviation was assessed. Correlation of IQM signal deviation with changes in plan dose-volume histogram (DVH) metrics was used to derive clinically relevant action levels[1]. These were checked using a retrospective audit of 32 clinical plans delivered on both phantom-based and IQM systems. Finally, a time efficiency audit was performed for a 3-month period.

Results: Strong linear correlation between deviation in IQM signal and DVH metrics was found across a range of sites. Asymmetric action levels of -6.3% and +4.0% were deduced, corresponding to a 5% reduction in planning target volume (PTV) metrics and a 5% increase in organs-at-risk (OAR) metrics respectively. No action levels were exceeded by the audited plans. Automation of the IQM software and reduced setup time contributes to an average monthly time saving of 31 hours.

Conclusion: IQM signal deviation correlates with variation of DVH plan metrics for treatment errors. The IQM is suitable for routine patient specific dosimetry across all tested sites. Implementation of the IQM has dramatically improved efficiency of the PSD workflow.

1. iRT Systems GmbH ed., (2019). *How to determine error tolerances for the IQM System (user training).* Koblenz, Germany.

C5.5 Radiographer IGRT training using "ProKnow contouring accuracy" to enhance online-adaptive workforce skills

Alex Beardmore; Rachel Brooks-Pearson; Karen Pilling

Newcastle Hospitals NHS Foundation Trust

Background: Online-adaptive radiotherapy (OART) may become the new gold-standard for radiotherapy to complex cancers. Current IGRT training programmes do not confer skills in organ at risk (OAR) and target volume contouring or plan evaluation. This study evaluates web-based contouring tasks (ProKnow) in IGRT training; gaining experience with OAR and target volume contouring. ProKnow uses peer-reviewed, expert contours on anonymous CT data-sets, providing Dice scores, which may help to reduce training burden on clinicians.

Method: 10 radiographers undertaking prostate IGRT training completed ProKnow contouring tasks. An anatomy and IGRT overview was delivered for trainees and supplemented by contouring instruction within ProKnow. Trainees contoured 6 CT data-sets (2x prostate, 2x seminal vesicles, 1x bladder and 1x rectum). Mean Dice scores for initial and final contours were compared using paired *t*-tests in Microsoft Excel.

Results: Dice scores significantly increased for the prostate (0.739 vs 0.850, p=0.001), seminal vesicle (0.566 vs 0.794, p=0.007) and for rectum contours (0.720 vs 0.882 p=0.010) from initial to final attempts. All radiographers achieved satisfactory initial bladder OAR contours and therefore initial and final scores matched. The mean Dice score for the bladder was 0.943.

Conclusion: This study shows radiographers significantly improve their contouring accuracy using this self-directed approach, limiting the time burden on training staff. OART capable hardware requires large investments; so OART must be used clinically early in the implementation to justify higher investment. This study indicates integration of ProKnow tasks into radiographer IGRT training builds experience and skills in preparation for radiographer-led OART services.

Proffered papers: Chest

D5.2 Improving diagnoses with AI: Deep learning software for chest xray interpretation

Sarah Blake; Neelan Das

East Kent University Hospitals

Background: Chest radiograph reporting at hospitals is challenged by increasing wait times and reporting backlogs due to growing scan volumes. Artificial intelligence (AI) with accurate and rapid chest radiograph reporting capability can help improve efficiency and increase accuracy of initial diagnosis.

Methods: qXR, a deep learning AI system that is trained on 3.5 million chest radiographs with separate detection pipelines for 30 abnormalities. Chest radiographs (n = 1040) from accident & emergency (A&E) (n = 252), general

practitioners' clinic (GP) (n = 265), in-patient admissions (IP) (n = 269) and out-patient centers (OP) (n = 253) were collected prospectively from East Kent NHS Hospital Trust. Two radiologists read each radiograph and provided a report; they then checked on the qXR report and submitted additional comments. Readings of the two radiologists were compared to qXR report for statistical analysis. Inter-reader agreement between radiologists and qXR were tested using Cohen's Kappa coefficient.

Results: Ground truth was established based on the results of radiologist 1's reports, which represented the ground truth. qXR reported each CXR as normal versus abnormal. qXR identified abnormal chest radiographs with a sensitivity of 0.98, specificity of 0.57, positive predictive value of 0.95, negative predictive value of 0.80. Inter-reader agreement (n = 743) between radiologists was 0.66, between qXR and radiologist 1 was 0.61 and between qXR and radiologist 2 was 0.70.

Conclusion qXR can accurately stratify chest radiographs as normal versus abnormal in a hospital setting, potentially reducing reporting backlogs and resulting in early intervention to patients.

D5.3 Factors affecting lung cancer SABR patients participating in a clinical trial

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[1]NHS Lothian; [2]Sheffield Hallam University

Background: Clinical trials are essential for the development of radiotherapy treatments and techniques. Lung cancer highly prevalent in the UK and recruitment into eligible clinical trials is crucial; however, trial participation is low (Du et al., 2008; Cancer Research UK, 2021). SABR lung patients are often frail and have other co-morbidities (SABR UK Consortium, 2019). This retrospective service evaluation looked to identify any specific patient demographic factors influencing participation in the current Lung DNA clinical trial.

Method There were 91 eligible trial patients referred for SABR, treated from April 2019 to December 2021. 30 patients participated and 61 patients declined trial participation, demonstrating a recruitment rate of 33%. Seven factors were investigated: age; sex; distance to hospital; transport to hospital; social deprivation; FEV1 and performance status. Statistical analysis was performed to investigate each factor individually using independent-samples t-test and Chi-square test for independence. The interrelation between these factors and participation was investigated using binary logistic regression.

Results: The independent-sample t-tests and Chi-square test for independence showed no statistical significance that any one factor alone affected patient participation. There was no statistical significance in the binary logistic regression 2 (7, N=86) = 4.518, p>0.7.

Conclusion This study showed no statistical relationship between any factors being investigated and participation in the Lung DNA trial. Further investigation into the factors surrounding patient participation in other trials could be used in comparison with this study. Additional research should be done to identify the reasons behind non-participation and to employ strategies to increase participation.

1. Cancer Research UK (2021). Lung cancer statistics. Available at: https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/lung-cancer#heading-Zero (Accessed: 14 August 2022). 2. Du, W., Mood, D., Gadgeel, S., & Simon, M. S. (2008). An educational video to increase clinical trials enrollment among lung cancer patients. Journal of Thoracic Oncology, 3(1), pp. 23-29. https://doi.org/10.1097/JTO.0b013e31815e8bb2 3. SABR UK Consortium. (2019). Stereotactic Ablative Body Radiotherapy (SABR): A Resource. (Version 6.1). Available at: https://www.sabr.org.uk/wp-content/uploads/2019/04/SABRconsortium-guidelines-2019-v6.1.0.pdf (Accessed 14 August 2022).

D5.4 Nasogastric tube safety improvement

Andy Creeden; Sam Smyth; Nayeem Khanda

University Hospitals Coventry and Warwickshire NHS Trust

Background: Feeding through a misplaced nasogastric tube (NGT) is a potentially fatal but avoidable cause of patient harm. Despite classification as a 'Never Event' thirty-one such incidents were reported to the NPSA in 2021 / 20221.

Method: A new process for NGT check x-rays was introduced to prevent feeding via a misplaced NGT caused by misinterpretation of x-rays. The process required:

- requests to include a statement regarding aspirate
- the NGT tip to be demonstrated on all check x-rays and line enhancement software tools to be applied
- radiology to provide formal reports within defined timescales
- reports to be electronically acknowledged by the referrer prior to feeding

NGT check x-rays were routinely reported by radiology during standard working hours; a report was available out-of-hours on request. Compliance was audited six months after implementation.

Results: Only 62% (n=62/100) of referrals included information on aspirate. 93% (n=93/100) of NGT check x-rays included the NGT tip. Line enhancement software tools were used in 94% (n=94/100) of cases. Examinations were reported by radiology within agreed timescales in 97% (n=97/100) of cases but the report was acknowledged by the referring clinician prior to feeding for 32% (n=16/50) of examinations. No NGT Never Events had been reported since implementation. However clinicians had raised concerns regarding out-of-hours reporting delays.

Conclusion: Radiology reporting of NGT check x-rays was implemented to improve patient safety. Further work is required to improve referrer compliance with requirements for stating aspirate on requests and acknowledgement of radiology reports prior to feeding. Availability of out-of-hours reports presents an additional challenge.

1. NHS England 2022, *Provisional publication of never events reported as occurring between 1 April 2021 published and 31 March 2022.* NHS England, London.

D5.5 Reducing never events associated with nasogastric tubes: a radiographer led initiative

Darren Dewick; Peter Brown

York and Scarborough Teaching Hospitals

Background: The Healthcare Safety Investigation Branch (2020) examined patient safety issues related to the placement of naso-gastric (NG) tubes. Several recommendations were proposed to reduce associated adverse events; such as, providing a timely report on the position of NG tubes on chest x-rays. Gill et al. (2017) conducted a successful trial of Radiographer reporting of NG tubes. Therefore, the aim of this study was to assess the safe transferability of Radiographer reporting of NG tubes to another trust.

Method: A prospective data analysis was conducted of 508 chest x-rays and reports for NG tube checks over 6-months. Accuracy of Radiographer reports were compared to reference standard Consultant Radiologists. Chest x-rays were also audited for potentially significant (none tube related) chest pathology.

Results: From 508 cases, the accuracy of Radiographer reporting was 98.6% (95% confidence interval [CI]: 97.2 - 99.4), sensitivity 98.9% (95% CI: 93.8 - 100), specificity 98.6% (95% CI: 96.9 - 99.5), positive predictive value 93.5% (95% CI: 86.8 - 97), and negative predictive value 99.8% (95% CI: 98.3 - 100). 7 (1.4%) minor discrepancies and no major discrepancies were identified. 6 cases (1.2%) had potentially significant (extra-tube) findings (4 heart failure, 1 infection and 1 pneumothorax) that had not been imaged before.

Conclusion: Radiographer immediate reporting of NG tubes on chest x-rays provides an accurate reporting service to improve patient safety by reducing the risk of intra-pulmonary feeding. There was a low occurrence of potentially significant (none tube related) chest pathology findings, however it is unclear if these were clinically new findings.

1. Healthcare Safety Investigation Branch. (2020) Placement of nasogastric tubes. Retrieved from: https://www.hsib.org.uk/investigations-and-reports/placement-of-nasogastric-tubes/placement-of-nasogastric-tubes/
2. Roe, G., Harris, K. M., Lambie, H. and Tolan, D. J. M. (2017) Radiographer workforce role expansion to improve patient safety related to nasogastric tube placement for feeding in adults. Clinical Radiology, 72(6), pp.518-e1.

Proffered papers: Pregnancy

E9.1 Hiding in plain sight - a case report on a heterotopic twin pregnancy

Sachin Sivakumar

North West School of Radiology

Background: Ruptured ectopic pregnancy (REP) and Ruptured corpus luteal cyst (RCLC) are two of the most frequent acute gynaecological emergencies, presenting with abdominal pain and haemoperitoneum. Heterotopic pregnancy (HP) is where there are multiple gestations (an intrauterine and extra-uterine location, i.e. an ectopic pregnancy). Whilst rare spontaneously (1 in 30,000), due to modern advances HP is now thought to have a common prevalence in those undergoing assisted reproduction techniques (1 in 100).1

Purpose: We present a rare case of a 7 week twin heterotopic pregnancy with normal antenatal scans and diagnostic uncertainty, with an initial diagnosis of RCLC on CT. We utilise this case to explain possible distinguishing imaging features on US and CT between these two conditions; and as an example of the increasing prevalence of HP in those undergoing IVF.

Summary : Diagnosing HP on imaging can be challenging, given that diagnosing REP relies on the lack of an intrauterine pregnancy and positive beta-HCG. Given the increasing prevalence of HP, this should be the principal diagnosis to consider and exclude in those who have undergone IVF. If an adnexal lesion is identified, REP and RCLC can be difficult to differentiate due to similar imaging features and are commonly misdiagnosed. Despite similar presentation, the management varies as REP often necessitates surgical treatment, whilst RCLC can usually be managed conservatively. Thus being able to differentiate between these conditions is vital for the imaging specialist to aid effective patient care.

1. Maleki, A. et al. (2021) The rising incidence of heterotopic pregnancy: Current perspectives and associations with in-vitro fertilization, European Journal of Obstetrics & Gynecology and Reproductive Biology, 266, pp. 138-144. Available at: https://doi.org/10.1016/j.ejogrb.2021.09.031.

E9.2 Offering post-mortem imaging as an alternative to conventional autopsy: Single centre experience of changes in parental choice

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[1]Great Ormond Street Hospital for Children NHS Foundation Trust; [2]UCL/Great Ormond Street Institute of Child Health

Background: Autopsy can provide parents with answers as to why their pregnancy ended. However, many parents decline this option due to the invasive nature of conventional autopsy (CA). Less-invasive autopsy (LIA) techniques, using medical imaging, provide parents with a more acceptable method of investigation, with high diagnostic accuracy when compared to CA. Micro-CT has recently been adopted within our centre as a non-invasive, high-resolution post-mortem imaging technique, providing an alternative for parents who decline CA. We examined the impact of integrating micro-CT into our clinical service on parental choice.

Method: We retrospectively analysed perinatal autopsy referrals to our institution across two different years. Parental consent and different types of autopsy performed were recorded. Chi squared statistical test was used to test proportions.

Results: Between 2019 and 2021 the number of parents who only consented to minimally-invasive autopsy techniques when offered showed a statistically significant increase from 14% (59/428;2019) to 28% (109/390;2021), p<0.00001. There was statistically significant reduction in CA from 204/428 (48%; 2019) to 107/290 (27%; 2021), p 0.0043 was very statistically significant. There was also a statistically significant increase in cross-sectional imaging from 55% (237/428;2019) to 81% (251/309;2021) p<0.0001, demonstrating an increased reliance on post-mortem imaging in a modern autopsy delivery service.

Conclusion: Our study shows that increased availability of LIA reduces demand for CA. Providing greater choice for parents allows individualised care pathways to be chosen that better suit the family's needs. Raised awareness and availability will provide benefit for parents and clinicians alike.

E9.3 The influence of antenatal imaging on parent-fetal bonding

Emily Skelton[1]; Alison Smith[2]; Gill Harrison[3]; Mary Rutherford[4]; Christina Malamateniou[1]; Susan Ayers[1]

[1]City, University of London; [2]Guy's & St Thomas' NHS Foundation Trust; [3]Society of Radiographers; [4]King's College London

Background: The emotional connection that expectant parents form to their unborn child is important for healthy fetal and infant brain development and parental wellbeing. Imaging during pregnancy is thought to facilitate the developing parent-fetal bond, however the factors which may influence this are not well understood (Skelton et al., 2022). This study aimed to identify parental and scan variables which may predict increased bonding after antenatal imaging.

Method: Expectant parents (mothers=58, fathers=18) attending a single site for obstetric ultrasound (n=64) or fetal magnetic resonance imaging as part of an existing research study (n=12) completed an online questionnaire (QualtricsXM) before and after their scans. Gestational age at imaging was between 18-36 weeks of pregnancy, and parents were invited to share their expectations and experiences of the scans. A modified version of Muller's Prenatal Attachment Inventory was used to measure prenatal bonding. Multivariate linear regression with bootstrapping was used to test if demographic information and scan variables significantly predicted bonding after antenatal imaging.

Results: Mean bonding was significantly (p<0.05) increased after imaging for mothers (*t*=6.11) and fathers (*t*=2.29) irrespective of imaging modality. The final regression model was significant and included nine variables (adjusted R2=0.33, F=4.86, p<0.001). Of these, modality type (=0.45, p=0.04), parental experience (=0.36, p=0.07), parental excitement (=0.31, p=0.01) and employment status (=0.25, p=0.02) were significantly associated with increased bonding scores after imaging.

Conclusion: Radiographers and sonographers in antenatal imaging are uniquely positioned to facilitate positive experiences through the provision of parent-centred care, which may enhance parental excitement and support the developing parent-fetal bond.

1. Skelton, E, Webb, R, Malamateniou, C, Rutherford, M. and Ayers, S. (2022) The impact of antenatal imaging on parent experience and prenatal attachment: a systematic review. J Reprod Infant Psychol. DOI: 10.1080/02646838.2022.2088710

E9.4 A qualitative exploration of UK obstetric sonographers' experiences of the COVID-19 pandemic

Emily Skelton[1]; Alison Smith[2]; Gill Harrison[3]; Mary Rutherford[4]; Susan Ayers[1]; Christina Malamateniou[1]

[1]City, University of London; [2]Guy's & St Thomas' NHS Foundation Trust; [3]Society of Radiographers; [4]King's College London

Background: Substantial changes were made to the provision of pregnancy ultrasound services during the COVID-19 pandemic to minimise virus transmission and maintain service continuity (Skelton et al., 2023). Literature describing the impact of the pandemic on obstetric sonographers is predominantly quantitative in nature, however statistics cannot fully convey sonographers' voices. This study aimed to gain a deeper understanding of the experiences of UK obstetric sonographers performing pregnancy ultrasound scans during the pandemic.

Method: A UK-wide, online, anonymous cross-sectional survey on QualtricsXM was open to responses between 9th March and 6th May 2021. Open questions were included to capture qualitative detail from respondents about their perceptions and experiences of scanning during the pandemic. Themes were generated from free text responses using thematic analysis.

Method: Written responses were received from 111 sonographers. Five themes were generated, depicting the impact of the pandemic on obstetric sonographers: 1) continuity in a crisis; 2) decisions about me, without me; 3) battle scars - the lasting damage of COVID-19; 4) what people think I do vs. what I really do; and 5) the human touch. A cross-cutting theme was sonographers' feelings of disconnection from senior figures and expectant parents which created a sense of abandonment and distrust.

Conclusion: Self-reported experiences of ineffective leadership and management, and perceived lack of understanding of the sonographer's role are potential contributory factors in the high levels of moral injury and occupational burnout reported within the workforce. Moral injury support and healing must be prioritised to enable post-pandemic recovery of the obstetric ultrasound workforce.

1. Skelton, E., Harrison, G., Rutherford, M., Ayers, S. and Malamateniou, C. (2023) UK obstetric sonographers' experiences of the COVID-19 pandemic: Burnout, role satisfaction and impact on clinical practice. Ultrasound. 31(1), 12-22.

E9.5 Prenatal diagnosis of tracheo-oesophageal fistula/oesophageal atresia: is MRI helpful?

Louise Wilson; Elspeth Whitby

University of Sheffield

Background: Oesophageal atresia (OA) with or without tracheo-oesophageal fistula (TOF) affects 2.75 per 10,000 births within the UK [1]. Studies have shown fetal magnetic resonance imaging (MRI) has a greater diagnostic accuracy than ultrasound [2], however there remains uncertainty over what size constitutes a small stomach and how frequently this correlates with a diagnosis of TOF/OA.

Method: A study of all patients referred to our centre for fetal MRI due to suspicions of TOF/OA on antenatal ultrasound between October 2011 and October 2022 was undertaken. The indication, MRI findings and postnatal outcome were then compared to assess diagnostic accuracy. Particular focus was on the size of the stomach seen on MRI.

Method: 52 patients had an MRI result suspicious of TOF/OA. 46 of these had been referred for MRI to exclude TOF/OA following ultrasound. 6 had MRI for different indication but a diagnosis of possible TOF/OA was made following the MRI (3/6 of these had TOF/OA). TOF/OA was suspected on 29/35 MRI scans of which 16 had TOF/OA (positive predictive value 55.2%). 6 MRI scans were reported as normal and none of these patients had TOF/OA (negative predictive value 100%). The stomach bubble was absent in 6 cases of which 5 had TOF/OA and only a sliver of stomach was seen in 2 cases which both had TOF/OA diagnosed postnatally.

Conclusion: Fetal MRI can accurately exclude TOF/OA and has improved diagnostic accuracy when compared with ultrasound alone.

1. Prevalence charts and tables. 24 Aug 2018 [cited 8 Feb 2023]. Available: https://eu-rd-platform.jrc.ec.europa.eu/eurocat/eurocat-data/prevalence_en 2. Pardy C, D'Antonio F, Khalil A, Giuliani S. Prenatal detection of esophageal atresia: A systematic review and meta-analysis. Acta Obstet Gynecol Scand. 2019;98: 689–699.

Proffered papers: History

The early days of radiology in India

Arpan K Banerjee

The International Society for the History of Radiology

There is little in the western literature on the early days of radiology in India. The news of Rontgen's discovery reached Calcutta and a Dr Mahendralal Sircar a campaigner for science was probably the first to use X-rays in India. On 20 June 1896 he took a photograph of a hand using Roentgen's apparatus ordered from the Ducretet company in Europe. He noted in his diary that he did not initially obtain a satisfactory picture due to over exposure but succeeded on 23rd June. This is believed to be the first X-Ray taken in India. The brilliant physicist J C Bose returned to India from the UK and in April 1897 he started building his X-Ray appparatus. D M Bose, his nephew, and former Director of the Bose Institute, wrote that after reading a newspaper account of Roentgen's discovery Bose built an X-ray apparatus in Presidency College, Calcutta. Sadly there are no records of this present. The 5th May 1898 edition of the Amrita Bazar Patrika, a respected English daily published in India, published a report 'Professor Bose and the New Light' but sadly no records of this issue exist today. The first hospital to acquire X-ray apparatus is probably Madras Medical college who acquired the equipment in 1900. X-rays were used to treat leukaemias as early as 1902. In 1918 an X-ray machine was installed at Lady Hardinge Medical College Delhi with the first chair in radiology created in 1923.

1923 and all that. Reflections on the centenary of the death day of Wilhelm Conrad Roentgen

Adrian Thomas

Canterbury Christ Church University

Background: Roentgen's life and times were both quite remarkable. Wilhelm Conrad Roentgen was born in Lennep in Germany on March 27, 1845. This was both before the revolutions of 1848, and before the industrialisation of Germany. He lived through the Austrian-Prussian War of 1866, the Franco-Prussian War of 1870, and the subsequent unification of Germany under Bismarck, dying after the Great War during the Weimar Republic.

During his life he experienced a time of unprecedented scientific, social and technical change. This will be discussed. For his remarkable discovery of X-rays he was awarded the first Nobel Prize for Physics in 1901. Roentgen died in Munich on February 10, 1923 at a time of increasing social unrest, and later that same year on November 8-9 the Beer Hall Putsch (or Munich Putsch) took place. The Beer Hall Putsch was a failed coup d'etat by the Nazi Party leader Adolf Hitler with others.

Purpose:

To celebrate the life and work of Wilhelm Conrad Roentgen.

To understand his life in relation to his times.

To consider the sequelae of the discovery of X-rays.

Wilhelm Roentgen at the time of the discovery of X-rays in 1895

Summary of Content: Roentgen's discovery changed how we view both ourselves and how we view reality. Nothing was quite the same again. All of us owe him a huge debt of gratitude.

1. Glasser, O. (1933) Wilhelm Conrad Roentgen and the Early History of the X-rays. Bale, Sons and Danielsson
2. Thomas, AMK. (2022) Invisible Light, The Remarkable Story of Radiology. Boca Raton: CRC Press (Taylor and Francis Group).
3. Underwood, E. Ashworth. (1957). Wilhelm Conrad Roentgen (1845-1923) and the Early Development of Radiology. In: Sidelights on the history of Medicine. Ed. Z. Cope. London: Butterworth & Co.

Proffered papers: Radiotherapy patient focus

F4.1 Using Compaq VERT to provide a person centred approach to patient information and education for the radical prostate pathway

Fiona Kennedy

NHS Tayside

Introduction: Compaq VERT, the first mobile VERT system in the UK, is used in a Multi-disciplinary prostate prehabilitation workshop , away from the hospital setting. This Virtual reality software provides an added visual element to deconstruct and simplify complex Radiotherapy concepts and provides a person centred approach to the patient information and education experience. This virtual reality software is utilised in the prostate pathway to aid explanation; specifically surrounding bowel and bladder preparations. Focus is on key topics; the anatomical relationship of the prostate and surrounding structures, importance of bowel and bladder preparation and daily reproducibility. A pre co-designed workshop programme is reflexively adapted for each group, to fulfil their information requirements and answer any questions. This increased engagement aims to help improve compliance with bowel and bladder preparation required for Radiotherapy to the prostate.

Methods: A questionnaire was distributed at a prostate cancer support group held at Maggie's centre. Half the group had Radiotherapy to the prostate and half had a radical prostatectomy.

Results/Discussion: Our research shows VERT helps improve understanding of why bowel and bladder preparations are required, and what Radiotherapy treatment is like. It was found to be beneficial to hold these workshops away from the clinical setting. Holding these workshops in an informal style, we can adapt the contents of the workshop reflexively to individuals needs and questions; tailoring content for the individual.

Conclusion: Feedback from VERT sessions has been positive and shows the inclusion of a visual aid has improved comprehension of complex Radiotherapy concepts.

F4.2 Development and implementation of a foot pedal patient alert system in a radiotherapy department

Amy Wilson; Robert Thompson; Julie Wood

Leeds Cancer Centre

Background: When radiotherapy is being delivered, the treatment room must be vacated except for the patient. Sometimes, during this procedure patients need to communicate with radiographers. This can be due to various reasons including anxiety, pain, struggling to maintain treatment position. Traditional communication methods include, CCTV, intercom and some departments have handheld patient alert systems. Many radiotherapy techniques involve patients holding onto equipment or holding their breath which limits the use of the current patient alert procedures.

Purpose: Alternative solutions to the current handheld alert systems were explored by a multidisciplinary team. The creation of a foot pedal patient alert system meant that patients could communicate with radiographers by using their foot. This provided an alternate method which would be able to be used by those patients who couldn't use their hands. A prototype was created using an indexable board of Perspex, mounted with a spring-loaded cradle, holding the original the handheld device alert system. This cradle resembles a pedal, which the patient can press down onto with their feet to activate the button and then the beacon. The cradle is fixed to the board with two suction plates. The position of the pedal can be varied along the board depending on the patient requirement.

Summary of Content: The creation of this device will be displayed through pictures demonstrating its use. Information will be provided on the use of it and which patients it has benefitted.

F4.3 Developing materials for talking about sexual pleasure during radiotherapy for gynaecological cancer

Lisa Ashmore[1]; Vicky Singleton[1]; Alison Hanbury[2]; Rachael Eastham[2]; Susie Layzell[1]

[1]Lancaster University; [2]Me&Her

Background: Research from the gynae narratives project exposed problematic silences, especially around sex (1). Methods used to address sexual wellbeing during cancer treatment often focus on deficit models and exist in pockets of expertise, rather than embedded in care.

Method: This presentation will focus on work conducted to address this finding. The project team worked with sex critical feminist social enterprise, 'Me&Her', to engage therapeutic radiographers in developing skills and resources that would enable and embed conversations about sex and pleasure within radiotherapy treatment. Fifteen therapeutic radiographers from across the UK participated in three online workshops about sexual wellness. The aim was to understand having conversations about sex prior to, during and following radiotherapy treatment as a practice of care. A fourth, in person workshop was held with members of the group and a graphic designer to co-create resources and materials to aid conversations about sexual wellbeing. A final workshop was convened with a group of patients to reflect on, and further develop, resource content.

Method: The workshops increased critical awareness about damaging silences when providing radiotherapy for gynaecological cancer, and promoted participants' confidence. Radiographers said they developed a network of peers with shared interest and developed skills and languages to enhance their care practices.

Conclusion: Talking about sexual wellbeing should be integral to radiotherapy care. Using fun and interactive workshops was a successful way of increasing attention given to sexual bodies during radiotherapy treatment.

1. Ashmore L, Singleton V, Kragh-Furbo M, Stewart H, Hutton D, Singleton C, et al. We need to talk about... radiotherapy for gynaecological cancer. Lancaster, UK: Lancaster University; 2022.

F4.4 Delivering tailored treatment information and reducing patient anxiety in radiotherapy with web based simulation in the clinical setting

Lauren Fantham[1]; Jan Antons[2]; Julie Hendry[1]

[1]St. George's, University of London; [2]Vertual Ltd.

Background: Providing Individualised care for patients having radiotherapy requires accessible information resources (NICE, 2012). It is difficult for patients to visualise their own internal anatomy, but a collaboration between healthcare professionals, practice educators and industry has enabled the development of an innovative browser-based 3D simulation to support patients' understanding and decisions about radiotherapy treatment. Viewed on a PC in the clinical setting, patients are visually engaged and empowered to ask questions about the process and associated side effects, related to tailored anatomy images and the OAR structures within the radiation beam. With discussion, this may result in lower levels of treatment related anxiety, better compliance with pre-treatment preparations, and a more confident approach to what is, to many, a disconcerting prospect.

Purpose of poster: This poster will highlight patients' evaluation of a personalised treatment demonstration of radiotherapy. This will be measured in terms of 1) gain in understanding of the treatment set up, preparation protocols and side effects, and 2) emotional response in terms of anxiety reduction.

Summary of content: The poster will outline the challenges of patient centred care in the radiotherapy setting, and the opportunities for patients to gain an understanding of the physical set up, equipment and structures affected by the path of the beam. Images from the 3D simulation will demonstrate the information content of the application. The benefits of individualised radiotherapy simulation delivered at point of care meetings following diagnosis will be summarised.

1. National Institute for Health and Care Excellence (2012) Patient experience in adult NHS services. Available at: https://www.nice.org.uk/guidance/qs15/chapter/quality-statement-4-individualised-care (Accessed: 09 February 2023)

F4.5 Radiation reveal: Exploring experiences of radiotherapy for teenagers and young adults

Lisa Whittaker[1]; Jamie Dean[2]; Catarina Veiga[2]; Rebecca Drake[3]; Sophie Langdon[1]; Samantha Terry[1]; Holly Masters[4]; Alex Britton[4]; Mia Cumbo[4]; Nicole Burdis[4]; Alfie Halil[4]; Gemma Fay[4]; Kate Mason[4]; Sophie Lambert[4]; Sam Benson[4]; Emma Smith[4]

[1]King's College London; [2]University College London; [3]Queen Mary University London; [4]Young Adult Participant

Understanding how patients experience radiotherapy is key to improving care and advancing research. Having cancer as a teenager or young adult (TYA) is very different from having it as a child or adult. This paper reports on a creative and collaborative public engagement project, Radiation Reveal. This multi-partnership project brought 10 TYAs (17-25 years old) who had radiotherapy for cancer together with radiation researchers in the Cancer Research UK RadNet. This project enabled TYAs and researchers to share experiences, provided an opportunity for peer support and identified what TYAs wish they had known before their radiotherapy treatment. The project produced several outputs and implications for practice, most notably, TYAs' 10 top tips for healthcare professionals. Sharing this project is an opportunity to raise awareness of meaningful public and patient involvement and engagement and influence medical practice using the patient voice. Content would include the TYAs' 10 top tips, an overview of three 2-hour online workshops, artwork capturing the discussion and additional outputs including podcasts and conference presentations. The workshops which formed the main part of the project allowed the TYAs to share their stories while also

connecting them with biology, physics, and oncology radiation researchers. The researchers gained an understanding of patient experiences of cancer and radiotherapy. Discussion was categorised into core themes: being young and diagnosed with cancer, radiotherapy treatment, side effects experienced and worries about late effects, measures taken to protect fertility, and importance of support, in particular peer support.

F4.6 What is the quality-of-life impact of surrendering a driving license for patients following stereotactic radiosurgery/radiotherapy for brain metastases at a single centre

Sheila Hassan[1]; Catherine Holborn[2]; Omar Al-Salihi[1]; Lucy Brazil[1]; Kazumi Chia[1]; Yasmin Akhtar[1]; Puteri ABDUL HARIS[1]

[1]Guys and St Thomas' Foundation Trust; [2]Sheffield Hallam University

Background: Research suggests that driving plays an important role in a person's quality-of-life (QoL). In the United Kingdom patients with brain metastases have to inform the DVLA and are required to surrender their driving licence. When this is communicated during a Stereotactic Radiosurgery (SRS) consultation patients will often say that having to give up driving is worse than a diagnosis of brain metastasis (BM) due to the perceived impact this will have on their lives. In the absence of evidence exploring QoL impact upon driving cessation (DC) within radiotherapy, the aim of this study was to investigate the impact of DC on patients treated with SRS, and whether patients would like more support and information.

Method: 132 patients met the inclusion criteria and received an anonymised questionnaire. Participants scored their level of agreement (1-5) with statements grouped into themes: mobility, independence, social, depression, restriction, and overall QoL. Further questions explored whether there was a need for written information.

Method: 47 questionnaires were returned. All QoL themes demonstrated a negative impact: Mobility (mode 5), independence (mode 5), social (mode 5), depression (mean 3.5), and restriction, (mean 2.6), and overall QoL (mode 5). Written information was also deemed a useful means of support (mode 5). Open comments highlighted the depth of feeling of losing a drivng licence and frustrations with the DVLA.

Conclusion: Results indicated there is a link between DC and a reduction in QoL across all five domains and that some written information and intervention programmes may help in mitigating the impact.

1. Buys, L.R. and Carpenter, L., 2002. Cessation of driving in later life may not result in dependence. Australasian Journal on Ageing, 21(3), pp.152-155. 2. Chihuri, S., Mielenz, T.J., DiMaggio, C.J., Betz, M.E., DiGuiseppi, C., Jones, V.C. and Li, G., 2016. Driving cessation and health outcomes in older adults. Journal of the American Geriatrics Society, 64(2), pp.332-341. 3. Curl, A.L., Stowe, J.D., Cooney, T.M. and Proulx, C.M., 2014. Giving up the keys: How driving cessation affects engagement in later life. The Gerontologist, 54(3), pp.423-433. 4. Harrison, A. and Ragland, D.R., 2003. Consequences of driving reduction or cessation for older adults. Transportation Research Record, 1843(1), pp.96-104. 5 .Mansur, A., Desimone, A., Vaughan, S., Schweizer, T.A. and Das, S., 2018. To drive or not to drive, that is still the question: current challenges in driving recommendations for patients with brain tumours. Journal of Neuro-Oncology, 137(2), pp.379-385. 6 .Qin, W., Xiang, X. and Taylor, H., 2020. Driving cessation and social isolation in older adults. Journal of aging and health, 32(9), pp.962-971. 7. Ragland, D.R., Satariano, W.A. and MacLeod, K.E., 2005. Driving cessation and increased depressive symptoms. The Journals of Gerontology Series A: Biological Sciences and Medical Sciences, 60(3), pp.399-403. 8. Siren, A. and Haustein, S., 2015. What are the impacts of giving up the driving licence?. Ageing & Society, 35(9), pp.1821-1838. 9 .Yeoh, S.F., Oxley, J., Ibrahim, R., Hamid, T.A. and Syed Abd. Rashid, S.N., 2018. Measurement scale development for mobility-related quality of life among older Malaysian drivers. Ageing International, 43, pp.265-278.

Proffered papers: Paediatrics

G5.1 The use of repetition computed tomography among paediatric patients in the Saudi health sector: How much is too much?

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Background: CT requests have increased, leading to higher rates of repeat imaging, raising concerns about collective radiation exposure, particularly in children who are highly sensitive to radiation. This study aims to determine the frequency and percentage of repeated paediatric CT exams in Saudi Arabia, prioritizing radiation safety in CT use.

Methods: This retrospective cross-sectional study analysed 7,707 patients over 6 months at King Fahad Armed Forces Hospital in Jeddah, Saudi Arabia. Of the 487 paediatric CT scans reviewed, patients ranged from 0 to 15 years old. Repeat scan percentages were calculated by identifying patient identification numbers, categorizing data by age and gender, and assessing duration between repeat scans.

Result: The study classified CT scan repetition into two, three, four, or five times, with 13%, 6%, 6%, and 1% of patients, respectively. The overall percentage of repeated CT scans was 27%, indicating a significant concern. The data revealed an average effective dose of 5567 mSv, with the highest dose reaching 21220 mSv and the lowest at 503 mSv. Most repetitions occurred within the same month, and the average age of paediatric patients was nine years old.

Conclusion: Despite the high priority given to radiation safety in Saudi Arabia, there is insufficient action to reduce the number of CT repeats. Modern approaches such as artificial intelligence and machine learning could improve radiation protection and provide a justification model. Additionally, the involvement of medical physics specialists in the decision-making process for repeat CT scans is urgently needed.

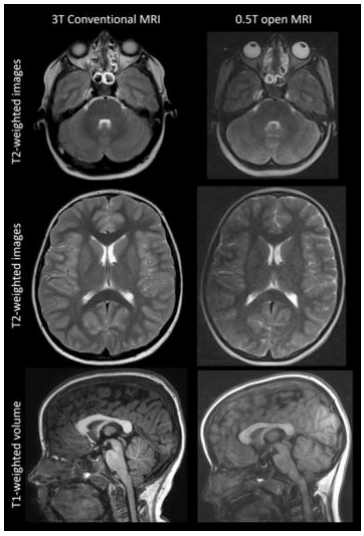
G5.2 Heads_Up - comparing upright open Magnetic Resonance Imaging (MRI) to conventional closed MRI for brain imaging in children -a pilot study

Carolyn Costigan[1]; Jesmine Dhooper[2]; Andrew Cooper[2]; Rob Dineen[2]

[1]Nottingham University Hospitals NHS Trust; [2]University of Nottingham

Background: MRI scans can be difficult for children to tolerate. Despite multiple techniques being developed to decrease child anxiety, there is still a high demand for sedation or general anaesthesia to successfully complete the MRI procedure. Upright open MRI scanners are less enclosed so may improve the child's scan experience and decrease sedation use. Currently, there are no studies evaluating image quality or experience of paediatric brain imaging in these scanners.

Aims: To establish the feasibility and acceptability of diagnostic brain imaging in young children using an upright 0.5T MRI scanner.



Methods: 6 children (5-10 years) who had been referred for a brain MRI to exclude a space occupying lesion were recruited to have an upright MRI scan following MR scanning in a 1.5 or 3T tunnel scanner. Participants and carers completed patient experience questionnaires after both scans. Image quality was assessed by a paediatric neuroradiologist.

Method: Feasibility criteria met - all children completed a diagnostic quality scan on the upright scanner, with no false negative or false positive findings on structural imaging compared to the concurrent 3T or 1.5T scans.

Acceptability criteria met - parents and children showed a clear preference for the upright scanner. Children also reported feeling less worried before and during the upright MRI scan, yet levels of comfort and self-reported motion remained the same.

Conclusion: The upright scanner improved child experience and provided scans of acceptable diagnostic quality for clinical practice. This promising data supports further investigation of this intervention in a larger population.

Afacan O, Erem B, Roby DP, Roth N, Roth A, Prabhu SP, et al. Evaluation of motion and its effect on brain magnetic resonance image quality in children. Pediatric Radiology. 2016;46(12):1728-35.
Artunduaga M, Liu CA, Morin CE, Serai SD, Udayasankar U, Greer MC, et al. Safety challenges related to the use of sedation and general anesthesia in pediatric patients undergoing magnetic resonance imaging examinations. Pediatr Radiol. 2021;51(5):724-35.
Chou IJ, Tench CR, Gowland P, Jaspan T, Dineen RA, Evangelou N, et al. Subjective discomfort in children receiving 3 T MRI and experienced adults' perspective on children's tolerability of 7 T: a cross-sectional questionnaire survey. BMJ Open. 2014;4(10):e006094.
Edwards AD, Arthurs OJ. Paediatric MRI under sedation: is it necessary? What is the evidence for the alternatives? Pediatr Radiol. 2011;41(11):1353-64.
Harrington SG, Jaimes C, Weagle KM, Greer MC, Gee MS. Strategies to perform magnetic resonance imaging in infants and young children without sedation. Pediatr Radiol. 2021:1-8.

G5.3 Children with autism - radiography staff development

Sophie Morrison; Alison Simpson; Rachel Aaron; Anya Metcalfe; Laura Holtom; Kiran Ahmed; Ammarrah Mahmood; Nisha Khan; Adam Mahmood; Ciara McNally

University of Bradford

Background: Autism is a neurodevelopmental impairment that effects more than 1 in 100 people worldwide. Within the UK there are around 700,000 autistic children and adults living with this development disability, affecting communication and social interaction within their everyday lives. Autistic children perceive the radiology department as an unfamiliar and stressful environment. Due to their heightened anxieties relating to cognitive functions, physical

senses and emotional intelligence and control, autistic children experience barriers to effective care in radiology. Enhancing the experience of autistic children to create a safe and positive environment that meets the individual needs of the child is therefore paramount.

Purpose: This poster is a practical evidence-based staff development resource for working with autistic children within a radiology department. Application of theory in practice is made accessible through infographics, conveying practical, responsive, and pro-active adaption of radiographic practice in a person-centred approach. Learning is supported through visual aids depicting evidence-based adjustments throughout the entire patient journey.

Summary of content: Key themes were established which are symptomatology of autism in children in the context of variation in barriers and individual accessibility to radiology services, a holistic determination of patient-centred practice, and improving patient experience. The work culminates in the presented 'The Children with Autism Patient Pathway' evidence-based guidance with wide applicability within radiology.

1. Berglund, I.G., Björkman, B., Enskär, K., Faresjö, M., & Huss, K. (2017) Management of children with autism spectrum disorder in the anaesthesia and radiographic context, Journal of Developmental & Behavioral Pediatrics, 38 (3), pp187-196. https://doi.org/10.1097/dbp.0000000000000432.
2. Drayton, A, N., Waddups, S. and Walker, T. (2019). Exploring distraction and the impact of a child life specialist: Perceptions from nurses in a paediatric setting. Journal for Specialists in Pediatric Nursing. 24(2), pp. 1-8. [Online]. Available at: https://doi.org/10.1111/jspn. 12242 [Accessed 23 January 2023].
3. National autistic society (2022) What is autism. Available at: https://autism.org.uk/advice-and-guidance/what-is-autism [Accessed: 23 January 2023]
4. Park, H.R., Lee, J.M., Moon, H.E., Lee, D.S., Kim, B.-N., Kim, J., Kimber D.G. and Paek, S.H. (2016). A Short Review on the Current Understanding of Autism Spectrum Disorders. Experimental Neurobiology, 25(1), p. 1. doi: 10.5607/ en.2016.25.1.1.

G5.4 Associations between cortical thickness and neuropsychological outcomes in HIV infected and uninfected children at 5 years

Ogechukwu Patience Anike

Association of Radiographer Registration Board of Nigeria

Background: Neurodevelopmental delay and cognitive impairments are reported even in HIV-infected (HIV+) children starting antiretroviral therapy (ART) in infancy. Recently we reported a visual perception deficit only at age 5 years in HIV+ children from the Children with HIV Early Antiretroviral (CHER) trial who commenced ART before 18 months compared to uninfected controls. Within the same cohort and at the same age, preliminary analyses have revealed clusters in the frontal and temporal lobes with cortical thickness increases. In healthy children, it has been shown previously that cortical thickness is related to general cognitive ability and decreases in left frontal cortical thickness over a two-year period have been related to reductions in full scale IQ. In this work, we were interested in identifying potential relations between observed cortical thickness changes and neuropsychological performance. We present an analysis of the relationships between cortical thickness in the regions showing HIV-related increases and neurocognitive outcomes in this cohort at 5 years.

Conclusion Even though no group differences were reported in the personal-social subscale measure in this cohort at this age, we find that cortical thickness increases in HIV+ children are associated with lower scores on this subscale. In addition, in regions in which HIV+ children demonstrate higher cortical thickness, control children display positive relationships between three cognitive domains and cortical thickness, which are not seen in infected children.

Bearden, E. C., van Erp, G.M.T., Dutton, A. R., Tran, H., Zimmermann, L., et al. (2006). Mapping Cortical Thickness in Children with 22q11.2 Deletions. CerebralCortex. doi:10.1093/cercor/bhl097 Burgaleta, M., Johnson, W., Waberd, D. P., Colom, R., Karama, S. (2013). Cognitive ability changes and dynamics of cortical thickness development in healthy children and adolescents. Neuroimage, 84: 810-819. https://doi.org/10.1016/j.neuroimage.2013.09.038 Karama, S., Dab'bagh, Y., Haier, R. J., Deary, I. J., Lyttelton, O. C., et al. (2013). Positive association between cognitive ability and cortical thickness in a representative US sample of healthy 6 to 18 year-olds. Intelligence, 37(2): 145–155. doi: [10.1016/j.intell.2008.09.006] Laughton, B., Cornell, M., Kidd M., Springer P. E., Dobbels E. M., et al. (2018). Five year neurodevelopmental outcomes of perinatally HIV-infected children on an early limited or deferred continuous antiretroviral therapy. Journal of the International AIDS Society, 21:e25106. http://doi.org/10.1002jia2.25106.

G5.5 A comparison of computed tomography (CT) and magnetic resonance imaging (MRI) in the diagnosis of non-accidental head injury (NAHI) in paediatrics: a narrative review of evidence

Esther Brint; Stuart MacKay

University of Liverpool

Background: NAHI has a 25% mortality rate, emphasising the significance of correct diagnoses (Joyce, Gossman and Huecker, 2020). CT is currently the 'gold standard' imaging modality, however peer-reviewed literature presents conflicting effectiveness data (Kleinman, 2009). This narrative review of literature investigates the sensitivity and specificity values of CT and MRI in the diagnosis of NAHI.

Method: A narrative review methodology was used to conduct this study. A variety of search terms were used to gather papers; literature was obtained from various databases. Inclusion and exclusion criteria helped to focus the review e.g; literature from the last 10 years. A relevant CASP tool was used to review the literature quality and a PRISMA flowchart shows the article filtration details. Articles passing the rigorous selection procedure were of high quality and relevance to this study's aims.

Method: Only five papers were eligible for the review. The ranges of CT sensitivity were 25.00%-87.00%, specificity 85.70%-100.00%. rMRI with GRE sequence sensitivity was 83.20%-92.80%, specificity 90.40%-96.20%. CT with rMRI with GRE sequence showed a sensitivity of 86.00%-90.00%.

Conclusion: The review concluded that rMRI scans with a GRE sequence increased sensitivity. However due to the lack of papers available further research is required before these findings can influence future practice.

1. Joyce, T. Gossman, W. and Huecker, M. (2020) 'Pediatric Abusive Head Trauma', National Center for Biotechnology Information (NCBI). Available from: https://www.ncbi.nlm.nih.gov/books/NBK499836/ [cited 18 November 2021]. 2. Kleinman, P. (2009) 'Diagnostic Imaging of Child Abuse', American Academy of Pediatrics, 123(5), pp.1430-1435. doi: 10.1542/peds.2009-0558

G5.6 Building a paediatric strategy for mobile fluoroscopy - three trusts, 80 units and one MPE

Andrea Williamson

Queen's Medical Centre

Children are more radiosensitive than adults because they are growing at a faster rate [1]. For this reason, IRMER 2017 regulation 12 "Optimisation" requires that particular attention must be paid in relation to medical exposures involving children [2]. Although mobile fluoroscopic procedures are lower effective dose than many imaging investigations [3], there are a lot of them carried out. Paediatric use of mobile fluoroscopy commonly includes surgical and orthopaedic procedures related to physical injuries - orthopaedic pinning, manipulation under anaesthetic, open reduction and internal fixations, for example [4]. Historically many mobile fluoroscopy units were used with adult exposure curves, relying on the automatic brightness control to scale the exposure to the size of the much smaller patient, but this doesn't fulfill the obligation of paying particular attention. Across three large trusts and 80 mobile fluoroscopy units, various strategies were developed to improve paediatric protocols quickly. Although there is room for further in-depth optimisation work for specific procedures, the broad strategies outlined in this poster are a first step in the right direction.

1. Radiation risks from medical x-ray examinations as a function of the age and sex of the patient. HPA CRCE 028. Wall BF, Haylock R, Jansen JTM, Hillier MC, Hart D and Shrimpton PC, 2011. https://www.gov.uk/government/publications/medical-x-rays-radiation-risks-by-age-and-sex-of-patient 2. The Ionising Radiation (Medical Exposure) Regulations 2017. Statutory Instrument 1322. Crown Publishing. https://www.legislation.gov.uk/uksi/2017/1322/contents/made 3. Frequency and collective dose for medical and dental x-ray examinations in the UK. HPA CRCE 012. Hart D, Wall BF, Hillier MC and Shrimpton PC, 2008. https://www.gov.uk/government/publications/medical-and-dental-x-rays-frequency-and-collective-doses-in-the-uk 4. Local paediatric dose survey for mobile fluoroscopy, author's own.

Proffered papers: Education 1

H5.1 Qualitative content analysis of image interpretation education in UK pre-registration diagnostic radiography programmes

James Harcus[1]; Voyin Pantic[1]; Johnathan Hewis[2]

[1]School of Medicine, University of Leeds; [2]School of Dentistry and Medical Sciences

Introduction: Image interpretation is a required capability for all UK pre-registration programmes in diagnostic radiography to meet the needs of graduate practice.(1,2) It also provides a potential educational foundation for future advanced clinical practice. The aim of this study was to explore how image interpretation education is designed, delivered, and assessed within contemporary UK pre-registration diagnostic radiography programmes.

Methods: Qualitative content analysis of open-source image interpretation curriculum data extracted from UK Higher Education Institute (HEI) websites for all HCPC-approved diagnostic radiography programmes. Extracted search data was initially coded and then identified into themes and sub-themes using thematic analysis.

Method: 34 pre-registration programmes across 27 UK HEIs were included in the study. There was marked variability in the open-source information available for analysis. Three overarching themes emerged; image interpretation education vision, operationalisation, and delivery and assessment.

Conclusion: This study identified significant heterogeneity in all aspects of UK pre-registration image interpretation education which may suggest an equal heterogeneity can be expected in the image interpretation knowledge, skill, confidence between newly registered practitioners. There may be a need for clearer expectations on HEIs by professional and regulatory bodies to ensure consistency in pre-registration image interpretation education.

1. Health & Care Professions Council. (2013). Standards of proficiency - radiographers. HCPC: London 2. Society and College of Radiographers. (2013). Preliminary clinical evaluation and clinical reporting by radiographers: policy and practice guidance. SCoR; London.

H5.2 Cultural competence education at Keele University for first year student radiographers preparing for placement - a qualitative study

Rebecca Scott; Emma Edwards; Eleanor Monaghan

Keele University

Background: Cultural competence is a crucial component in providing effective and culturally responsive healthcare services, ethical patient centered care and improved patient health outcomes (Campinha-Bacote, 2002). Cultural competence is a process, not an event (Campinha-Bacote, 2002) and it is not feasible to educate allied health professionals in all aspects of different cultures (Jhutti-Johal, 2013).

Health professionals have repeatedly expressed a desire to learn more about cultural competency (Coleman and Angosta, 2017) and cultural awareness activities have shown to evaluate well with student radiographers (Ebba Maldonado and Huda, 2018). There is a gap in the literature surrounding level appropriate cultural care core competencies, and the optimal model for teaching and assessing such content (Paal et al., 2014) which shape behaviour changes and development over time (Ebba Maldonado and Huda, 2018).

Purpose: To highlight our positively evaluated educational presentation and facilitated discussion session in cultural awareness delivered in the Practice Experience component of training over three successive cohorts. These sessions unpacked some of the themes identified in the literature surrounding cultural competence and spiritually sensitive healthcare (Lalani et al., 2021) (Bowland et al., 2013) and were designed and delivered by the chaplaincy team at the students' HEI.

Summary: Positive feedback was received from students related to their experience within the sessions and has highlighted concerns felt by student radiographers related to their perceived deficiencies in cultural competence at this level of their training. These themes could be further evaluated to identify level appropriate cultural care core competencies across the programme.

1. Campinha-Bacote J (2002) The process of cultural competence in the delivery of healthcare services: a model of care. Journal of Transcultural Nursing 13, 181- 184
2. Coleman, J.- S. and Angosta, A.D. (2017) The lived experiences of acute-care bedside registered nurses caring for patients and their families with limited English proficiency: A silent shift, Journal of Clinical Nursing (John Wiley & Sons, Inc.), 26(5-6), pp. 678-689.
3. Ebba Maldonado, L. and Huda, K. (2018) Increasing the Cultural Competence of Student Radiographers, Radiologic Technology, 89(6), pp. 616-620.
4. Jhutti-Johal, J. (2013) Understanding and coping with diversity in healthcare, Health Care Analysis, 21(3), pp. 259-270.
5. Lalani, N.S., Duggleby, W. and Olson, J. (2021) "I Need Presence and a Listening Ear": Perspectives of Spirituality and Spiritual Care Among Healthcare Providers in a Hospice Setting in Pakistan, Journal of Religion & Health, 60(4), pp. 2862-2877.
6. Noble, A. and Shaham, D. (2020) Why do Thoracic Radiologists Need to Know About Cultural Competence (and What Is it Anyway)?, Journal of thoracic imaging, 35(2), pp. 73-78.
7. Paal, P., Roser, T. and Frick, E. (2014) Developments in spiritual care education in German--speaking countries BMC medical education, 14, p. 112.

H5.3 Impostor phenomenon traits in radiography students

Christopher Gibson

Canterbury Christ Church University

Background: Imposter Phenomenon (IP) includes feelings of being a fraud, which can be associated with high levels of anxiety3. Research suggests students on placement report high levels of anxiety6. Up to 82% of the population experience IP1, however little research has been carried out on IP and radiography. Parkman4 showed that educating students on IP can have a positive impact on wellbeing and attainment.

Method: An online survey of UK student radiographers used the Clance Imposter Phenomenon Scale (CIPS)2 with permission and ethical approval. The survey was open for 6 weeks in 2023. Demographic questions included gender, field of radiographic study, age categories and year of study, to enable comparisons to be made.

Method: Of 92 responders, 77% were found to have frequent or intense IP traits. No significant differences were seen with the age of responder (p=0.46), or field of radiography (p=1). Year of study demonstrated a significant difference (p=0.0057), with second years scoring higher (mean IP score of 78.56) than first and third years (72.41 and 66.17 respectively).

Conclusion: Every year group sampled returned a mean IP score of >70 which is above the scores from other studies including medical (mean IP score of 63.1)5, dental (65)7 and nursing students (60.13)8. Further studies are needed to explore strategies and educational requirements for radiography students to deal with IP feelings during their studies as a way to help reduce anxiety.

[1] Bravata, D.M., Madhusudhan, M.B., Cokley, K.O. (2020) 'Commentary: Prevalence, Predictors, and Treatment of Imposter Syndrome: A Systematic Review', Journal of Mental Health & Clinical Psychology, Available at: https://doi.org/10.29245/2578-2959/2020/3.1207 (Accessed: 8 January 2023).
[2] Clance, P.R. (1985) The imposter phenomenon: Overcoming the fear that haunts your success, Atlanta, GA: Peachtree.
[3] Deshmukh, S., Shmelev, K., Vassiliades, L., Kurumety, S., Agarwal, G., and Horowitz, J.M. (2022) 'Imposter phenomenon in radiology: incidence, intervention, and impact on wellness', Clinical Imaging, 82, pp. 94-99, Available at: https://doi.org/10.1016/j.clinimag.2021.11.009 (Accessed: 8 January 2023).
[4] Holliday, A.M., Gheihman, G., Cooper, C., Sullivan, A., Ohyama, H, Leaf, D.E., and Leaf, R.K. (2020) 'High Prevalence of Imposterism Among Female Harvard Medical and Dental Students', Journal of General Medicine, 35, pp. 2499-2501.
[5] Levant, B., Villwock, J.A., and Manzardo, A.M. (2020) 'Impostorism in third-year medical students: an item analysis using the Clance impostor phenomenon scale', Perspectives on Medical Education, 9, pp. 83-91.
[6] Mawson, J.A., Miller, P.K., and Booth, L. (2022) 'Stress, a reflective self and an interna locus of control: On the everyday clinical placement experiences of older undergraduate radiographers in the UK', Radiography, 28(1), pp. 55-60, Available at: https://doi.org/10.1016/j.radi.2021.07.019 (Accessed: 9 February 2023).
[7] Parkman, A. (2016) 'The Imposter Phenomenon in Higher Education: Incidence and Impact', Journal of Higher Education Theory and Practice, 16(1), pp. 51-60.
[8] Sasser, J.T., and Jacobs, M.D. (2021) 'Imposter Phenomenon in Undergraduate Nursing Students: A Pilot Study of Prevalence and Patterns', Journal of Nursing Education, 60(6), pp. 329-332. Available at: https://doi.org/10.3928/01484834-20210520-05 (Accessed: 10 February 2023).

H5.4 Black, Asian and ethnically diverse student experience in therapeutic radiography undergraduate education - student collaboration in research design

Louise Codd[1]; Aarthi Ramlaul[2]; Daksha Trivedi[1]

[1]University of Hertfordshire; [2]Buckinghamshire New University

Background: There is a disparity in Higher education (HE) awards between students from Black, Asian and ethnically diverse backgrounds in comparison to students from white backgrounds, with a lower proportion of 'good degrees' (2.1 or above) awarded (Advance HE 2020b). This occurs when entry qualifications, social or economic factors (Broeke & Nicholls 2007) are controlled, impacting employment and progression to postgraduate study (Cramer 2021).

Method: A student-led workshop explored experiences, generating themes and questions for inclusion in a larger-scale future questionnaire. A 90-minute workshop was conducted with five student volunteers who self-identified as having a Black, Asian, or ethnically diverse background. Three themes i.e. academic learning, placement and perceived barriers to attainment functioned as a starting point for student-led discussion. Audio data was recorded, thematically transcribed, and analysed using NVivo software.

Method: Students recounted experiences of racism and microaggressions, assumptions made about them and a feeling of having to work harder than their white counterparts in the placement setting. Feelings that commitments at home were not understood by academic staff alongside difficulties in mental health because of pressures to succeed were key themes emerging around attainment.

Conclusion: Further collaboration with students as co-creators in research is invaluable. Not only to develop reliable and valid methods but to highlight student voices, embedding their narratives within the research which impacts them from the outset. Further research into the experiences of student therapeutic radiographers from Black, Asian, and ethnically diverse backgrounds is vital to create an equitable learning environment to reduce the awarding gap.

1. AdvanceHE. 2020b. Equality in Higher Education, Student Statistical Report 2020. AdvanceHE. https:// www.advance-he.ac.uk/knowledge-hub/equalityhigher-education-statistical-report-2020
2. Broeke S, Nicholls T. Ethnicity and Degree Attainment. Department for Education and Skills; 2007. https://dera.ioe.ac.uk/6846/1/RW92.pdf
3. Cramer L. (2021). Alternative strategies for closing the award gap between white and minority ethnic students. eLife, 10, e58971. https://doi.org/10.7554/eLife.58971

H5.5 The continued development, improvement and implementation of a leadership placement for undergraduate radiography students

Eleanor Monaghan; Emma Edwards; Rebecca Scott

Keele University

Background: The continuing national shortage of diagnostic radiographers has applied pressure on education providers to continue developing alternative and innovative clinical placements to help meet the ever-increasing demand for clinical placement capacity. There is also a desire for higher education institutions to produce graduate radiographers who are resilient and show leadership skills right from the beginning of their careers. Having previously had successful outcomes with a piloted leadership placement we implemented this on a larger scale over more clinical

hours in partnership with a local trust. This allowed our students to gain experience of leadership from two different perspectives: a higher education institution and an NHS trust. This placement aims to provide third year student radiographers with the essential skills of resilience, leadership and critical peer review while empowering them to complete a project in an area they are passionate about.

Purpose: This poster aims to evaluate the feedback we received both from leadership students and local providers to further optimize and futureproof the placement opportunity. This will then aid in further expanding the opportunity for more students, further increasing clinical placement capacity. This poster also evaluates the addition of a leadership conference to the placement opportunity, allowing the students to present their projects, critique other student's work, and network with local leaders.

Summary of Content: This poster outlines the background to the development of an educational leadership placement, the experience of the students involved, and proposed future changes to this placement experience.

1. Health Education England (2023) Educating our future workforce through leadership placements https://www.hee.nhs.uk/about/how-we-work/your-area/north-west/north-west-news/educating-our-future-workforce-through-leadership-placements 2. Society for Radiographers (2021) SoR student placement inspires leaders of the future https://www.sor.org/news/students/sor-student-placement-inspires-leaders-of-the-futu

Proffered papers: Education 2

I5.1 Establishing a core integrated care curriculum

Ruth Strudwick

University of Suffolk

Aim: To establish a core integrated care curriculum across all pre-registration health and social work courses at The University of Suffolk (UoS). Introduction: During the 2021/22 academic year UoS reviewed its health and social work courses to introduce integrated care as common indicative content in all pre-registration programmes. We undertook a scoping project and analysis of course content.

Methods: five focus groups were undertaken. A mix stakeholders attended including service users, carers, managers, staff from health, social care and the private and voluntary sector, students, practice educators and university staff. Data were transcribed and synthesised to generate key 'integrated care' topics, to inform and enhance the curricula. The topics were mapped against the current curricula.

Method: gaps were found where topics were not covered or there were subjects that were already delivered but required augmentation, e.g. for diagnostic radiography, course additions included advocacy for service users, and social prescribing. As an addition to the curriculum two integrated care days were planned for all pre-registration health and social work students. The days included keynote seminars, interprofessional workshops, and involvement of service users and carers. This involved collaborative learning based upon mutual respect for one another's expertise, knowledge and skills (Pearson, 2000).

Conclusions: Integrated care and working in an interprofessional team are key curriculum areas for health and social work students (CAIPE, 2008). Students should be encouraged to work with others and gain an understanding of one another's professional roles and responsibilities in order to provide high-quality care for service users.

CAIPE (2008) www.caipe.org.uk/about-us/defining-ipe. Pearson, L. (2000) Collaboration requires shared accountability, The Nurse Practitioner. 25 (12) 14-17.

I5.2 Supporting radiographers through a clinical-academic pathway

Jessica Eaton[1]; Paula Kelly[2]; Clare Simcock[1]; Owen Arthurs[3]; Ian Simcock[1]

[1]Great Ormond Street Hospital; [2]Centre for Outcomes and Experience Research in Children's Health Illness and Disability (ORCHID); [3]Institute of Child Health/University College London/NIHR Biomedical Research Centre

Background: The clinical-academic role provides a range of advantages for the individual, department, profession and most importantly the patient by advancing clinical practice through evidence (Society of Radiographers, 2021). Funding streams including the College of Radiographers Research Grant (CoRIPS) and the HEE/NIHR fellowship programme has proven to be beneficial for radiographers wishing to develop a clinical academic career.

Purpose: This poster looks at the ways in which organisations can support Radiographers (and other Allied Health Professionals (AHP's)) to start and increase research activity. At Great Ormond Street Hospital (GOSH), staff with

research ambitions were supported with their MSc with departmental funding. Further BRC funding facilitated a 1-day per week secondment to The Centre for Outcomes and Experience Research in Children's Health, Illness and Disability (ORCHID) to facilitate collaborations with other research active AHP's and nursing staff. This helped to secure initial grant funding to external organisations for PhD preparation. Two radiographers were subsequently successful in applying for NIHR pre- and post-doctoral funding.

Summary of content: The combined support by funding and professional bodies, managers, and other academic and clinical healthcare professionals will be described. Learning outcomes from this model include the importance of support (dedicated time, funding, and supervision), academic skills development and time to develop research skills. We hope that by showcasing this support network a similar model may be adopted by other centres to assist clinical academic radiographers to form new and exciting roles and push future professional boundaries.

Society of Radiographers. (2021). Clinical Academic Radiographer: Guidance for the support of new and established roles. https://www.sor.org/getmedia/267948a8-53ee-44d5-8608-d152588c1256/Clinical-Academic-Radiographer-Guidance-for-the-support-of-new-and-established-roles, Accessed 30.01.2023.

I5.3 The impact of a massive open online course on patient centred care in UK-based diagnostic radiographers

Emma Hyde[1]; Maryann Hardy[2]; Ruth Strudwick[3]; Amanda Upton[4]

[1]University of Derby; [2]University of Bradford; [3]University of Suffolk; [4]University of Cumbria

Background: UK health professionals' awareness of Patient Centred Care (PCC) has grown in recent years due to the impact of high-profile reports on poor care, such as Francis (2014), guidance documents such as those from Picker Institute (2014) and Health Foundation (2014), and the publication of NHS strategies such as The Long Term Plan (2019). Research by Hyde & Hardy (2021a,b,c) showed that although awareness of PCC within the UK Diagnostic Radiography community was good, there were many challenges to its introduction, particularly time and efficiency concerns, and the technical nature of diagnostic radiography roles. This research set out to investigate the impact of a new educational tool, a Massive Open Online Course (MOOC), designed to support UK-based Diagnostic Radiographers with PCC approaches.

Method: Following ethical approval, UK based Diagnostic Radiographers were recruited to take part in the research via social media. Participants were asked to complete an online survey about PCC, before completing the MOOC. Participants were asked to complete the survey again after finishing the MOOC to assess whether their awareness of PCC had changed. The quantitative data collected was statistically analysed. Qualitative data from free text comments were thematically analysed.

Method: Data collection and analysis is currently in progress. Results will be ready for presentation at UKIO 2023.

Conclusion: The PCC MOOC has the potential to make a significant impact on UK based Diagnostic Radiographers practice. Increased awareness of PCC approaches may help to support Diagnostic Radiographers to integrate PCC into their everyday practice.

1. Francis, R (2014) Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry. MHSO: London. Available at: Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry - GOV.UK (www.gov.uk)
2. Hyde E & Hardy M (2021a) Delivering patient centred care (Part 1): Perceptions of service users and service deliverers. Radiography. 27 (2021) pp8-13 DOI: https://doi.org/10.1016/j.radi.2020.04.015
3. Hyde E & Hardy M (2021b) Delivering patient centred care (Part 2): a qualitative study of the perceptions of service users and deliverers. Radiography. 27 (2), pp322-331. DOI: https://doi.org/10.1016/j.radi.2020.09.008
4. Hyde E & Hardy M (2021c) Delivering patient centred care (Part 3): Perceptions of student radiographers and radiography educators. Radiography. 27 (3) pp803-810. DOI:https://doi.org/10.1016/j.radi.2020.12.013
5. NHS England. Published on 7th January 2019. The NHS Long Term Plan. Available at: https://www.longtermplan.nhs.uk/publication/nhs-long-term-plan/
6. Picker Institute Europe. Principles of person-centred care. Available at: https://www.picker.org/about-us/picker-principles-of-person-centred-care/
7. The Health Foundation. Patient-centred care made simple (2014) Available at: http://www.health.org.uk/sites/health/files/PersonCentredCareMadeSimple.pdf.

I5.4 Evaluation of a sonography high intensity foundation training programme

Heather Venables; Gillian Coleman; J.P. Mayes; Rebecca White; Emma Hyde; Elle Wyke; Nang-Tege Ekumah

University of Derby

The UK is experiencing a significant and sustained shortage of sonographers (BMUS 2021). Despite this, approaches to practical training have been largely unchanged over several decades. While national debate continues, pressure on clinical departments is unrelenting. To support training across specialties and at scale, it is imperative that all early-stage ultrasound skills development is moved out of the clinical department and is achievable within a short timescale (Sim, J. 2016). This pilot study evaluates the effectiveness of a high intensity campus-based training programme on

early skills development for ST1 radiology trainees (n=23) prior to learning in a clinical environment. Using an active learning approach, SHIFT (Sonography High Intensity Foundation Training) combines core theory with highly structured practical sessions and computer-based simulation activities that aim to enable trainees to develop the hand-eye coordination required for ultrasound image capture, to build familiarity and understanding of equipment controls and recognition of normal ultrasound appearances. This enables specialist trainees to enter clinical placement with minimal disruption to service delivery and reduced impact on supervising staff. Qualitative feedback and reflection on learning is captured through use of a 'Listening Rooms' methodology to capture trainee peer-to- peer reflections on their experience (Heron, E 2019). The study uses a collaborative approach to building a better understanding of the impact of high intensity training on trainee experience, understanding and confidence in key foundation skills. We present initial findings, interpreted from a learner perspective.

1. British Medical Ultrasound Society (2021) NHS Sonographers Scope of Practice, (Available on line) https://www.bmus.org/static/uploads/resources/BMUS_Sonographers_Scope_of_Practice_Report_FINAL.pdf 2. Heron, E. (2019). Friendship as method: reflections on a new approach to understanding student experiences in higher education. Journal Of Further And Higher Education, 1-15. doi: 10.1080/0309877x.2018.1541977 3. Sim, J. (2016) Preparing work-ready sonography trainees: An accelerated model of ultrasound training by the University of Auckland; Sonography 3 134–141 © 2016 Australasian Sonographers Association

I5.5 Postgraduate medical ultrasound student and mentor perceptions and experiences of academy model clinical ultrasound training in Scotland

Diane Dickson[1]; Morgyn Sneddon[1]; Clair Graham[2]; Claire Lindsay[2]; Morag Stout[2]

[1]Glasgow Caledonian University; [2]NHS National Education Scotland

Background: The National ultrasound training programme (NUTP) is a new initiative based within the NHS Scotland Academy to support clinical ultrasound training and boost training numbers in response to workforce decline and increased demand on service. NHS Scotland Health boards are being supported for funding of trainees from Scottish Government directed by the NHS Recovery Plan 2021-2026 1 Clinical training is a key component in the development of ultrasound competency and is heavily supported by NHS board clinical staff in their role as mentor/practice educator. This study will explore the perceptions and experiences of the first cohort of students who undertake clinical training within the NUTP, and their mentors. Identifying potential opportunities and challenges will provide evidence-based recommendation for future enhancements.

Method: Up to 12, 60-minute, semi-structured, one-to-one Microsoft Teams interviews with NUTP trainees, NUTP mentors and NHS Scotland health board ultrasound mentors will be performed between April and July 2023. Open-ended questions to explore perspectives, barriers and facilitators will be audio-recorded and transcribed verbatim with participants invited to verify the transcript to establish rigour. Framework analysis for iterative and in-depth analysis of key themes will be employed to explore data within and across participants.

Method: The NUTP is supporting nine students from six Scottish NHS boards. Four sonographers provide a minimum five weeks of dedicated training lists and mentorship out with the trainees' employed health board, with 150 examinations completed each week. Demographic service data and preliminary key outcome findings/recommendations will be available for conference presentation.

1. Scottish Government. NHS Recovery Plan 2021-2026, https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2021/08/nhs-recovery-plan/documents/nhs-recovery-plan-2021-2026/nhs-recovery-plan-2021-2026/govscot%3Adocument/nhs-recovery-plan-2021-2026.pdf (2021).

I5.6 Factors contributing to CT dose optimisation, does current clinical training need a rethink?

Victoria Major[1]; Sean Ryan[1]; Desiree O'Leary[2]

[1]University of Hertfordshire; [2]Keele University

Background: In CT scanning, patients should receive the optimal level of radiation to achieve a clinically diagnostic image. Vulnerable groups are particularly sensitive to the ionising radiation dose from CT scanning, potentially causing cancers in the future. The amount of radiation from CT scanning is disproportionately high compared to projectional X-ray imaging technology1. Radiographers are required to adjust exposure parameters and scanning technique to achieve clinically diagnostic images with an optimal level of radiation2. Collaborative working with radiographers, radiologists, clinical scientists, and application specialists is required to effectively optimise CT parameters giving maximum image quality for minimum radiation exposure. This study examines radiographers' views, experiences and perspectives on the factors contributing to holistic dose optimisation within the clinical environment.

Method: Mixed methods study. First phase, longitudinal study of pre- and post-registration radiographers. Second phase, qualitative study seeking expert opinion from advanced radiographers, clinical scientist, radiologist.

Method: Longitudinal study qualitative data identified three themes which were: Education, Culture, and Dose optimisation. Post-registration, knowledge of exposure parameters increased significantly. Pre- and post-registration

radiographers felt poorly supported because trained professionals were too busy to pass on knowledge. Advanced CT radiographers felt they required more knowledge and applications training before they could manipulate exposure parameters, a feeling being cascaded through the workforce to pre-registration radiographers.

Conclusion: This study has shown that learning in the clinical environment is complex, there is an urgent requirement for professional education to keep pace with technological advances in CT scanning. Current training is not producing newly qualified radiographers competent in cross-sectional imaging.

1. Elliott, A. (2014) Committee on Medical Aspects of Radiation in the Environment (COMARE) 16th Report Patient radiation dose issues resulting from the use of CT in the UK. Department of Health (UK). 2. Joyce, S., O'Connor, O. J., Maher, M. M., & McEntee, M. F. (2020). Strategies for dose reduction with specific clinical indications during computed tomography. Radiography, 26, S62-S68.

Proffered papers: Digital technology

K10.1 Digital Transformation and Artificial Intelligence In (Operational) Radiology

Peter Strouhal[1]; Mariam Darwish[2]; Naeem Khan[2]; Brad Miles[3]; Chris Vallis[3]; Ann Heathcote[3]; James Berry[3]; Imran Farid[2]; Stefano Persichini[2]

[1]Alliance Medical; [2]GE HealthCare; [3]AML

Alliance Medical Ltd (AML) is a trusted partner of NHS, serving over 800,000 patients in England via a mix of 50+ mobiles (MRI, CT, PETCT), 41 static sites and 10 Community Diagnostic Centres. Hospitals could utilise Artificial Intelligence to improve operational decision-making in patient flows, scheduling, staffing and supply chain management. In 2022/23, AML pilot-tested GE HealthCare's Imaging360 solution, which enables enterprise-radiology organizations to standardize performance across multiple sites and scanners, enhancing imaging efficiency and resource allocation; and increasing patient choice for scanner selection. AML achieved greater, easier oversight of operations across the whole estate from single cloud-based platform including detailed overview of imaging operations via a combined integration of HL7, DICOM image transfer and management information CSV extracts. Imaging360 provides retrospective, real time and predictive views of scheduling: Enabling schedule optimisation, including flagging duplicate exams or multiple upcoming appointments; allows protocol libraries to be standardised, optimised, and delivered to scanners; allows patient appointment choice; and shortens appointments. For example, one site reduced scan times from 30 to 20 minutes so increased potential appointments by 35/week, akin to extra day's scanning; or one could give this time back to staff. Imaging360 can predict patient no-shows/cancellations, logic used to infer new data points in real time enables users to respond to alerts, to create more seamless patient and staff experiences. This bringing together of clinical, operational and scheduling data allows healthcare operators to improve outcomes, expand access to care and deliver care more cost effectively.

K10.2 Automating monitoring of radiology processes to aid oversight of radiology and reporting performance

Richard Szabranski

Worcestershire Acute NHS Trust

Radiology reporting backlogs are an acknowledged bottleneck in patient care currently, Worcestershire Acute Trust Radiology (WAHT), having successfully dealt with our backlog, have evolved robust process to monitor and maintain this level of service. This level of oversight nessecatates a high payload of staff time which is already at a premium in todays radiology department. To this end, Worcestershire Acute Trust Radiology department have developed in-house software to monitor and feedback on several key essential aspects of radiology and its reporting. These include: 1) Reporting time to verification and reporting is keeping to departmental KPI's 2) Is report auto-reported correctly and vice-versa 3) Vetting status of all modalities 4) Radiology imaging reject rates 5) Notify of Radiology appointments for deceased patients 6) Monitoring Radiology staff compliance governance documentation Most of these functions run unattended in the background and when required alert to correct staff any actions or result requiring further investigation such as notifying a Radiologist that a report is still outstanding. The system, RAD*i* , has been observed by the CQC and NHSe and commended as an example of "best practice" Presentation will be via PowerPoint demonstration

K10.3 Delivery of a National Optimal Stroke Imaging Pathway (NOSIP), including the use of Artificial Intelligence (AI) as a CT decision support tool, in England improves access to acute stroke imaging

David Hargroves[1]; Darrien Bold[2]; Deb Lowe[1]; Samanjit Hare[3]

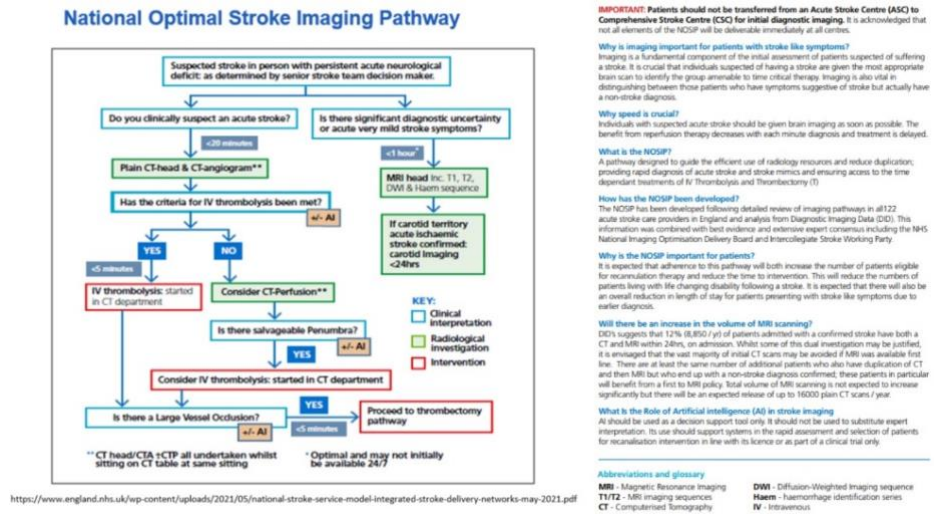
[1]National Stroke Programme and GIRFT, NHSE; [2]National Stroke Programme, NHSE; [3]NHS England

Background and aims: GIRFT data (2019) reveled IV thrombolysis (<12%) and mechanical thrombectomy (MT<2%) rates were low with limited access to CTA, prolonged time spent before transfer for MT (door in door out times >2hrs 22 mins) and inefficiency in access to first line MRI (<2%); 5% of units were using AI with 12% of patients receiving both CT and MRI within 24 hrs of admission. Recommendations were made to improve acute stroke imaging in the national stroke GIRFT report (ref 1). In 2021, following extensive consultation, the NOSIP (ref 2, image 1) was published including use of CT AI, aiming to improve volume and speed of access to recanalisation therapy, reducing radiological inefficiencies and inpatient bed occupancy. We undertook an assessment of adherence to the NOSIP in 2022.

Methods: Each of the 107 acutely admitting stroke centres in England completed a RightCare self-assessment (image 2) of adherence to the various elements of the NOSIP.

Method: 80% of stroke units now report use of AI, the remaining expect to <6/12. 60% undertake CT and CTA at same initial sitting. 50% routinely use AI for all patients having a CT or CTA. 15% report day time Mon-Friday access to first line MRI for patients with minor stroke or of diagnostic uncertainty.

Conclusions: Since the publication of the NOSIP: most stroke units in England now have access to AI with all units planned to have access by Dec 2023. Improvements in access to CT, CTA, CTP and first line MRI is reported. A nationally adopted care pathway for stroke imaging is associated with improvements in access to acute stroke imaging and is likely to translate into improved patient outcomes and financial savings.



NHS

Section 4.4 – Rapid access to appropriate imaging

4.4.1 Have you undertaken a gap analysis regarding access to acute stroke imaging, in line with the National Optimal Stroke Imaging Pathway (NOSIP)?
4.4.2 Is there a networked plan in place regarding progression to delivery of the NOSIP?
4.4.3 Do you routinely undertake CT & CTA (aligned with the NOSIP) for appropriate patients at the same sitting 24/7?
4.4.4 Do you routinely undertake CT, CTA & CTP (aligned with the NOSIP) for appropriate patients at the same sitting 24/7?
4.4.5 Do your stroke physicians routinely (for majority of patients) use Artificial intelligence decision support software (AI) to interpret plain CT brain scans?
4.4.6 Do your stroke physicians routinely (for majority of patients) use Artificial intelligence decision support software (AI) to interpret CTA brain scans?
4.4.7 Do your stroke physicians routinely (for majority of patients) use Artificial intelligence decision support software (AI) to interpret CTP brain scans?
4.4.8 Do you routinely undertake first line MRI (aligned with the NOSIP) for appropriate patients 9-5pm: Mon-Friday?
4.4.9 Do you routinely undertake first line MRI (aligned with the NOSIP) for appropriate patients for extended hours (at least 10hrs / day): Mon-Friday?
4.4.10 Do you routinely undertake first line MRI (aligned with the NOSIP) for appropriate patients Saturday and Sundays?

1. Hargroves, D. and Lowe, D. on behalf of all acute stroke care providers in England (2022). GIRFT Stroke Programme National Specialty Report. https://gettingitrightfirsttime.co.uk/medical_specialties/stroke/ 2. Hargroves, D., Lowe, D., Fisher, R., Powell, J. on behalf of National Stroke programme, NHSE (2021). National Stroke Service Model. https://www.england.nhs.uk/wp-content/uploads/2021/05/stroke-service-model-may-2021.pdf

K10.4 Artificial Intelligence based breast thermography using radiomic feature extraction versus conventional manual interpretation of breast thermograms in the prediction of breast cancer: A multi-reader study

Geetha Manjunath; SivaTeja Kakileti; Sathiakar Collison

Niramai Health Analytix Pvt Ltd, India

Objective: Artificial intelligence-enhanced breast thermography is increasingly being evaluated as an ancillary modality in the evaluation of breast disease (Hakim and Awale, 2020). This study evaluates the performance of Thermalytix, a CE-marked system that analyses thermal images using advanced thermal radiomics against unaided manual interpretation of thermographic images by trained thermologists.

Methods: In this retrospective, multi-reader study, thermal imaging data of 258 women who participated in a previously published clinical trial were used. These images were read manually by 3 thermologists independant of each other, using the scoring system of the American Association of Thermologists . The images were then evaluated by the Thermalytix system that automatically extracts hotspot, areolar and nipple radiomic parameters and a total of 64 individual radiomic features are analysed using 3 random forest classifiers configured for 200 decision trees generating a score predictive of the presence of breast cancer in the region of interest (Kakileti et al., 2020). The manual interpretation and Thermalytix interpretation were compared for sensitivity, specificity, positive predictive value, and negative predictive value and reciever operating characteristic curves were created to estimate prediction accuracy.

Method: Automated Thermalytix had sensitivity and specificity of 95.2% and 66.7% respectively while AUROC of 0.85 (13.7% greater) than manual interpretation. Hotspot and vascular scores derived in the automated Thermalytix are the strongest predictors of breast cancer lesions (AUROC: 0.84 and 0.83, respectively).

Conclusions: Automated AI-based Thermalytix has higher accuracy than manual interpretation of breast thermal images, in the prediction of breast cancer lesions

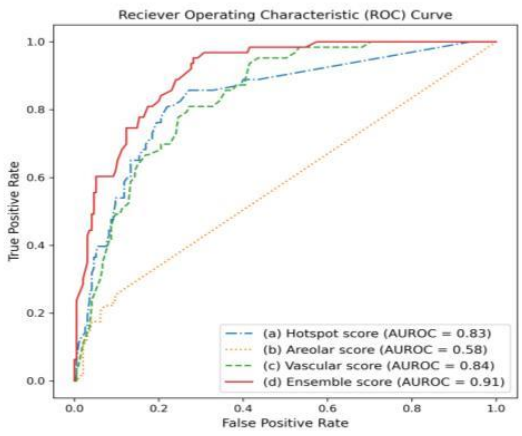


Figure A. ROC curve illustrating the individual classifier AUC performance using hotspot score, vascular score and areolar score and the calculated Ensemble score.

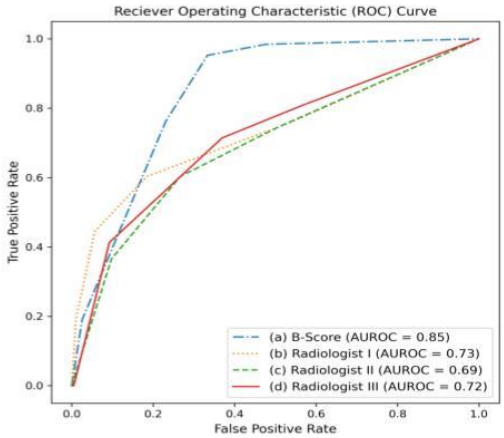


Figure B. ROC curve demonstrating the separation in performance between Thermalytix and manual interpretation of thermography

1. Hakim, A. and Awale, R.N. (2020). Thermal Imaging - An Emerging Modality for Breast Cancer Detection: A Comprehensive Review. Journal of Medical Systems, 44(8). doi:10.1007/s10916-020-01581-y. 2. Kakileti, S.T., Madhu, H.J., Manjunath, G., Wee, L., Dekker, A. and Sampangi, S. (2020). Personalized risk prediction for breast cancer pre-screening using artificial intelligence and thermal radiomics. Artificial Intelligence in Medicine, 105, p.101854. doi:10.1016/j.artmed.2020.101854.

K10.5 Radiographer/radiologist education and learning in artificial intelligence (REAL-AI)

Geraldine Doherty[1]; Laura McLaughlin[1]; Claire Rainey[1]; Ciara Hughes[1]; Raymond Bond[1]; Jonathan McConnell[2]; Sonyia McFadden[1]

[1]University of Ulster; [2]Leeds Teaching Hospitals NHS Trust

Background: Artificial intelligence (AI) is incipient in radiography, and whilst there are many studies investigating its potential in the clinical environment, there is a paucity of research investigating the needs of clinical staff. Further

research is required to identify what training and preparation is required for a new AI-powered work environment, or indeed what AI education is available at undergraduate and postgraduate levels.

Method: This CoRIPS funded study included two electronic surveys (i) one was performed amongst radiographers and radiologists investigating their baseline AI knowledge, identifying what training they desire and preferred method of delivery. (ii) the second survey was for academics and educators in Higher Education Institutions to identify educational provision of AI in the radiography curriculum across the UK and Europe.

Method: Data collection and analysis are underway and will be completed at the European Congress of Radiology in Vienna, March 2023. Participant feedback will determine perceptions of clinical staff and identify topics for inclusion in postgraduate/undergraduate programmes.

Method: will inform the next phase of the study which will incorporate focus groups with staff to explore adaptation of the curricula to enable incorporation of AI into clinical practice.

Conclusion: Radiographers, radiologists and Higher Education Institutions have been surveyed to ascertain current knowledge and needs for AI training. Collaboration and symbiosis between academia, clinical and industry partners is possible, to pioneer AI education tailored to medical imaging staff. The impact of this research has the potential to be of significant value across disciplines within the wider healthcare sector.

Proffered papers: Patients needs

L4.1 The patient's voice is the master key in a clinician’s toolbox

Margot McBride

University of Dundee

Introduction: Until you are a patient yourself, you don't always acknowledge the importance of a patient's voice which can turn the key in a clinician's decision-making during a diagnostic work-up. Today's challenges have increased the likely hood of spending less time on patient-centred care. Clinicians, including radiology staff are busy trying to find solutions to the growing pressures from rising referral lists and workforce shortages which have led to many patients not having basic care leading in some cases to death. My Doctor of Philosophy study of Cushing syndrome highlighted that the fundamental challenge for clinicians was time to listen to their patients. Being a Cushing's patient and a diagnostic radiographer was the driving force behind my desire to find out if other patients had similar negative experiences. This paper concentrates on a section of the disease-specific health-related quality of life questionnaire used in my study, which focuses on the clinicians' abilities to listen to their patients' voices.

Method: 86 patients participated. All felt that most clinicians have little time to listen. 61.6% of them relied on their support groups and helplines to share their experiences and seek advice. Feelings of frustration, dismay were experienced by 43.3%, expressing that their appointments were, "rushed," with very little information and what to expect regarding the long-term effects.

Conclusion: As new chapters of medicine open, the lessons learned are that we should listen and not just consider patients as a patient with a medical condition, but a human life with needs beyond her or his medical condition.

1. McBride M. (2023). Patient-centred care when diagnosed with a Sarcoma and Cushing syndrome. Radiography; Jan; 10.1016/iradi.2022.12.005 2. McBride M et al. (2021). Quality of Life in Cushing's syndrome. Best Practice & Research Clinical Endocrinology & Metabolism, Elsevier; Jan; 35 (1): 101505. 3. McBride M. (2020). Cushing syndrome and disease: Why does it take so long to diagnose? Is the interdisciplinary medical team aware of the signs and symptoms? What are the consequences? Bioscientific; Sept. 22nd Endocrine Abstracts, Pituitary and Neuroendocrinology.

L4.2 From student radiographer to breast cancer patient and back again: What can we learn?

Kirsty Mounsey

University of Leeds

Background: In the UK alone in 2020/21 there were 423,838 referrals to the two week wait pathway in regards to breast cancer, in which 25,202 then went on to have cancer treatment after diagnosis via this route. Patient centred care (PCC) informs, educates and engages patients in their care planning and treatment. The quality of PCC given along the breast cancer pathway has the potential to impact both a patient's and their relatives wellbeing and empowerment throughout the pathway and has strong links with improved treatment adherence, reduced anxiety and mortality.

Purpose: As a allied healthcare professional (AHP) it is crucial to recognise the value of our interactions and actions along each step of the breast cancer pathway. As a student diagnostic radiographer with lived experience of breast cancer I will offer my personal experiences along the breast cancer diagnosis and treatment pathway and how this has affected my practice as a student Radiographer.

Summary of content: Breast cancer is currently one of the most prevalent cancers in the UK with over 25,000 people been treated in the year 2020/21. PCC informs and engages patient in care planning and treatment and has been shown to have a huge impact on patient outcomes. AHPs have a huge role to play in delivering high quality patient centred care and as a student Radiographer with lived experience of breast cancer, I want to offer insight into how this has influenced my practice and aim to influence others.

1.Cancer Research UK. 2023. Early Diagnosis Data Hub. Cancer Research UK 2. NHS England (2019). The NHS Long Term Plan https://www.longtermplan.nhs.uk/ 3.Nyhof BB, Wright FC, Look Hong NJ, Groot G, Helyer L, Meiers P, Quan ML, Baxter NN, Urquhart R, Warburton R, Gagliardi AR. Recommendations to improve patient-centred care for ductal carcinoma in situ: Qualitative focus groups with women. Health Expect. 2020 Feb;23(1):106-114. doi: 10.1111/hex.12973. Epub 2019 Sep 18. PMID: 31532871; PMCID: PMC6978860.

L4.3 Ready patient one: Could a virtual experience help as a preparatory tool prior to MRI scanning?

Darren Hudson[1]; Christine Heales[2]

[1]InHealth; [2]University of Exeter

Background: Despite developments in MRI which have helped improve the patient experience, the procedure remains a source of anxiety for many, which can be expressed as claustrophobia due to the physicality of the scan equipment. Traditional forms of patient preparation only go so far in representing what to expect from a scan, and so virtual reality (VR) has emerged as a potential means of providing enhanced support prior to a scan. The aims of this feasibility study were to assess how realistic a virtual scan experience was for participants and how this might help manage emotional control associated with having an MRI.

Methods: Fifteen participants volunteered to undergo a VR session comprising of two virtual scan experiences. Measures to assess their demand and resource appraisal of the experience, and reported anxiety throughout were obtained, along with feedback on its realism, usefulness and application.

Method: All participants managed to complete two virtual head scans within VR. Restriction was the dominant concern regarding claustrophobia and was shown to significantly reduce following the exposures. Demand-resource evaluation scores showed six participants to initially be in a state of 'threat', with all moving to, or lowering a state of 'challenge' following exposure, in particular after the second. Confidence to cope significantly improved following exposure to the virtual experience. The virtual experience was considered realistic by users with some areas for improvement highlighted.

Conclusion: Results suggest VR does suitably represent reality and elicit an emotional response that can be improved through exposure, thereby suggesting such tools as beneficial in preparation for MRI.

L4.4 Education and training of radiography practitioners when caring for people living with dementia

Robert Higgins[1]; Adam Spacey[1]; Anthea Inness[2]

[1]University of Salford; [2]McMaster University

Background: Despite abundant literature on the diagnosis of dementia, limited research has explored the lived experiences by radiography practitioners when delivering care to people living with dementia (PLWD).

Method: A two-stage qualitative multi-method study was used to explore the perceptions and compatibility of current professional guidance by both radiography practitioners and key stakeholders involved in developing the Society and College of Radiographers clinical practice guideline document for caring for people with dementia. Fifteen diagnostic and two therapeutic radiography practitioners from across the UK participated with three asynchronous online focus groups. One core member and three members from the key stakeholder group participated with individual semi-structured interviews. Data analysis included narrative and thematic analysis.

Method: Participants from both stages identified enablers and barriers to providing care to PLWD. One key theme that emerged was the need for role specific education and training rather than current generic resources from other disciplines so that radiography practitioners have the knowledge, attitude and skills needed to deliver good care to PLWD. However, it was acknowledged that sustaining dementia training could be difficult in a busy department.

Conclusion: Dementia training needs to be specifically tailored for radiography practitioners to bridge the gap between guidelines and clinical practice, rather than being generalised from other disciplines. Dementia-related education should be available at pre-registration and post-registration (continuing professional development) levels.

L4.5 'I felt helpless. The radiographer took charge and I couldn't help the patient in distress.' A survey exploring the role of placement experiences in student radiographers' confidence of adapting practice for autistic patients

Ben Potts

Birmingham City University

Background: In part due to the barriers to healthcare services that autistic people face, they die approximately 17 years younger than non-autistic people (Doherty, 2022; Mason, 2021). With the ubiquitous use of imaging and oncology services, we must address what role radiography plays. Adapting practice can improve patient experience and therefore is taught in radiography courses; however, nothing is known about how placement prepares students to do this. This study explored the impact placement experiences have on students' confidence in adapting their practice for autistic patients.

Method: Final-year diagnostic and therapeutic student radiographers were recruited via an internal university email and social media. 44 participants completed an online survey, which used a mixed methods approach. The data was analysed using content and thematic analysis.

Method: The majority of students reported not feeling confident overall. Those that did have experience external to studying radiography or had both observed and practised adaptations on placement. There were ten reports of observing distressing interactions, which broadly had a negative impact on students' confidence. The themes that emerged are: 1) distressing experiences 2) involving a caregiver 3) external experience 4) patient information 5) the quality of adaptions used.

Conclusion: Generally, participants with more experience felt more confident, however, their perception of the experiences had a much more important and complex relationship with their confidence. It is important that students with no placement experience are able to gain practice through simulated means, ensuring the future radiographic workforce is equipped to care for autistic patients.

Doherty, M., Neilson, S., OSullivan, J., Carravallah, L., Johnson, M., Cullen, W. and Shaw, S.C.K. (2022) Barriers to healthcare and self-reported adverse outcomes for autistic adults: a cross-sectional study. BMJ Open 12, e056904

Mason, D., Ingham, B., Birtles, H., Michael, C., Scarlett, C., James, I. A., Brown, T., Woodbury-Smith, M., Wilson, C., Finch, T. and Parr, J. R. (2021) How to improve healthcare for autistic people: A qualitative study of the views of autistic people and clinicians. Autism 25(3), 774785.

L4.6 Autism-friendly MRI: A research project to improve autistic individuals' experience of and access to magnetic resonance imaging

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Background: Autistic people may need to undergo MRI examinations for various clinical conditions or research. The MRI environment may be overwhelming for these patients, with known sensory sensitivities and/or communication challenges. This research project aimed at improving the patient experience, scan quality, and access to this valuable tool.

Method: A systematic review of the literature was initially conducted to evaluate knowledge and gaps related to the topic. Following that, an online survey was built on Qualtrics and was administered to all MRI radiographers in the UK. A second survey was then administered to autistic people and their carers/parents who had undergone MRI examinations in the UK.

Method: Tailored communication, adjustments to the MRI environment, familiarisation/distraction techniques were proved to be very important in the literature. The survey to MRI radiographers (n=130) highlighted the need for effective communication (87.7%), optimisation of the examinations (64.7%), and environmental adjustments. Lack of guidelines was also reported as a challenge for radiographers (37.7%). Autistic individuals (n=112) reported high levels of claustrophobia (44.8%) and rated their MRI experience as average. They reported not receiving information (29.6%) and environmental adjustments prior to the scan.

Conclusion: These studies highlight the need for autism-related training, while the importance of optimal communication strategies tailored to the patient's needs and preferences was also strengthened. MRI environments

should be adjusted and become more inclusive, so that all autistic patients have a better MRI experience. Autistic people should be empowered to disclose their identity to help radiographers optimally adjust the procedure for them.

Proffered papers: Radiotherapy – practice development

M5.1 Exploring therapeutic radiographer career outreach in the UK

Shannon Johnson[1]; Kim Meeking[2]; Zoe Grant[3]; Joanna McNamara[4]

[1]Somerset NHS Foundation Trust; [2]Radiotherapy UK; [3]University of Suffolk; [4]Sheffield Hallam University

Background: Radiotherapy is needed by 50% of people with cancer (Borras, 2015). Therapeutic radiographers (TRs) who plan and deliver this vital treatment are under increasing pressure to keep up with growing demand and are faced with their highest vacancy rate on record (8.1%) (COR, 2021).

A key factor in recovering from the cancer workforce crisis is successful recruitment of TR students. Current recruitment strategies include promoting radiotherapy at career events and work experience placements. The success and impact of such strategies has not previously been explored.

This study aims to find out what career outreach activities are successfully being utilised nationally and what factors contribute to students choosing a career as a TR.

Method: Two online surveys were developed to capture opinions and experiences from 1st year undergraduate students and qualified staff involved in radiotherapy career outreach. The surveys were distributed from June 2022 to March 2023. Data analysis included descriptive statistics and qualitative thematic analysis.

Method: 85 student responses highlighted the key influencing factor for enrolling in a radiotherapy degree was a friend or family experience of cancer, followed by positive experiences at university open days and work experience in radiotherapy. A quarter of the respondents attended career events; 3D visualisation of radiotherapy and hands-on activities were key influencing factors. Data collection for the professional stakeholder survey is ongoing with results anticipated in April 2023.

Conclusion: Ensuring patients understand the role of a TR can positively impact both a patient's treatment and radiotherapy recruitment. Future analysis will allow for recommendations on national recruitment strategies required.

1. Borras JM, Barton M, Grau C, et al. (2015). The impact of cancer incidence and stage on optimal utilization of radiotherapy: Methodology of a population based analysis by the ESTRO-HERO project. *Radiotherapy Oncology* 116(1): 45-50 3.

2. College of Radiographers (2021) *Radiotherapy radiographic workforce 2021 UK census.*Available at: https://www.sor.org/getmedia/8503732e-e584-4c8a-a4e0-51b61f37690b/2021_CoR_radiotherapy_radiographic_workforce_uk_census_report_v3.pdf (Accessed: 01 February 2023)

M5.2 Evaluation of a pilot therapeutic radiographer (RTT)-led radiotherapy late effects service

Samantha Bostock; Gillian Bestwick; Elaine Smith

Gloucestershire Hospitals NHS Foundation Trust

Background: Radiotherapy can cause debilitating late effects which impact on a person's physical and psychological health. In response, an RTT-led radiotherapy late effects service was piloted. Patients were given opportunities to talk about symptoms and their physical/emotional impact. A joint management/support plan was created aimed at reducing the impact of late effects on an individual's daily life and ability to function. This study evaluated the impact the service had on patients using it.

Method: Patients using the pilot service between May 2020 and July 2022 were invited to complete questionnaires after their initial appointment and again 3-4 months later. Quantitative data was evaluated to assess how patient's needs were met. Thematic analysis of patient's comments provided qualitative evidence on service impact.

Method: Questionnaires returned from 34 patients after their initial consultation showed 97% reported it met expectations, had a positive outcome and they gained better understanding of their symptoms and how to self-manage. 3-4 months later 100% of 17 patients scored > 8/10 for satisfaction with the service (M=9.65, SD=0.61). Mean response regarding service impact on symptoms affecting daily life was 7.47 (SD=2.65) with 76% of patients scoring 7 or higher. Patient-reported themes across both questionnaires: positive emotions - feeling more hopeful, positive, reassured; information - information provided improved understanding of symptoms; positive outcomes - symptoms resolved or reduced with action plans: praise for the RTT leading the service.

Conclusion: The pilot service had a considerable positive impact on patients' ability to understand/manage symptoms leading to quality-of-life improvements alongside reduced significance of symptoms.

M5.3 A centralised advanced clinical practitioner-led breast radiotherapy service

Sarah Findlay

Lancashire Teaching Hospitals NHS Trust

Background: Radiotherapy is used to treat 63% of all breast cancer patients (CRUK, 2018), with the incidence of breast cancer referrals to radiotherapy evidenced to be increasing (Trust Statistics, 2022) there is an expanding workload. A shortfall in Clinical Oncologists (RCR, 2021) has led to the need for skill expansion of therapeutic radiographer roles for example Advanced Clinical Practitioners (HEE, 2018) to aid in the optimisation of the breast radiotherapy treatment pathway.

Method: A business plan was submitted in 2019 for three ACPs who would have specific responsibilities for the management of the radiotherapy pathway for breast cancer. This required a 2 year training period prior to the ACP-led services' full implementation and generation of income for the Trust. All ACPs completed an Advanced Practice MSc, in-house training and competencies aligned with the HEE ACP framework (2017).

Method: 42.3% of all breast cancer referrals during 2022-2023 were managed through the centralised ACP-led breast radiotherapy service, enabling the department to meet the referral caseload and reduce workload burden for Clinical Oncologists. A reduction in waiting times from referral to breast radiotherapy treatment by 50% in most cases has been evidenced since implementation of the ACP-led service. Service user and radiotherapy clinical team satisfaction surveys indicated a high level of satisfaction with the ACP-led service throughout the radiotherapy treatment pathway.

Conclusion: Advanced Clinical Practitioners in therapeutic radiography are an alternative workforce that can be utilised effectively to address service gaps in the breast radiotherapy pathway, to improve consistency, capacity and patient experience.

1. Cancer Research UK. (CRUK) (2018) Breast cancer treatment statistics. [Online]. Available at: https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/breast-cancer/diagnosis-and-treatment [Accessed [01 February 2023].
2. Health Education England. (HEE) (2017) Multi-professional framework for advanced clinical practice in England. [Online]. Available at: https://www.hee.nhs.uk/sites/default/files/documents/Multi-professional%20framework%20for%20advanced [Accessed 01 February 2023].
3. Health Education England (HEE). (2018) Strategic Framework for Cancer Workforce. [Online]. Available at: https://www.hee.nhs.uk/sites/default/files/documents/Cancer-Workforce-Document_FINAL%20for%20web.pdf [Accessed 23 January 2023].
4. Royal College of Radiologists (RCR). (2021) RCR Clinical oncology census report 2021. [Online]. Available at: https://www.rcr.ac.uk/clinical-oncology/rcr-clinical-oncology-census-report-2021 workforce consensus 2021 [Accessed 23 January 2023].

M5.4 Caring in therapeutic radiography -- perceptions and experiences of academic educators

Julie Hendry

St George's University of London

Caring is frequently espoused within healthcare, being well established in policy and professional codes of conduct, whilst featuring within the NHS Constitution. The notion of caring and its meaning remains troublesome and nebulous. Within Therapeutic Radiography TR there is a paucity of research involving caring. This phenomenological study explored the perceptions and experiences of caring in academic educators. Eight interviews were conducted and analysed, using a modified van Maan approach, to reveal the essences of caring. The notion of Being Caring emerged, educators having caring characteristics and being caring individuals, resulting from a variety of antecedents in the lives. These antecedents were alongside the innate moral caring virtue with which individuals entered the profession. Caring in the clinical and education settings was similarly interpreted by participants. Caring For emerged as a task-oriented and practical focussed dimension of caring, lacking an emotional connection with the patient or student, being viewed as lesser caring. Caring About emerged as emotive and feelings-focussed, where humanity, a relationship, and rapport existed to enable knowing and connection between the recipient of caring and the practitioner. Supportive behaviours were part of Caring About at a level participants described as 'above and beyond' the essential, perfunctory tasks. This research contributes to knowledge as the first UK study to explore caring with academic TR educators. Caring For and Caring About provide a useful model for framing teaching and practice, better enabling practitioners to deliver caring in both the clinical and educational settings.

MSK POSTER PRESENTATIONS

P001 Intra- and Inter-operator precision errors for single site tibia measurements using the Bindex QUS scanner

Harriet Buxton; Charlotte Khanan; Daniel Stedman; Nia Tate; Abdulkareem Algahtani; Karen Knapp

University of Exeter

Background: The Bindex is a quantitative ultrasound scanner, which measures the cortical thickness of bone in the radius and tibia as a measure of fragility fracture risk and osteoporosis (1). This study aimed to explore the intra- and inter-operator precision errors for the single site measurement protocol at the proximal tibia.

Method: Four operators had half a day training on the Bindex. 30 participants were recruited and scanned with duplicate scans by two operators each; each pair scanned 15 participants. The root mean squared standard deviation (RMSSD) and coefficient of variation (RMSCV%) were calculated to assess the intra- and inter-operator precision errors.

Results: Intra-operator precision errors ranged from 1.33% (0.014) to 1.59% (0.016) for RMSCV% (RMSSD) and inter-operator prevision errors were 1.97% (0.020) and 2.45% (0.025) for RMSCV% (RMSSD) for pair 1 and pair 2 respectively. The grouped inter-operator precision error was RMSCV% 2.23% (RMSSD 0.022). The mean age of the population scanned was 21 years, with a mean body mass index of 24kg/m2.

Conclusion: The intra-operator precision errors are comparable with those reported for DXA(2). Inter-operator precision errors were greater than the intra-operator ones, which is in line with expectations for a device utilising a hand-held probe. Operators can be rapidly trained to use the Bindex and perform scans with good precision. The differences between operators may be reduced with further training. This study was performed on young volunteers, so the results may not reflect a standard clinical population.

1. National Institute for Clinical Excellence (NICE) (2021) Osteoporosis prevention of fragility fractures. Available at: https://cks.nice.org.uk/topics/osteoporosis-prevention-of-fragility-fractures 2. Knapp KM, Welsman JR, Hopkins SJ, Fogelman I Blake GM. 2012 Obesity Increases Precision Errors in Dual-Energy X-Ray Absorptiometry Measurements. J Clin Densitometry. 15(3),315-319.

P002 Necessity of cervical spine MRI imaging in spondyloarthropathy imaging protocol

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The Royal Wolverhampton NHS Trust

Background: For the assessment of sponyloarthropathy (SPA), MRI whole spine (WS) and sacroilliac joints (SIJs) is the gold standard, it is readily available with no radiation burden making it an invaluable investigation tool and allowing prompt treatment of inflammatory back pain. SPA has a propensity for the thoracic spine and SIJs, and MRI can detect active/chronic changes. At our institution, the SPA MRI protocol includes the WS and SIJs, taking a minimum of 45 minutes. The authors aim to streamline the current protocol to improve efficiency and patient throughput. Methods: Retrospective analysis of MRI WS and SIJs performed between July 2021- January 2023 indicated for SPA, referred by Rheumatologists. Inflammatory lesions (vetebral corner/ endplate osteitis, costovertebral/costotransverse/ facet joint odema) and structural changes (erosions, syndesmophytes, ankyloses) were deemed positive cases. The authors documented the level of abnormality (cervical/thoracic/lumbar/SIJs) and the type of SPA change.

Results: 368 patients reviewed; 49 patients were SPA positive. 86% patients positive in the thoracic spine; 45% exclusively. 16% involved the cervical spine, 0% exclusively.

Conclusion: MRI is the gold standard for investigating SPA and can detect inflammatory lesions/ structural changes. Majority of cases were positive in the thoracic spine; with no exclusive cervical spine changes. Omitting the cervical spine from the SPA protocol can reduce scanning/ reporting times and increase patient throughput.

1.Chan, S.C. et al. (2020) "Diagnostic utility of whole spine and thoracic spine MRI corner inflammatory lesions in axial spondyloarthritis," Therapeutic Advances in Musculoskeletal Disease, 12. Available at: https://doi.org/10.1177/1759720x20973922. 2.Giraudo, C. et al. (2015) "Optimizing the MRI protocol of the sacroiliac joints in spondyloarthritis: Which para-axial sequence should be used?," European Radiology, 26(1), pp. 122–129. Available at: https://doi.org/10.1007/s00330-015-3790-4. 3.Laloo, F. et al. (2019) "MRI of the axial skeleton in spondyloarthritis: The many faces of new bone formation," Insights into Imaging, 10(1). Available at: https://doi.org/10.1186/s13244-019-0752-4. 4.Ramos-Casals, M. et

al. (2019) "Eular recommendations for the management of Sjögren's syndrome with topical and systemic therapies," Annals of the Rheumatic Diseases, 79(1), pp. 3–18. Available at: https://doi.org/10.1136/annrheumdis-2019-216114. Weber, U. et al. (2014) "Does spinal MRI add incremental diagnostic value to MRI of the sacroiliac joints alone in patients with non-radiographic axial spondyloarthritis?," Annals of the Rheumatic Diseases, 74(6), pp. 985–992. Available at: https://doi.org/10.1136/annrheumdis-2013-203887.

P003 Appropriateness of referrals for MRI knees and MRI lumbar spines from general practice - a quality improvement project

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Background: Back pain is the most common site of musculoskeletal complaint, with knee pain being 2nd [1]. Current guidelines regarding knee and back pain state that there are no indications for GPs to refer for imaging. Instead, GPs are advised to refer patients to either an MSK clinic (e.g. physiotherapy) or fracture clinic. The number of patients waiting for more than 6 weeks for an MRI scan increased from 25.8% in 2021 to 29% in 2022 [2]. This highlights the importance of informing clinicians about the indications for MRI knees and MRI lumbar spines to help reduce waiting times.

Method: Patient records were retrieved from EMIS Web using parameters such as "Radiology", and "Magnetic Resonance Imaging", with ages filtered to 18+. A randomised selection of 410 patient records were searched. The type of MRI scan, the findings of the scan, as well as the consequent management plan were recorded.

Results: 37 out of 410 patients were deemed appropriate for final analysis. 19 patients had inappropriate MRI knee scans, whilst 18 had MRI lumbar spine scans. There were more positive findings from the MRI lumbar spines (66%) compared to the MRI knees (52%). Most patients were treated with a combination of analgesic medication and physiotherapy in both the MRI knee and lumbar spine groups (69% and 56%, respectively).

Conclusion: Results suggest that it is better for GPs to refer patients to an MSK service than order imaging for back and knee pain, since most patients ended up being treated by physiotherapy.

1. Khan, S. , et al. , The Assessment and Management of the Arthritic Knee: An Update. Cureus, 2020. 12(11): p. e11582.
2. NHS Diagnostic Waiting Times and Activity Data. 2022; Available from: https://www.england.nhs.uk/statistics/wp-content/uploads/sites/2/2022/03/DWTA-Report-January-2022_C4LM7K.pdf.

P004 Lateral epicondylitis - review of sonographic appearances and image guided therapeutic regimens

Rashed Al-Khudairi; Hannah Steinitz; Siddhant Muzumdar; Thomas Armstrong

Royal Free Hospital NHS Trust

Background: Lateral epicondylitis ("tennis elbow") is estimated to affect between 1-3% of the adult population. Tendinosis of the extensor origin at the lateral humeral epicondyle is the underlying pathological process. Ultrasound can assist in diagnosis. If first line non-invasive measures fail there are several image guided therapeutic regimens that are used in current clinical practice. These include dry needling, corticosteroid injection, platelet rich plasma injection, prolotherapy and injection of autologous blood.

Purpose: Diagnostic- Ultrasound assessment can identify structural changes in the involved tendons ; thickening, hypoechogenicity, intra tendon calcification and bony irregularity at the tendon insertion. Colour doppler may show tendon hyperaemia. The absence of these findings have been shown to rule out lateral epicondylitis. Ultrasound can also be used to assess for entrapment of the posterior interosseus nerve, which may present with similar clinical features.
Therapeutic - Unfortunately there is still no universally accepted image guided therapeutic option. The National Institute for Health and Care Excellence (NICE) does not recommend image guided therapy for long term symptom relief. The safety, mechanism of action, availability and efficacy of these four therapeutic strategies must be considered when providing this service in routine clinical care.

Summary: We will discuss and display the sonographic findings of lateral epicondylitis. In addition we will outline the current evidence, hypothesised mechanisms of action and recommended techniques of the aforementioned image guided therapeutic regimens. This information can assist both the referring and operating clinicians in their clinical practice.

1. Ahmad, Z. (2013). *Lateral epicondylitis.* The Bone & Joint Journal, 95-B(9), pp.1158/1164. 2. Du Toit, C. (2008) *Diagnostic accuracy of power Doppler ultrasound in patients with chronic tennis elbow.* British Journal of Sports Medicine. 2008;42(11):872/876. 3. NICE. (2020) Available at: https://cks.nice.org.uk/topics/tennis-elbow/management/management/. 4. Smidt, N. (2006) *Tennis elbow in primary care.* BMJ2006;333:927/928.

P005 GP mri knee results - a burden on orthopaedic clinics?

Kirsteen Graham; Simon Spencer; Katherine Coyle; Mairiosa Biddle; Evan Wright; Douglas Macleod

NHS Greater Glasgow and Clyde

The guidelines in the community directing primary care practitioners on who qualifies for a knee MRI are dated and difficult to access. Before updating these guidelines, we must ascertain if primary care practitioners are currently actioning on their MRI reports efficiently. Data had been prospectively collected by a MRI Knee reporting radiographer within a Scottish Health Board. Upon review, scans were excluded that had recommended an Orthopaedic referral in the report. The remaining number were reviewed to ascertain if these patients were still referred to and seen by Orthopaedics and their end outcome using clinical portal. In a two-year period over 500 knee MRI scans were requested and reported back to primary care. Of 260 scans/ reports that did not stipulate need for an Orthopaedic review, 70 patients were referred to Orthopaedics (26.92%). Of these 17 (6.53%) patients are still on the waiting list. Five (1.92%) patients underwent operative intervention and 31 (11.92%) were sent to physio and discharged, the remaining 17 (6.54%) patients had varied interventions/onward referrals. Primary care physicians appear to be actioning on most scan reports in the community, with roughly 10% of patients being referred to Orthopaedics requiring no further intervention. Along with the radiology department and management, we are revising the guidelines for G.Ps to access MRI for knee pain.

https://pubmed.ncbi.nlm.nih.gov/30637879/ https://pubmed.ncbi.nlm.nih.gov/32171376/

P007 Don't be a clot! Additional pathologies at DVT scanning

Nicholas Ridley; Dawn McCafferty; Jo Wheeler; Katie Thompson

Great Western Hospital

Background: A DVT is characterised by pain and swelling in a limb. Duplex venography is performed to diagnose venous thrombosis. However, there are other pathologies that can mimic the same symptoms. In addition there are incidental findings that can be seen. At our busy DGH our pick up rate for DVT is 15-20% of referrals. We assess the whole leg including the calf. We have found a number of additional findings in our practice.

Purpose: This pictorial review will enable sonographers to appreciate any additional pathology they may encounter during scanning the leg for DVT. It is important to be aware that patients with suspected DVT may have other abnormalities. Sonographer teaching should include knee MSK findings.

Summary of content: The additional findings will be illustrated with ultrasound images, plain films, CT and MRI. These include; Bakers cyst, Ruptured Bakers cyst, oedema, superficial thrombophlebitis, gastrocnemius myositis, knee joint effusion, meniscal cyst, Achilles tendon rupture, osteochondroma, arterial occlusion and aneurysm and intramuscular haematoma.

P008 Knee radiographs in ED: Reporting essentials

Nicholas Ridley; Dominique Faulkner; James Ross

Great Western Hospital

Background: Plain films of the knee are the mainstay of investigation for the painful knee in the Emergency Department. In general interpretation is straightforward. However, there are a number of subtle injuries that can be difficult to identify and it is easy to miss fractures in certain cases. Small bony fragments can be a clue to significant injury.

Purpose: Based partly on our weekly ED/Radiology meetings and teaching files we have assembled relevant images of the knee obtained in the ED department. It is important that reporting radiographers, Radiologists and ED doctors are able to understand subtle injury and to look out for unsuspected pathology.

Content: A number of cases are presented focussing upon subtle injury including small bony fragments such as the Second, sliver and sleeve fractures. In addition soft tissue changes around the knee such as quadriceps rupture and patella tendon injury are highlighted. Unsuspected pathology such as tumour is also included.

P009 The "bum & cherry" technique -- a quicker way of correcting lateral knee positioning

Xuan Tran

Birmingham Women's and Children's NHS Foundation Trust

Background: Correcting lateral knee positioning is predominantly based on fibula head position, which can be unreliable. Some radiographers are unsure whether internal or external rotation is needed to superimpose femoral condyles. The "bum & cherry" technique offers a strong and quick visual indicator to identify whether positioning is too internally or externally rotated and which way to turn to correct positioning within 3 seconds of taking the x-ray.

Purpose:
* To understand the key difference between medial and lateral femoral condyles
* To visualise the appearance of lateral knee x-rays that are too externally and internally rotated
* To identify which of these presents as a "bum" and which are a "cherry"
* To use the "bum" and "cherry" to correct lateral knee positioning within seconds

Summary of content: There is a video on the technique and supplementary posters; these contain an educational narrative that will take participants through the key driver of the technique: the anatomical and visual differences between lateral knee x-rays that are too internally and too externally rotated. Participants will then be shown the simple visual indicator that identifies x-rays that are too internally rotated ("cherries") and x-rays that are too externally rotated ("bums"). Participants will then be demonstrated that "bums" need turning in and "cherries" need turning out eliminating guesswork regarding correcting positioning.

Video: https://www.youtube.com/watch?v=GaRnsps6u4E Posters: https://imgur.com/a/h9Aio4B
1. Ahn, L. (2021a). Type III Pediatric Tibial Tubercle Fracture edited by Xuan Tran. [Online Image] OrthoBullets. Available at: https://www.orthobullets.com/pediatrics/322103/pediatric-knee-trauma-radiographic-evaluation [Accessed 27 Sep. 2022].
2. Ahn, L. (2021b). Type IV Pediatric Tibial Tubercle Fracture edited by Xuan Tran. [Online Image] OrthoBullets. Available at: https://www.orthobullets.com/pediatrics/322103/pediatric-knee-trauma-radiographic-evaluation [Accessed 27 Sep. 2022].
3. Bell, D. (2022). case 1: normal knee edited by Xuan Tran. [Online Image] radiopaedia. Available at: https://radiopaedia.org/articles/knee-horizontal-beam-lateral-view-1 [Accessed 22 Jun. 2022].
4. Dupuis, C., Westra, S., Makris, J. and Wallace, E. (2009). Paediatric Lateral Knee Radiograph edited by Xuan Tran. [Online Image] RadioGraphics. Available at: https://pubs.rsna.org/doi/10.1148/rg.293085163 [Accessed 27 Sep. 2022].
5. Ghaffari, S. (2018). Lateral Radiography of (A) Right and (B) Left Knee Showing Low Riding of Patella and Sign of Hemarthrosis in Both Knees edited by Xuan Tran. [Online Image] Shafa Orthopedic Journal. Available at: https://www.researchgate.net/figure/Lateral-Radiography-of-A-Right-and-B-Left-Knee-Showing-Low-Riding-of-Patella-and-Sign_fig3_324876118 [Accessed 22 Jun. 2022].
6. RMH Core Conditions (2015). medial tibial plateau fracture edited by Xuan Tran. [Online Image] Radiopaedia. Available at: https://radiopaedia.org/cases/medial-tibial-plateau-fracture [Accessed 22 Jun. 2022].
7. The Journal of Bone and Joint Surgery, (2012). A lateral radiograph of the knee edited by Xuan Tran. [Online Image] The Journal of Bone and Joint Surgery. Available at: https://quiz.jbjs.org/an-eleven-year-old-boy-with-left-knee-injury [Accessed 27 Sep. 2022].
8. wikiradiography (2020a). LATERAL KNEE edited by Xuan Tran. [Online Image] wikiradiography. Available at: http://www.wikiradiography.net/page/Lateral_Knee_Radiography [Accessed 22 Jun. 2022].
9. wikiradiography (2020b). lateral knee edited by Xuan Tran. [Online Image] wikiradiography. Available at: http://www.wikiradiography.net/page/Lateral_Knee_Radiography [Accessed 22 Jun. 2022].
10. wikiradiography (2020c). lateral knee edited by Xuan Tran. [Online Image] wikiradiography. Available at: http://www.wikiradiography.net/page/Lateral_Knee_Radiography [Accessed 22 Jun. 2022].
11. wikiradiography (2020d). lateral knee edited by Xuan Tran. [Online Image] wikiradiography. Available at: http://www.wikiradiography.net/page/Lateral_Knee_Radiography [Accessed 22 Jun. 2022].
12. wikiradiography (2020e). lateral knee edited by Xuan Tran. [Online Image] wikiradiography. Available at: http://www.wikiradiography.net/page/Lateral_Knee_Radiography [Accessed 22 Jun. 2022].
13. wikiradiography (2020f). lateral knee anatomy edited by Xuan Tran. [Online Image] wikiradiography. Available at: http://www.wikiradiography.net/page/Lateral_Knee_Radiography [Accessed 22 Jun. 2022].

P010 Long-term precision errors of radiofrequency echographic multi-spectrometry (REMS) bone density measurements using an Echolight scanner at the lumbar spine and femoral neck

Mohammed Asiri; Karen Knapp; Jonathan Fulford; David W Strain

University of Exeter

Background and study aim: Osteoporosis is a chronic skeletal disease characterized by low bone density and microarchitectural deterioration of the bone structure, leading to enhanced bone fragility and increased susceptibility to fractures, particularly of the hip and spine[2]. The standard imaging technique for evaluating bone mineral density is through Dual X-ray Absorptiometry (DXA) scanning. However, DXA has some limitations that prompt the exploration of alternative approaches. Radiofrequency Echographic Multi-spectrometry (REMS) is an innovative diagnostic technology that provides a means of assessing bone density through BMD measurement[1]. This study aims to evaluate the precision errors of REMS measurements at the lumbar spine and femoral neck over the long term.

Methods: 10 participants in both genders underwent 12 scans of their lumbar spine and neck of femur, over three years using the Echolight scanner. Pregnancy and prior hip replacement or spine surgery were both exclusionary conditions. The REMS root mean square coefficient of variation (RMSCV%), and root mean square standard deviation (RMS-SD) were calculated

Results: The RMS-SD, which represents the precision error rate, was 0.012g/cm² for the Lumbar spine, 0.008g/cm² for the femoral neck, and 0.01g/cm² for the total proximal femur. The RMSCV% was 0.97%, 0.89%, and 1.12% for the lumbar spine, femoral neck, and proximal femur respectively.

Conclusion: The outcomes show that the precision error (PE) rates for REMS measurements on the spine and femur are comparable to the reported PE for DXA. However, further investigation is required to determine the impact of obesity on REMS measurements, as it was previously studied in the context of DXA by Knapp et al. (2012).

P012 MSK arthropathy - 'pieces of the puzzle don't always fit'- simple pictorial how to guide

Valerie Middleton

University Hospitals North Midlands

Interpretation of arthropathy requires in depth knowledge and experience to ensure quality actionable reports are verified with resultant optimal patient outcome being achieved. 'Initial imaging evaluation of arthritis begins with radiography' (Kluckman, 2021).

Even with extensive experience in the field of medical image interpretation it is a known fact that arthritidies present relatively unique scenarios in the fact that inter reporter and intra reporter differences regularly occur and are more prevalent when compared to other areas of radiographic image interpretation.

Without a systematic thorough approach using both radiographic imaging and clinically presenting factors conclusive actionable outcomes cannot be achieved to positively impact patient treatment, care and overall outcome.

A simple pictorial poster in the form of a flow diagram/puzzle using both words and radiographic images can provide an everyday reference guide to both inexperienced and experienced reporters alike. The aim of this poster is to do exactly that. A valuable resource to positively impact patient care.

1. Ahmadzadeh A, Dehghan P, Rajaee A; Emam M, Enteshari K, Gachkar L, (2013) Assessing rheumatologists and radiologists agreement rate regarding the diagnosis of focal bone erosions and osteopaenic changes using hand X-rays radiography in patients with rheumatoid arthritis 33 (8); p. 2019-2023 Rheumatology international, UK

2. Fukae J, Koike T, (2009) Imaging methods in Rheumatoid Arthritis. 19(3) p.311-315 Clinical calcium. English Abstract Journal Article review, UK

3. Kluckman, M.L, Bernard, S, Bui-Mansfield, L.T, (2021) A Systematic Approach to Radiographic Evaluation of Arthritis of the Hand and Wrist . 44(11) Contemporary Diagnostic Radiology, USA

P013 Nora lesion: The eponymous bizarre parosteal osteochondromatous proliferation- MR imaging with pathologic correlation

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Background: "Bizarre parosteal osteochondromatous proliferation" (BPOP) or Nora lesion represents an unusual proliferative condition occurring in the tubular bones of the hands and feet. In BPOP, abnormal cartilage harbours characteristic bizarre binucleate chondrocytes. Whether related to periosteal injury or a true neoplastic process, BPOP may occasionally exhibit a locally aggressive behaviour simulating bone sarcoma.

Purpose: We present two patients with BPOP to address this distinct osteochondromatous abnormality. Radiographs revealed an osteosclerotic lesion arising from the phalanges. CT findings disclosed a parosteal, corticated hypodense mass that originated directly from the phalangeal cortex, sparing the cancellous bone. Ultrasonography demonstrated lesions of increased echogenicity surrounded by a hyperechoic rim, with retro-acoustic shadowing. In one patient, dynamic flexion-extension images proved that the mass jeopardized the flexor tendons. MR images showed an ovoid lesion of decreased signal intensity on T1-weighted images. On the T2-weighted images, lesions exhibited either decreased or increased signal intensity. In one patient, the lesion exerted mass effect on the neurovascular bundle, causing motosensory disturbance. Surgical excision was performed and histopathology disclosed BPOP.

Summary of content: BPOP may demonstrate imaging appearances that range from osteochondroma to bone sarcoma. BPOP is characterized by corticomedullary continuity with parent bone and an overlying cartilage cap, whereas osteochondroma typically is noncontiguous with underlying bone and lacks a hyaline cartilage cap. Bone sarcomas only rarely affect the small bones of the hands and feet and are characterized by predominant corticomedullary bone destruction. The imaging appearances of parosteal lesions exhibiting characteristics of BPOP may help radiologists exclude malignancy.

1. Rappaport A, Moermans A, Delvaux S (2014). Nora's lesion or bizarre parosteal osteochondromatous proliferation: a rare and relatively unknown entity JBR-BTR 97:100-102. 2. Bajwa SN, Reddy R, Wagh YS, Agarwal M, Katariya A (2019). Bizarre parosteal osteochondromatous proliferation- A case series of typical and atypical presentations. J Orthop Case Rep 10:45-50. 3. Fenerty S, Ling S, Wang C, Awan O, Ali S (2017). Painless hand mass. Skeletal Radiol 46:405-407. 4. Joseph J, Ritchie D, MacDuff E, Mahendra A (2011). Bizarre parosteal osteochondromatous proliferation: a locally aggressive benign tumor. Clin Orthop Rel Res 469:2019-2027.

P014 Juxtacortical cartilaginous tumours in the hand and foot: Imaging and pathology features

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Background: Juxtacortical (parosteal) chondroma (JC) is a benign cartilaginous tumor arising from the periosteum. JCs comprise 0.6-1.3% of all cartilage tumors and are located in the hands and feet of young patients. On histology, JC features a hyaline cartilage mass juxtaposed to the bone cortex. Soft tissue chondroma is histologically identical to JC, and imaging differential diagnosis of these two cartilaginous lesions relies on osseous involvement. Both tumors need to be differentiated from malignant low-grade juxtacortical chondrosarcoma and the periosteal osteosarcoma.

Purpose: We describe the imaging and histopathological findings in 4 patients (3-female, 1-male, 35-76 years-old) with JCs of the hand and foot who presented with swollen digits. Radiographs showed small, juxtacortical calcified mass lesions. CT images documented dense osseous formations about the phalangeal cortex. Ultrasonography showed hypoechoic mass lesions containing calcifications. On MRI, the lesions had intermediate signal intensity on T1- and increased signal intensity on T2-weighted images. A few intralesional regions of low signal intensity were seen, representing calcified matrix. The lesions were of predominant high signal intensity on the 3D gradient-echo sequences used for depiction of cartilage, and showed ample contrast enhancement. Patients underwent surgical excision, and histologic examination of the lobulated lesions yielded juxtacortical hyaline cartilage exhibiting varied cellularity, without nuclear anaplasia.

Summary of Content: Benign juxtacortical cartilaginous tumors are usually small-sized lesions, causing periosteal elevation with an intact to thickened cortex. Typically marginated by a cuff of sclerosis, parosteal chondromas show no intramedullary involvement. When present, cytologic anaplasia, osteosarcomatous foci, or chondrosarcomatous tissue favour malignancy.

1. Brien EW, Mirra JM, Luck JV Jr (1999). Benign and malignant cartilage tumors of bone and joint: their anatomic and theoretical basis with an emphasis on radiology, pathology and clinical biology. II. Juxtacortical cartilage tumors. Skeletal Radiol 28(1): 1-20. 2. Kosaka H, Nishio J, Matsunaga T, Aoki M, Iwasaki H, Naito M (2014). Imaging features of periosteal chondroma manifesting as a subcutaneous mass in the index finger. Case Rep Orthop 2014:763480. 3. Posadzy M, Vanhoenacker F, Siozopoulou V (2019). Juxta-Cortical chondroma of the phalanges: Is there a role for cone-beam computed tomography in diagnosis and local staging? J Belg Soc Radiol 103:22, 1-6.

P015 Mucopolysaccharidosis type-IV (Morquio-Brailsford syndrome): Assessment of skeletal deformity and bone mass status

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Background: Mucopolysaccharidosis type-IV (MPS-IV) or Morquio-Brailsford syndrome is a rare metabolic disease caused by deficiency of the enzymes catalyzing degradation of the glycosaminoglycans (GAGs). Storage of GAGs (mucopolysaccharides) in turn, causes multisystemic organ damage including bone and cartilage abnormalities comprising "dysostosis multiplex". Osteoporosis, dwarfism, kyphoscoliosis, lumbar lordosis, and platyspondyly are common. Additional manifestations may include coxa valga with dysplastic, flattened femoral heads and rapid evolution to osteoarthritis.

Purpose: We present the bone densitometric results in a 35-year-old female with MPS IV and kyphoscoliosis. Bone mineral density (BMD) was measured at the lumbar spine (LS) using DXA and 3-D QCT. BMD was also measured at the proximal femur (total hip, femoral neck, trochanter, intertrochanter) using DXA. BMD of the LS by DXA appeared falsely normal, 1.373 g/cm2 (T-score: 3) due to prominent degenerative changes and spinal deformity. BMD of the foreshortened femoral neck showed borderline osteopenia, 0.727 g/cm2 (T-score: -1.1). BMD appeared fallaciously normal (T-scores were 0.3, -0.1, and 0) for the trochanter, intertrochanter, and total hip sites, respectively. When spinal trabecular BMD was estimated using 3D-QCT the volumetric BMD was 70.4 mg/cm3 (< 80 mg/cm3) (T-score: -3.77, Z-score: -1.47), indicating osteoporosis.

Summary of content: In MPS-IV, severe skeletal deformity may jeopardize bone mass measurements by DXA, which is a projectional 2D-technique allowing the assessment of combined trabecular and cortical bone BMD. Because QCT enables separate estimates of trabecular and cortical BMD providing volumetric mineral density, it is well suited for the determination of true bone mass in these patients.

1. Martell L, Lau K, Mei M, et al. (2011). Biomarker analysis of Morquio syndrome: identification of disease state and drug responsive markers. Orphanet J Rare Dis 2011(6):84-93. 2. World Health Organization Study Group (1994). Assessment of fracture risk and its application to screening for postmenopausal osteoporosis. WHO technical report Series No 843, Geneva, Switzerland. 3. American College of Radiology (2013). ACR practice guideline for the performance of quantitative computed tomography (QCT) bone densitometry, 2008. Guidelines revised collaboratively by the American College of Radiology (ACR), the Society for Pediatric Radiology (SPR), and the Society of Skeletal Radiology (SSR) (Resolution 32).

P016 The uncommon Os sustentaculum: An accessory foot ossicle associated with painful talocalcaneal coalition

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Background: The os sustentaculum (OS) is a small accessory bone lodged at the medial aspect of the sustentaculum tali. OS occurs with an incidence of 0.3%, and may become symptomatic. In talocalcaneal coalition (TCC), (fibro)-osseous union between the talus-calcaneus causes painful restriction of motion of the subtalar joint. OS may form accessory joints with both the talus and calcaneus that can fuse, developing a talocalcaneal bridge. We believe there is a meaningful association between OS and the development of TCC.

Purpose: We describe a patient with medial ankle pain related to an OS and TCC. Radiography showed an OS, and suggested TCC. CT revealed extraarticular TCC with OS on the left foot, and TCC without OS on the right foot. Obliteration of irregular talocalcaneal joint, subchondral sclerosis, and dysmorphic sustentacula were seen. On MRI, a distinct ossicle was visualized interposed between the calcaneus and talus, forming two separate junctions (one with the sustentaculum tali and another with the talus). STIR images showed marrow oedema in the OS and the osseous coalition. Unlike the symptomatic ankle harbouring OS, there were no oedematous changes on the foot TCC without OS. Therefore, we presume that there is an association between marrow oedema and medial ankle pain, in patients with a TCC harbouring an OS. After surgical resection of the painful TCC coalition with OS the symptoms resolved.

Summary of content: Because OS can become a source of medial ankle pain in patients with tarsal coalition, recognition of this association is clinically important.

1. Bencardino J, Rosenberg Z, Beltran J, Sheskier S (1997). Os sustentaculi: depiction on MR images. Skeletal Radiol 26(8): 505-506. 2. Yun SJ, Jin W, Kim GY, Lee JH, Ryu KN, Park JS, Park S (2015). A different type of talocalcaneal coalition with Os sustentaculum: the continued necessity of revision of classification. AJR Am J Roentgenol 205(6): W612-618. 3. Bloom R, Libson E, Lax E, Pogrund H (1986). The assimilated os sustentaculi. Skeletal Radiol 15: 455-457

P017 Dish, dash... dosh?

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Background: Diffuse idiopathic skeletal hyperostosis (DISH) and axial spondyloarthritis (AxSpA) are traditionally regarded as mutually exclusive conditions with separate classification and diagnostic criteria. Inflammatory back pain is increasingly recognised to be poorly sensitive and specific for AxSpA (1). We present imaging from a classical case of each DISH and AxSpA and two separate cases with imaging findings consistent with both DISH and AS.

Purpose: We propose that current dichotomous classification and diagnostic criteria fail to recognise the possibility of co-existent DISH and AxSpA changes that can affect a proportion of patients. This can lead to a diagnostic dilemma which may result in some patients being denied effective treatment and others receiving inappropriate immunosuppression.

Summary of content: Possibility of the co-existence of features of both AxSpA and DISH must be considered when reporting imaging. Whether this represents true 'dual pathology' or overlap of imaging findings can be uncertain from case to case (2). Specific imaging reports on the presence of both AxSpA and DISH features can enable clinicians to interpret the radiological findings within the clinical context. Further research into the prevalence and outcomes of patients with features of both entities is warranted to guide future practice.

1. Poddubnyy, D., Callhoff, J., Spiller, I. et al. Diagnostic accuracy of inflammatory back pain for axial spondyloarthritis in rheumatological care. RMD Open 2018;4e000825 2. Kuperus, J S., Waalwijk, J F., Regan, E A. et al. Simultaneous occurence of ankylosing spondyloarthritis and diffuse idiopathic skeletal hyperostosis: a systematic review. Rheumatology 2018;57:2120-2128

P018 Secondary bone healing process

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Bone fractures are one of the most common injuries occurring due to trauma or pathological factors. There are two types of fracture healing processes; primary healing and secondary healing. In primary healing there is a direct union of the bone aided by conventional compression plate, which facilitates the stability of the fracture site. Secondary bone healing is the most common form of bone healing process and has three stages. The first stage is the inflammatory stage and occurs within hours. Secondly, the reparative stage takes place within days to weeks. Finally, the remodelling stage lasts months to years. Diagnostic radiography can be a vital tool not only to identify a fracture, moreover it allows the Radiographer and other clinicians to be able to identify the age of fracture through the different stages of secondary bone healing when interpreting radiographs. It is important for Radiographers to be familiar with normal appearances of the stages of bone healing. Furthermore, this will essentially facilitate in identification of non-union fractures and determine whether the patient requires conventional intervention.

1.Ghiasi, M., Chen, J., Vaziri, A., Rodriguez, E. and Nazarian, A., 2017. Bone fracture healing in mechanobiological modeling: A review of principles and methods. Bone Reports, [online] 6, pp.87-100. 2.Schubert, R., 2021. 2. Fracture healing | Radiology Reference Article | Radiopaedia.org. [online] Radiopaedia.org. 3. Roth, T., Ladd, L. and Kempton, L., 2017. 3. Fracture Healing and Imaging Evaluation. Current Radiology Reports, [online] 5(7). Available at: . 4.Dijkman, B., Sprague, S., Schemitsch, E. and Bhandari, M., 2010. 4. When Is a Fracture Healed? Radiographic and Clinical Criteria Revis ited. Journal of Orthopaedic Trauma, [online] 24, pp.S76-S80. 5.Emergency, B., 2021. Core pathology: Is it a hard of soft callous during bone healing?. [online] FRCEM, MRCEM, Ultrasound Emergen cy Medicine Courses.

P019 Soft tissue foreign body (STFB) detection utilising ultrasound and general radiography: A phantom based study employing a survey

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Background: Soft tissue foreign body (STFB) wounds commonly result from punctures or lacerations in the extremities and pose various health risks if retained (Tantray et al., 2018). Guidance indicates the initial use of general radiography for STFB detection, however, this carries a stochastic risk of radiation-associated cancer (Davis et al., 2015; Ingraham et al., 2015). Additionally, high fallibility has been observed for General radiography when imaging

radiolucent STFBs, producing false negative diagnoses (Carneiro et al., 2020). An alternative quick, inexpensive and non-ionising-radiation modality is ultrasound (Royal college of radiologists (RCR), 2022).

Methods: Seven phantoms (mimicking soft tissue of the hand) were created to house foreign bodies of varying materials and radiopacity. These were imaged in a blind study using ultrasound and direct digital radiography. To minimise researcher bias, a blind survey of radiography staff, apprentices and students at a university was employed to assess the images/videos of the phantoms for the presence of a foreign body.

Results: Respondents (n=50) achieved a mean sensitivity of 95% and a mean specificity of 90% in detecting STFBs in the ultrasound videos and a mean sensitivity of 53% and a mean specificity of 88% in the radiographs.

Conclusion: Under the conditions of the study, general radiography was highly sensitive (99%) and specific (88%) for radiopaque STFBs but had poor sensitivity (9%) for radiolucent STFBs. Whereas ultrasound was highly sensitive and specific in the detection of STFBs of varying densities, suggesting possible superior capabilities for STFB detection. Future in-vivo study is required to investigate the potential positive impact to practice.

1. Carneiro, B.C., Cruz, I.A.N., Chemin, R.N., Rizzetto, T.A., Guimarães, J.B., Silva, F.D., Yoshida Junior, C., Pastore, D., Ormond Filho, A.G., Nico, M.A.C., 2020. Radiographics 40, 1965-1986.
2. Davis, J., Czerniski, B., Au, A., Adhikari, S., Farrell, I., Fields, J.M., 2015. Academic Emergency Medicine 22, 777-787.
3. Ingraham, C.R., Mannelli, L., Robinson, J.D., Linnau, K.F., 2015. Emerg Radiol 22, 425-430.
4. Royal college of radiologists (RCR), 2022. iRefer | [WWW Document]. URL https://www.irefer.org.uk/ (accessed 8.24.22).
5. Tantray, M.D., Rather, A., Manaan, Q., Andleeb, I., Mohammad, M., Gull, Y., 2018. Strategies Trauma Limb Reconstr 13.

CARDIAC / CHEST & LUNG POSTER PRESENTATIONS

P020 Using CT scan measurements on routine surveillance CT in metastatic NET disease to improve the screening for carcinoid heart disease

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Background: Patients with metastatic neuroendocrine tumours (MNET) have surveillance CT scan, therefore non-gated cardiac imaging is acquired. We present preliminary data investigating screening of carcinoid heart disease (CHD) in MNET. We investigated simple measurements on CT thorax that maybe helpful detecting the presence of CHD.

Method: This retrospective single centre study was performed on 73 tertiary cardiology service patients with suspected CHD. All patients had CT scans before and after referral. CT scan nearest to the referral date prior to cardiology intervention was investigated. We measured simple non-gated cardiac CT parameters and assessed for differences in groups with confirmed CHD (41 patients) and non-CHD (32 patients) after cardiology investigation. Parameters include maximum axial short axis of both ventricular internal diameters and ratio (RV/LV), maximum axial long axis of both atrial internal diameters and their ratio (RA/LA). We calculated the dispersion measures and unpaired t-tests. 3 parameters were statistically significant.

Results: 75% of CHD patients and around 75% of non-CHD patients have a RA/LA larger and less than ≈1.4, respectively ($p < 0.0001$). 50% of CHD patients and 75% of non-CHD patients have a right atrial internal diameter greater and lower than approximately 58mm, respectively ($p = 0.002$). Respectively, 50% of CHD patients and 75% of non-CHD patients have a RV/LV above and below 1 ($p = 0.028$).

Conclusion: This preliminary assessment suggests that measuring cardiac CT parameters from routine CT scans maybe useful for identifying early CHD in MNET patients and can be a simple addition to routine reporting.

1. Bhattacharyya, S., Toumpanakis, C., Caplin, M., Davar, J. (2008) Analysis of 150 patients with carcinoid syndrome seen in a single year at one institution in the first decade of the twenty-first century. The American Journal of Cardiology. 101(3):378-81. 2. Ferrari, A., Glasberg, J., Riechelmann, R. (2018) Carcinoid syndrome: update on the pathophysiology and treatment. Clinics (Sao Paulo). 73(Suppl 1): e490s. 3. Ram, P., Panalver, J., Lo, K., Pressman, G. (2019) Carcinoid Heart Disease: Review of Current Knowledge. Texas Heart Institute Journal. 46(1): 21-27.

P021 Radiographer led CTCA - the beginning of the end for routine facilitating beta blocker therapy

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Background: Cardiac computed tomography coronary angiography (CTCA) is a rapidly advancing technique for assessing coronary artery disease (CAD). Traditionally CTCA imaging involves direct supervision by a radiologist or cardiologist and since inception has required facilitating beta blockers (BB). However, CT technology has improved rapidly as has radiographer and reporter expertise. Utilising this, we instituted a radiographer led cardiac CT service (RLCCTS), without routine BB, which we then studied for quality control (QC).

Methods: RLCCTS started October 2021 using the Revolution Apex CT System (GE Healthcare UK), 20-minute slots. Uniform reporting was agreed including indication, BB administration, demographics, dose length product (DLP) and the coronary artery disease -- reporting and data system (CAD-RADS) score. Uncertain CAD-RADS meant a non-diagnostic scan (NDS). Six months data was collected; stable chest pain patients (SCPP), who have national CTCA QC indicators were analysed.

Results: Of 1475 patients, 447 were not SCPP leaving 1028 SCPP CTCA for analysis. Demographics - mean age 63 years, BMI 29, 50.4% female. BB therapy - 4 patients (2 recalls). Overall, 36/1024 or 3.5% were NDS; median DLP 179mGycm; mean heart rate (HR) 70 beats per minute (BPM).

Conclusion: RLCCTS compares favourably against national data audits. National audit data suggests a 4% NDS rate and a median DLP for SCP patient CTCA of 209mGycm. With wide detector CT technology, experienced radiographers, and reporters, drugless RLCCTS can deliver 20-minute slot CTCA for SCP patients with satisfactory QC indicators.

P022 Evaluating the use of Gradient Echo Imaging for the detection of cerebral microbleeds in acute stroke cases: A literature review and retrospective data analysis in a stroke unit

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Background: Imaging in stroke allows its classification into ischaemic or haemorrhagic, ensuring for time-sensitive treatment to be administered when required. Imaging can also have the ability to detect cerebral microbleeds (CMBs), which may further determine pharmacological intervention in acute stroke. True gradient echo (T2*GRE) magnetic resonance imaging (MRI) has high sensitivity for the detection of CMBs. This sequence is included in the national guidelines; however the implementation of these guidelines can vary depending on local interpretation and scanner capabilities; The aim is to evaluate the use of true T2*GRE imaging for all acute stroke patients, to improve local practice.

Methods: A literature review was used to determine best practice as a reference point. Retrospective data analysis of the native database, spanning a 6-month period, was also used. The data of 281 acute stroke patients with an MRI were analysed. The MRI sequences applied and the final diagnosis were noted for each case.

Results: Of 281 acute stroke patients with MRI, 259 (92.1%) had an acute infarct, 16 (5.69%) acute haemorrhage and 6 (2.14%) had both. Overall, 13 (4.63%) had a diagnosis of CMBs. All these 13 had a true T2*GRE sequence. CMBs were not detected without T2*GRE.

Conclusion: T2*GRE imaging is essential for detecting CMBs. When omitted, CMB incidence rates can be considerably lower than those suggested in the literature. Missing CMB diagnoses in stroke patients may result in suboptimal treatment pathways. It is therefore imperative to always include a true gradient-echo sequence to detect microbleeds in acute stroke cases.

DoH. The Department of Health. Implementing the national stroke strategy- an imaging guide. 2008. Accessed June 2019. Available from: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_085146?IdcService=GET_FILE&dID=166106&Rendition=Web SoR. The Society of Radiographers. Stroke Imaging Services; Guidance and Advice. 4th Edition. 2015. Accessed June 2019. Available at: https://www.sor.org/learning/document-library/stroke-imaging-services-guidance-and-advice. NICE. Stroke and transient ischaemic attack in over 16s: diagnosis and initial management. NG128. 2019. Accessed June 2019. Available from: https://www.nice.org.uk/guidance/ng128.

P023 A retrospective audit of 3D and 4D image guidance in lung SABR

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Intro: Imperial College Healthcare NHS Trust (ICHT) implemented Lung SABR treatment in 2021. The IGRT protocol at each treatment fraction consists of a 3DCBCT acquisition with 6DoF correction for gross positional errors, followed by a 4DCBCT acquisition to assess tumour motion and to capture/correct any residual setup errors. A retrospective evaluation of this verification imaging process was performed to determine if the 4DCBCT was of benefit in ensuring accurate and reproducible patient setup and if this depended on the tumour location.
Method: The online review data for 35 consecutive patients (206 fractions; 18 Right-side, 16 Left-side - 24 Upper, 3 Mid, 8 Lower lobes) was collected from the Varian Aria OIS and analysed to determine if shifts corrected via the 3DCBCT required additional correction following 4DCBCT.
Results: Online corrections determined from the 3DCBCT were made in the Lat/Vert/Long (LVL) directions for 205 fractions and for pitch/roll/rotation (PRR) in 198 fractions. Online analysis of the 4DCBT demonstrated that subsequent PRR correction was only required for 3 fractions, but LVL correction was required at least once for 25 (71%) patients accounting for a total of 67/206 (33%) fractions. Table 1 shows the number of fractions that required correction divided by tumour location, and the mean and maximum shifts.

Conclusion: Although PRR shifts were successfully corrected by 3DCBCT image verification, residual translational shifts were found on 4DCBCT images when reviewing against tumour motion for all tumour locations. It is proposed that 4DCBCT imaging is sufficient in capturing all positional errors, eliminating the need for the 3DCBCT image.

TABLE 1 – (Note: Shifts are absolute values)	VERTICAL			LONGITUDINAL			LATERAL		
Tumour location	Mean (cm)	Max (cm)	% of 4D corrections required	Mean (cm)	Max (cm)	% of 4D corrections required	Mean (cm)	Max (cm)	% of 4D corrections required
Upper Lobe	0.20	0.80	23.6	0.27	0.86	31.4	0.15	0.31	21.4
Middle Lobe	0.20	0.20	5.6	0.16	0.21	11.1	0.00	0.00	0.00
Lower lobe	0.20	0.42	33.3	0.30	0.72	45.8	0.21	0.21	35.4

P024 Identifying incidental breast lesions on CMR using AI

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Imperial College London

Background: Cardiovascular magnetic resonance imaging (CMR) is a crucial investigation for patients with cardiovascular disease (von Knobelsdorff-Brenkenhoff et al., 2017). The first few images in a CMR scan frequently reveal incidental extra-cardiac findings, such as breast lesions, but are often interpreted by cardiologists, who may not have undergone training in breast imaging interpretation (Antony et al., 2011). Whilst neural networks have been used to assist image interpretation, they have never been used to identify incidental findings in CMR scans. This study aimed to develop a neural network capable of identifying incidental breast lesions on CMR scans.

Methods: CMR images were organised into normal and abnormal classifications and split into training, validation and testing datasets. Three neural networks were constructed and evaluated using balanced accuracy, validation loss, receiver operator characteristic area under the curve (AUC) and Cohen's Kappa.

Results: Training, validation and testing were conducted using 1643, 201 and 207 images, respectively. With the validation dataset, the EfficientNet-b4 network had the highest accuracy of 85.2% compared to the network built from scratch at 58.6%. The best-performing network achieved an accuracy of 75.1% and Cohen's Kappa of 0.525 in testing, corresponding to an AUC of 0.931 ($p<0.001$), specificity of 95.3% and sensitivity of 61.1% (Figure 1).

Conclusions: The neural network could identify incidences of breast cancer with excellent rule-out performance. This may reflect the lower incidence of breast lesions in the dataset; future studies should focus on developing the model using varied, balanced data. Hopefully, these results will encourage others to develop this technology.

*1. Antony R, Daghem M, McCann GP, Daghem S, Moon J, Pennell DJ, et al. Cardiovascular magnetic resonance activity in the United Kingdom: a survey on behalf of the British Society of Cardiovascular Magnetic Resonance. Journal of Cardiovascular Magnetic Resonance. 2011;**13**(1):57.*

*2. von Knobelsdorff-Brenkenhoff F, Pilz G, Schulz-Menger J. Representation of cardiovascular magnetic resonance in the AHA / ACC guidelines. Journal of Cardiovascular Magnetic Resonance. 2017;**19**(1):70.*

P025 A single centre audit of diagnostic adequacy and complication rates of CT-guided lung biopsy

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NHS Lanarkshire

Background: Pulmonary lesions suspicious of malignant nature require sampling for histological diagnosis to guide future management. Computed tomography (CT) image-guided lung biopsy (CTLB) is a well-established procedure for this purpose, especially for lesions not accessible to bronchoscopy or sonographic approach. The British Thoracic Society (BTS) published standards for diagnostic and complication rates for CTLB: >90% of samples should be sufficient for histological diagnosis; pneumothorax rate should be <20.5%, and <3.1% if requiring drainage; haemoptysis <5.3%; and death rate <0.15%. This audit aims to assess the rates of these outcomes for CTLB performed in a district general hospital and compare with the standards set by BTS.

Methods: Patients who underwent CTLB during a six-month period from January -- June 2022 were identified using hospital database (n=23). Information on complications and diagnostic sufficiency were collected retrospectively using their biopsy report, follow-up chest x-ray, and pathology report. Admissions within one-month of the procedure were also reviewed to look for all potentially related complications .

Results: Overall sufficient diagnostic rate was 96% (n=22). Pneumothorax rate was 22% (n=5), and 4% (n= 1) required drainage; haemoptysis rate was 4% (n=1); no death was reported in this study (n=0).

Conclusion: At our centre, CT-guided lung biopsy has excellent diagnostic rate exceeding the standard set by the BTS. Rates of pneumothorax regardless of need for drainage were slightly above the standard. Haemoptysis and death rates were acceptable. This study is limited by the small sample size which may inflate the reported rates.

Manhire et al (2003). Guidelines for radiologically guided lung biopsy. Thorax 58 (11): 920-36.

P026 Approaches taken to educate on portable chest x-rays to reduce a high reject rate analysis

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Background: Reject analysis is the monthly audit of understanding a percentage of how many images are of diagnostic quality at first attempt and how many are rejected. (Atkinson, Neep and Starkey, 2020). Although no national guidance on reject analysis rates for projectional radiography, a frequently >15% reject rate was retrieved from the local portable imaging machines. Out department considered this to be high which resulted in a need to understand why images were not diagnostic at first attempt.

Purpose: This poster will explore the rationale and approaches taken to identify radiographer's reasons for rejecting images combined with educating on the arising of any knowledge gaps. An overall aim was to reduce the reject analysis rate for portable chest imaging to reduce radiation dose and efficiency within the department.

Summary of content: A visual representation of the methods used to identify the learning needs of the radiographers, including, a QR delivered survey, an interactive presentation, simulation with x-ray phantom and portable machine and feedback of key learning points from learners. The project includes an element of learners not knowing what they don't know. (Kruger and Dunning, 1999). It will also show the limitations of the methods and the outcomes of the project. Outcomes include; updating learning checklists, manual handling promotion and time with reporting radiographers for newly qualified radiographers in the department. Overall, it will also demonstrate that since identifying and acting on the learning needs the reject rate for portable imaging has lowered.

Atkinson, S., Neep, M. and Starkey, D. (2020) 'Reject rate analysis in digital radiography: an Australian emergency imaging department case study', J Med Radiat Sci. 67, pp. 72– 79. Kruger, J. and Dunning, D. (1999) 'Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments', J Pers Soc Psychol. 77(6), pp. 1121-34. doi: 10.1037//0022-3514.77.6.1121.

P027 A clinical audit of reporting radiographers and consultant radiologists' ability to identify suspected lung cancer on chest x-ray images and to determine the effectiveness of the fast-track referral system

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University of Liverpool

Background: NICE recommend for a chest X-ray (CXR) as the initial diagnostic test for lung cancer. People with known or suspected lung cancer must be offered a CT thorax with contrast to help confirm or rule out a cancer diagnosis. This audit evaluated a departmental CXR alert system for suspected lung cancer. Radiologists and reporting radiographers alerted CXRs they suspected showed possible lung cancer features. The accuracy of the fast-track system and ability of each reporting group were explored.

Method: 846 cases with lung alerts were analysed and 545 CXRs were audited. The CXRs were split into two groups, the images reported by the radiologists (168) and the images reported by the reporting radiographers (377). Data was collected through PACS and Cerner computer systems to identify if the patient was "positive" or "negative", for lung cancer or had "other findings" as determined by CT.

Results: 32.8% of CXRs flagged for lung cancer were positive, 40.6% were negative, and 26.6% had other findings. Chi square test showed no significant difference between the two reporting groups in their ability to identify lung cancer on CXRs. 27% of CXRs flagged by the radiologists and 35% by the reporting radiographers were positive for lung cancer.

Conclusion: Reporting radiographers and radiologists are not statistically significantly different regarding their ability to identify lung cancer on CXRs and use the fast-track system. The fast-track system worked well, with 59.4 % accuracy rate in identifying a serious pathology, concluding that the system is good but could do better.

P028 New uses for old tools; evaluating 4DCT and 4DCBCT respiratory motion in lung SABR radiotherapy

John Rodgers; Sarah Tweedly; Sophie Wagstaff

The Christie NHS Trust

Background: Breathing induced motion of tumours is a significant source of uncertainty in lung SABR radiotherapy. 4DCT and 4DCBCT are routinely used for accurate delineation and treatment guidance, respectively. The aim of this work was to compare the difference in motion captured by the two modalities.

Method: Twenty lung patients were planned and treated with radical VMAT SABR radiotherapy. Planned motion was measured during radiotherapy planning. Two experienced therapy radiographers measured the respiratory motion of all lesions on #1 of treatment. The tumour was aligned at a set point within ITV on both the exhale and inhale phase. The difference between translation coordinates provided the estimated motion in all three planes as demonstrated by figure 1. The mean of each observer's registration was used to assess
motion.

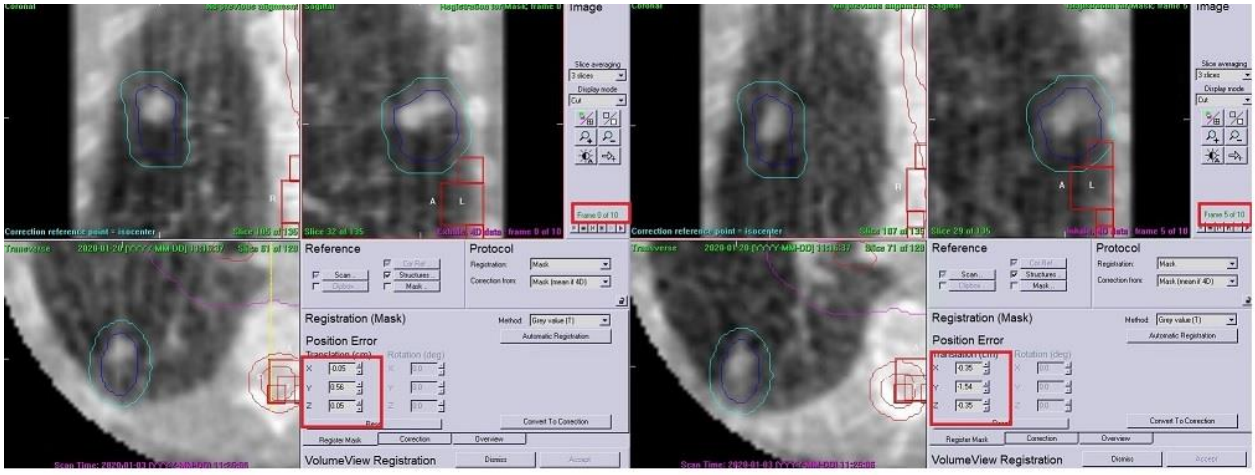
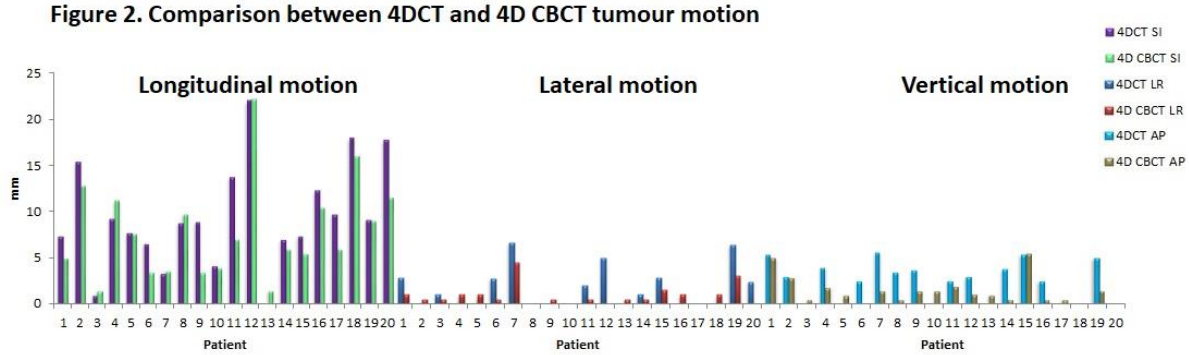


Figure 1. Estimating motion on 4D CBCT using inhale and exhale phases.

Results: Twenty 4DCT and 4DCBCT #1 images were compared. Figure 2 plots the range of motion between 4DCT and 4DCBCT in all three translational planes. Longitudinal motion demonstrated the greatest range of motion. Motion on 4D CBCT was reduced compared to 4DCT for 14 (70%) of patients. Although the magnitude of motion was less for other directions the results were similar regarding reduced motion on 4DCBCT; 14/20 patients (70%) in the lateral direction, 12/20 patients (60%) in the vertical
direction.

Figure 2. Comparison between 4DCT and 4D CBCT tumour motion



Conclusion: Results suggest target motion seen during treatment is less than estimated by 4DCT. Further investigation is required, however this innovative work raises the possibility to reduce departmental ITV-PTV SABR lung margins from from 5mm to 4/3mm and may have a direct impact on patient outcomes.

P029 Interobserver variability of the ATS/ERS/JRS/ALAT diagnostic CT criteria for idiopathic pulmonary fibrosis: A systematic review and meta-analysis

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Background: HRCT is a key element of the diagnostic process for idiopathic pulmonary fibrosis (IPF). The 2011 and 2018 ATS/ERS/JRS/ALAT guidelines sought to produce clear guidelines on the investigation, diagnosis and management of IPF (Raghu et al., 2018). We aimed to calculate through meta-analysis the interobserver variability of the ATS/ERS/JRS/ALAT criteria for diagnosis of IPF on HRCT.

Methods: The protocol for the review was registered with PROSPERO (CRD42022361803). We identified relevant original research papers via a search of Embase, Medline and Cochrane up to September 2022. Studies which calculated the interobserver agreement between chest radiologists using the ATS/ERS/JRS/ALAT diagnostic criteria were considered for inclusion. A modified version of the QUADAS-2 risk of bias tool was used for quality assessment of the included papers. Pooled kappa statistics for the 2011 and 2018 diagnostic criteria were calculated using a random effects model. Kappa values have been interpreted using the Landis and Koch classification (Landis and Koch, 1977).

Results: 8 studies (a total of 1,025 scans) were selected for inclusion in the analysis. One study was found to be at high risk of selection bias. There was an overall kappa value of 0.61 [0.51-0.71]. The 2011 guidelines had a kappa value of 0.55 [0.41-0.68], while the 2018 guidelines had a kappa value of 0.69 [0.57-0.81] (p = 0.13).

Conclusion: Our meta-analysis demonstrates substantial agreement between expert chest radiologists when using the ATS/ERS/JRS/ALAT criteria for the interpretation of HRCT scans. Furthermore, there is no significant difference in interobserver agreement between the 2011 and 2018 versions of the guidelines.

1. Landis, J.R. and Koch, G.G. (1977) 'The Measurement of Observer Agreement for Categorical Data', Biometrics, 33(1), pp. 159-174. Available at: https://doi.org/10.2307/2529310. 2. Raghu, G. et al. (2018) 'Diagnosis of Idiopathic Pulmonary Fibrosis. An Official ATS/ERS/JRS/ALAT Clinical Practice Guideline', American Journal of Respiratory and Critical Care Medicine, 198(5), pp. e44-e68. Available at: https://doi.org/10.1164/rccm.201807-1255ST.

UROradiolgy GI and Heptobiliary Poster Presentations

P030 A survey comparing radiographers' perception of pelvic projectional imaging of ambulatory and emergency patients

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University of Liverpool

Background: Achieving high quality radiographic images is imperative when imaging patients with suspected pelvic trauma Imaging patients on trolleys often poses challenges not experienced with mobile patients. Repeat analyses often show a high rate of repeats in pelvic imaging. Despite this, no empirical research has been conducted into the difference in confidence levels of practitioners undertaking these examinations.

Method: Following University ethical approval a survey was disseminated via email and social media to student and qualified radiographers in the UK and internationally. Respondents were asked a series of closed demographic questions, a Likert scale measuring confidence across the different examinations (anteroposterior (AP) and horizontal-beam lateral (HBL) using an X-ray table versus a trolley) and an open question to discuss their reasoning.

Results: 79% of the 67 total respondents agreed pelvis X-rays are repeated more often when imaging patients on trolleys. Overall confidence rates were lower for both HBL and AP examinations on trolleys when compared to using the X-ray table. Years of experience did not correlate with increased confidence concerning trolley imaging. Challenges associated with using standard X-ray equipment in trauma situations accounted for 53% of responses to the open question.

Conclusion: Regardless of experience, practitioners reported lower confidence in undertaking AP and HBL pelvis examinations on trolleys versus the X-ray table, mostly due to the challenges posed by the equipment available. The development of equipment specifically designed for emergency imaging combined with specific training regarding adapting practice for these situations could positively impact confidence and pelvic imaging accuracy.

P031 Current abdominal X-Rays practice in accident and emergency -- an audit

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Previous reviews revealed that abdominal x-rays (AXR) performed for the accident and emergency department (A+E), had low sensitivity, high rate of further imaging and non-alignment to the Royal College of Radiologists (RCR) justification guidelines. A single-site audit was performed to investigate the current practice.

An audit was performed at the largest A+E in Wales, in accordance with the RCR audit guidelines. All the AXR requests from A+E, regardless of the patient's age, within the 28 days period commencing 17th November 2021, were retrospectively assessed, excluding Non-A+E patients and abandoned examinations due to uncooperativeness.

The total number of AXR requests received by the A+E imaging department was 169, with 28/169 falling into the exclusion criteria.

Of the 141 included requests, five unjustified requests were correctly rejected; the remaining 136 requests were accepted and subsequently performed. Only 115/136 of these had justified indications. The most common justified and unjustified indications were obstruction and renal stones respectively. Additionally, 45/136 patients were referred for further imaging, mostly CT. Only 4% of reported AXR had non-foreign body abnormalities.

The small proportion of significant findings agreed with previous studies, suggesting a significant AXR overuse. Over 80% of non-compliant requests were performed, and awareness of the justification guidelines can be increased by clinical governance, posters, or an algorithm previously presented. The 32.4% further imaging rate, as opposed to the 73.7% reported previously, merits attention.

Stopping the overuse can minimise the dose received and relieve the pressure in imaging and reporting for patients who would have been benefited otherwise.

1. Artigas Martín, J. M., Martí de Gracia, M., Rodríguez Torres, C., Marquina Martínez, D., and Parrilla Herranz, P. (2015) Radiografía del abdomen en Urgencias. ¿Una exploración para el recuerdo? Radiología 57(5): 380-390. 2. Cobo, M. E., Vicente, A., Corres, J., Ana Royuela, and Zamora, J. (2009) Implementing a guideline for the request of chest and abdominal x-rays in nontrauma pathologic conditions in an ED. American Journal of Emergency Medicine 27(1): 76-83. 3. De Grood, A., Blades, K., and Pendharkar, S. R. (2016) A review of discharge-prediction processes in acute care hospitals. Healthcare Policy 12(2): 105. 4. Feyler, S., Williamson, V., and King, D. (2002) Plain abdominal radiographs in acute medical emergencies: an abused investigation? Postgraduate Medical Journal 78(916): 94-96. 5. Kaboli, P. J., Go, J. T., Hockenberry, J., Glasgow, J. M., Johnson, S. R., Rosenthal, G. E., Jones, M. P., and Vaughan-Sarrazin, M. (2012) Associations between reduced hospital length of stay and 30-day readmission rate and mortality: 14-year experience in 129 Veterans Affairs hospitals. Annals of internal medicine 157(12): 837-845. 6. Kellow, Z. S., MacInnes, M., Kurzencwyg, D., Rawal, S., Jaffer, R., Kovacina, B., and Stein, L. A. (2008) The role of abdominal radiography in the evaluation of the nontrauma emergency patient. Radiology 248(3): 887-893. 7. Kyriakides, J., Khamar, R., Lunat, R., and Khani, A. (2020) The Role of Abdominal Radiography in the Evaluation of the Nontrauma Emergency Patient. Conference Poster presented at the BIR Annual Congress 2020. 8. McEwan, S. (2020) Use of Abdominal X-Ray in the Emergency Department. Conference Poster presented at the BIR 2020 https://www.eposters.net/poster/use-of-abdominal-x-ray-in-the-emergency-department-. 9. Morris-Stiff, G., Stiff, R. E., and Morris-Stiff, H. (2006) Abdominal radiograph requesting in the setting of acute abdominal pain: temporal trends and appropriateness of requesting. The Annals of The Royal College of Surgeons of England 88(3): 270-274. 10. Mowlem, P. J., Gouveia, A., Pinn, J., and Hardy, M. (2019) The evaluation of compliance with iRefer guidelines for abdominal imaging and the impact of the normal abdominal radiograph on the clinical confidence and decision making of emergency clinicians. Radiography 25(1): 28-32.

P032 Clinical and imaging course of stricturing and penetrating Crohn's disease

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King Fahad Military Medical Complex

Background: and objective The natural history and behaviour of CD are highly heterogeneous. Even though the most common initial presentation of CD is purely uncomplicated inflammatory disease, within 10 years of diagnosis more than 70% of CD patients develop a stricturing or perforating complication. An overlap may exist between stricturing and penetrating disease. No accurate and specific predictor for intestinal fibrosis exists. Therefore, we sought to identify clinical and imaging course of such CD patients that might predict such complication.

Method: We retrospectively evaluated clinical and imaging records of CD patients who were diagnosed on imaging to have stenosing and penetrating (or fistulizing disease), in a period of last 10 years at our hospital in Dhahran. Clinical parameters like age of presentation, gender, smoking, weight loss more than 5 kg, location of disease, need for steroid, and use of dual therapy were recorded. Imaging findings of bowel involvement, mucosal pattern (stratification), with or without stenosis, mucosal enhancement (on CT or MR enterographies), and diffusion restriction (on MRE) were documented. Period of development of fistula in disease course was also recorded. Imaging was interpreted with 2 senior radiologists with more than 10 years of body imaging experience.

Results: 35 patients of stenosing (13) and penetrating (10) CD were found. Most of these were females. Early presentation age, use of steroids, more than 5 kg weight loss, active inflammation on stenosing disease and subacute bowel obstructions during hospital visits found in fistulae (7/10).

Conclusion: Certain clinical and imaging features can predict fibrostensing and penetrating CD.

Hou JK, El-Serag H, Thirumurthi S. (2009) Distribution and manifestations of inflammatory bowel disease in Asians, Hispanics, and African Americans: a systematic review. Am J Gastroenterol.104(8):2100-9. van Rijn KL, Lansdorp CA, Tielbeek JAW, Nio CY, Buskens CJ, D'Haens GRAM, Löwenberg M, Stoker J. (2020) Evaluation of the modified Van Assche index for assessing response to anti-TNF therapy with MRI in perianal fistulizing Crohn's disease. Clin Imaging. 59(2):179-187. Rabilloud ML, Bajeux E, Siproudhis L, Hamonic S, Pagenault M, Brochard C, Gerfaud A, Dabadie A, Viel JF, Tron I, Robaszkiewicz M, Bretagne JF, Bouguen G; (Groupe ABERMAD). (2022) Long-term outcomes and predictors of disabling disease in a population-based cohort of patients with incident Crohn's disease diagnosed between 1994 and 1997. Clin Res Hepatol Gastroenterol. 46(9):101974.

P033 The impact of a CT colonography advanced practice radiographer on a colorectal cancer diagnostic pathway in the DGH setting

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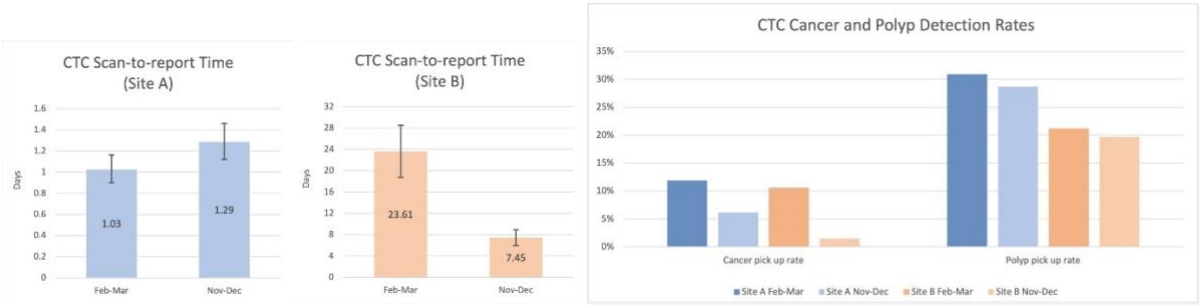
Background: CT Colonography (CTC) examinations reported by advanced practice radiographers (APRs) can achieve accuracy comparable with radiologists. The GIRFT Radiology report outlined faster reporting times as a clear benefit of developing radiographer reporting in certain imaging modalities (1). The impact of integrating an APR to a radiologist-only CTC service was explored in the district general hospital (DGH) setting.

Methodology: A retrospective audit was undertaken comparing two sites of a UK DGH. In Site A, CTCs were reported by a team of 2 radiologists and 1 APR and in Site B by 3 radiologists. Scan-to-report times for studies undertaken between February-March 2022 were recorded alongside cancer and polyp detection rates. By the end of 2022, the APR from Site A was partially assisting Site B with CTC reporting. The impact of this assistance on scan-to-report times on both services was recorded between November-December.



Results: During February-March 2022, Site A had a scan-to-report time of 1.03 days (± 0.13 95% CI) compared to site B: 23.61 (± 4.88 95% CI). The reporting time for Site B between November-December significantly improved to 7.45 (± 1.49 95% CI). There was no statistically significant impact on Site A's report time: 1.29 (± 0.17 95% CI). Volume of CTC was higher at site A, whilst Site B remained unchanged. Polyp detection rates were comparable, however cancer detection rates reduced at both sites. Conclusion: This study demonstrates that integration of an APR to report CTCs has time advantages both through internal recruitment and integration of cross-site service.

1. Halliday, K. et al. (2020) GIRFT Programme National Specialty Report, gettingitrightfirsttime.co.uk. Available at: https://gettingitrightfirsttime.co.uk/wp-content/uploads/2020/11/GIRFT-radiology-report.pdf

P035 Hepatic adenoma imaging characteristics on MRI - a pictorial presentation

Sachin Sivakumar

North West School of Radiology

Background: Hepatic adenomas (HA) are a benign liver tumour of uncommon prevalence. Histologically, these display well differentiated hepatocytes without bile ducts. Most classically, these occur in women of reproductive age, with further linked risk factors including oral contraceptives, obesity, androgen steroid administration, and familial adenomatous polyposis.1 HAs are classified into four subtypes according to the molecular and genetic biology - inflammatory (I-HA), hepatocyte nuclear factor 1 alpha (HNF-HA), beta catenin mutated (B-HA), and unclassified (U-HA).2 The modality of choice is MRI, in which recent research has made progress on identifying individual imaging traits.3

Purpose: The purpose of this pictorial poster is to provide a comprehensive summary of up-to-date information on the diagnosis and subsequent management of hepatic adenomas for the general imaging specialist.

Summary: This poster will explain the imaging characteristics of the different subtypes of HA on MRI, taking us primarily through identifying features of I-HA and HNF-HA. The characteristics of B-HA and U-HA are less well known, and may mimic hepatocellular carcinoma and necessitates referral for expert discussion. Distinguishing between these subtypes has crucial clinical implications, as they each have different predispositions to complications such as malignancy and haemorrhage. Whilst many of these focal liver lesions suspected to be adenoma will still require referral to the loco-regional MDT; if these conform to known imaging characteristics of the I-HA and HNF-HA - then the vast majority of these will be benign and can managed conservatively. This will help alleviate capacity, avoid unnecessary biopsy, and allow for enhanced patient care.

1. Chang, C.Y. et al. (2013) Changing epidemiology of hepatocellular adenoma in the United States: Review of the literature, International Journal of Hepatology, 2013, pp. 17. Available at: https://doi.org/10.1155/2013/604860.
2. Katabathina, V.S. et al. (2011) Genetics and imaging of Hepatocellular Adenomas: 2011 update, RadioGraphics, 31(6), pp. 15291543. Available at: https://doi.org/10.1148/rg.316115527.
3. Shreenath, A.P. and Kahloon, A. (2022) Hepatic Adenoma - StatPearls - NCBI Bookshelf, Hepatic Adenoma - Stat Pearls. Available at: https://www.ncbi.nlm.nih.gov/books/NBK513264/ (Accessed: February 12, 2023).

P036 Liver sabr motion management: eebh vs abdo compression vs free-breath case study

Sunita Mahto; Caroline Sisodia; Benjamin Taylor; Marina Khan

Guys and St Thomas Hospital NHS Foundation Trust

Background: The liver is significantly affected by respiratory motion, increasing the difficulty in treating liver tumours with focal therapies. This risks an increased size of radiotherapy target volume and reduced prescribed dose in order to keep the livers mean dose within safe limits. SABR accompanied with a motion management methods is the favoured method of treatment for HPB and liver mets. Motion management techniques can enable those with larger tumours, or those with large respiratory motion, to still be eligible for commissioned SABR. The aim here is to compare the volumetric PTV size and the Liver-GTV mean dose constraint for EEBH, Abdominal Compression and free-breath treatment techniques.

Purpose: 2 patients with Liver Mets. received 3 planning scan: * 1st Scan: EEBH * 2nd Scan: Free-breath (routine back-up for breath-hold scans, if EEBH is not achievable on-treatment) * 3rd Scan: Abdominal Compression Volumes and Plans were produced on all scans. PTV volume size and Liver-GTV mean dose constraint were evaluated. As expected the plan produced on EEBH scan was significantly smaller (approx. 50%) volumetrically and also met lower mean liver constraints. This was followed by abdominal compression and finally free-breath. These patients would have required a change in fractionation, or might have been deemed inappropriate for treatment, if motion management was not an option. EEBH is concluded to be the superior method of motion management in comparison to abdominal compression and free-breath, and should be the preferred method used.

Summary of content: Poster will include method, results, graph, images showing volume size and conclusion.

P037 Setting up a 177 Lu PSMA therapy (Vipivotide Tetraxetan) service: Challenge and lessons learnt

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Royal Liverpool University Hospital

Aim of the study: To draw inferences from our learning during the initial phase of introduction of 177 Lu PSMA therapy.

Material and Methods: There are several key legislative and licensing pre-requisites, including drug licensing, mechanism for re-imbursement, ARSAC approval, drugs and therapeutics committee approval amongst a few more permissions prior to setting up a radiolabeled therapy service. In our journey, we identified Champions from each discipline involved in the service including Nursing, Radiopharmacy, Medical Physics, Clinical, to name a few and had frequent meetings to address key issues. Patient selection is one of the key parameters and we wanted to ensure that the early group of patients were reasonably early in their cancer journey so that they could undergo the treatment regime without clinical deterioration. This patient selection invovles several discussions with the treating oncologists and the patients themselves. A few patients were excluded from the therapy due to them being unfit. We list our experience with the first 11 patients who were referred for 177 Lu PSMA therapy at our institute. In addition to clinical scenarios in these elderly patients of proven, treatment refractory metastatic disease we had to take care of multiple other aspects dealing with regulatory implications, logistical and technical support, radiation protection/shielding, radionuclide storage, administration, radioactive waste disposal, release of patient, readiness for handling of deceased person and involvement of other stakeholders in a multidisciplinary team setting.

Summary: We share our experience with setting up a Lu177 PSMA Therapy and hope that this will be useful for upcoming centres given the likely surge in theranostics treatments.

Herrmann K, Giovanella L, Santos A, Gear J et al. (2022). Joint EANM, SNMMI and IAEA Enabling Guide: How to Set Up a Theranostics Centre. Eur J Nucl Med Mol Imaging. 49(7):2300-2309.

P038 Comparison of initial image interpretation of appendicular radiographs by radiographers and emergency nurse practitioners: A single centre study using JAFROC

Emma Compton[1]; Keith Piper[2]; Lisa Pittock[2]; Nick Woznitza[3]

[1]Guys' and St.Thomas' NHS Foundation Trust; [2]Canterbury Christchurch University; [3]UCLH

Introduction: Independent preliminary radiograph interpretation has become a key aspect of Emergency Nurse Practitioners advanced practice within the UK. Image interpretation is taught to Radiographers, with it being a core competence to register with the HCPC. This study aimed to compare the initial image interpretation of appendicular trauma radiographs by ENPs and radiographers.

Methods: Twenty observers (ENP n=10, radiographers n=10) interpreted a test bank (n=32) of appendicular trauma images of a balanced design (normal n=16, abnormal n=16) with a range of findings including those of a subtle or discriminatory nature. Adult and paediatric imaging were included, with some common errors incorporated (for example, misinterpreted normal variants). Observer performance was analysed using jack-knife alternative free-response receiver operating characteristics and trends in misinterpreted radiographs collated.

Results: No apparent difference in the diagnostic accuracy of the ENPs and radiographers was found, Figure of Merit = 0.818 and 0.826 respectively (F=0.56, p=0.813). Results stratified by experience and percentage of time spent within an acute setting found no statistically significant difference. Whilst overall performance was similar, slight differences were found, ENPs demonstrating a higher sensitivity rate and radiographers a higher sensitivity rate (sensitivity 0.786, 0.750 and specificity 0.6, 0.693 respectively).

Conclusion: Initial image interpretation accuracy of ENPs and radiographers is similar. Whilst overall performance is similar, ENPs demonstrated a higher specificity rate with radiographers showing a higher sensitivity rate. A small sample size in this pilot study limits generalisability. Most common errors (paediatric interpretation) can be predicted. Findings support a collaborative approach to initial image interpretation.

1. Andrew, S. and Halcomb, E.J. (2007) 'Mixed methods research is an effective method of enquiry for community health research', Contemporary nurse, 23(2), pp. 145-153. 2. Benger, J.R. (2002) 'Can nurses working in remote units accurately request and interpret radiographs?', Emergency Medicine Journal, 19(1), pp. 68-70. 3. Berman, L., de Lacey, G., Twomey, E., Twomey, B., Welch, T. and Eban, R. (1985) 'Reducing errors in the accident department: a simple method using radiographers.', Br Med J (Clin Res Ed), 290(6466), pp. 421-422. 4. Brealey, S. and Scally, A.J. (2001) 'Bias in plain film reading performance studies', The British journal of radiology, 74(880), pp. 307-316. 5. Busby, L.P., Courtier, J.L. and Glastonbury, C.M. (2018) 'Bias in radiology: the how and why of misses and misinterpretations', Radiographics, 38(1), pp. 236-247. 6. Chakraborty, D.P. (2014) JAFROC [0]. Available at: (Downloaded: 01/12/2020). 7. Coleman, L. and Piper, K. (2009) 'Radiographic interpretation of the appendicular skeleton: A comparison between casualty officers, nurse practitioners and radiographers', Radiography, 15(3), pp. 196-202. 8. College of Radiographers (2013) 'Preliminary Clinical Evaluation and Clinical Reporting by Radiographers: Policy and Practice Guidance', . 9. Crouch, R. and Brown, R. (2018) 'Advanced clinical practitioners in emergency care: past, present and future', British journal of hospital medicine, 79(9), pp. 511-515. 10. Dinh, M., Walker, A., Parameswaran, A. and Enright, N. (2012) 'Evaluating the quality of care delivered by an emergency department fast track unit with both nurse practitioners and doctors', Australasian Emergency Nursing Journal, 15(4), pp. 188-194. 11. Free, B., Lee, G.A. and Bystrzycki, A. (2009) 'Literature review of studies on the effectiveness of nurses ability to order and interpret X-rays', Australasian Emergency Nursing Journal, 12(1), pp. 8-15. 12. Gaziano, T.A. (2007) 'Reducing the growing burden of cardiovascular disease in the developing world', Health affairs, 26(1), pp. 13-24. 13. Hardy, M., Flintham, K., Snaith, B. and Lewis, E.F. (2016) 'The impact of image test bank construction on radiographic interpretation outcomes: A comparison study', Radiography, 22(2), pp. 166-170. 14. Hardy, M. and Culpan, G. (2007) 'Accident and emergency radiography: A comparison of radiographer commenting and 'red dotting'', Radiography, 13(1), pp. 65-71. 15. Health and Care Professions Council (2013) Standards of Proficiency: Radiographers. HCPC. 16. Hunt, A. and Wright, C. (2015) 'Radiographer Preliminary Clinical Evaluation: a safe approach to reduce waiting times in Accident and Emergency?', . 17. IBM. SPSS [0]. Available at: (Downloaded: . 18. Jennings, N., Lee, G., Chao, K. and Keating, S. (2009) 'A survey of patient satisfaction in a metropolitan emergency department: comparing nurse practitioners and emergency physicians', International journal of nursing practice, 15(3), pp. 213-218. 19. Lancaster, A. and Hardy, M. (2012) 'An investigation into the opportunities and barriers to participation in a radiographer comment scheme, in a multi-centre NHS trust', Radiography, 18(2), pp. 105-108. 20. Liberman, D.B. and McCarthy, T.J. (2019) 'The cost of callbacks: return visits for diagnostic imaging discrepancies in a pediatric emergency department', Emergency radiology, 26(4), pp. 381-389. 21. Lockwood, P. and Pittock, L. (2019) 'Multi-professional image interpretation: Performance in preliminary clinical evaluation of appendicular radiographs', Radiography, . 22. Mabrook, A.F. and Dale, B. (1998) 'Can nurse practitioners offer a quality service? An evaluation of a year's work of a nurse led minor injury unit.', Emergency Medicine Journal, 15(4), pp. 266-268. 23. McConnell, J., Devaney, C., Gordon, M., Goodwin, M., Strahan, R. and Baird, M. (2012) 'The impact of a pilot education programme on Queensland radiographer abnormality description of adult appendicular musculo-skeletal trauma', Radiography, 18(3), pp. 184-190. 24. Nash, K., Zachariah, B., Nitschmann, J. and Psencik, B. (2007) 'Evaluation of the fast track unit of a university emergency department', Journal of Emergency Nursing, 33(1), pp. 14-20. 25. Neep, M.J., Steffens, T., Owen, R. and McPhail, S.M. (2014) 'A survey of radiographers' confidence and self-perceived accuracy in frontline image interpretation and their continuing educational preferences', Journal of medical radiation sciences, 61(2), pp. 69-77. 26. Obuchowski, N.A. (2000) 'Sample size tables for receiver operating characteristic studies', American Journal of Roentgenology, 175(3), pp. 603-608. 27. Overton-Brown, P. and Anthony, D. (1998) 'Towards a partnership in care: nurses' and doctors' interpretation of extremity trauma radiology', Journal of advanced nursing, 27(5), pp. 890-896. 28. Piper, K.J. and Paterson, A. (2009) 'Initial image interpretation of appendicular skeletal radiographs: a comparison between nurses and radiographers', Radiography, 15(1), pp. 40-48.

P039 Optimised bowel preparation processes for CT colonography

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University Hospitals Plymouth NHS Trust

Background: In CT colonography (CTC), a process involving multiple different manual steps across different departments was previously relied upon for the supply of Gastrografin bowel preparation to each patient. The previous convoluted process was identified as a frequent source of delay, impacting upon our ability to meet our internal targets for 2 week-wait cancer investigations (85% imaged within 10 days of request). As patients are now increasingly referred for cancer investigations after remote consultation, medications cannot be routinely provided at the point of clinic attendance. A robust pathway for supply of pre-imaging medications is vital to ensure no additional delay is introduced.

Methods: We used open-source software to automate a key part of the process. An emailed daily PDF provides details of all patients requiring bowel preparation for appointment allocated the previous day. Any potential contraindications to bowel preparation highlighted by the referrers are flagged for manual review. Making the service safer and more robust.

Results The new pathway has had the following benefits:

- Improved time to supply bowel preparation o Staffing shortages at key points are less likely to result in process blocking
- Improved booking staff satisfaction o Less manual intervention required means staff can focus on safety checks and communication with patients
- Reduced risk of human error o Any bugs are logged, investigated, and improved

Conclusion: Improved process efficiencies for supply of bowel preparation have improved the ability of our imaging department to perform CTC within the target time frame. At the beginning of this project internal compliance was at 0% and this project has improved this.

P040 Same-day staging CT for jaundice hotline patients with suspected Pancreatico-Biliary (PB) cancer

Nabih Hanbali; Amjad Chamsi Basha; Nang Thiri Phoo; Abeer Mohamed; Dushyant Shetty

Royal Cornwall Hospital

Background: Pancreatico-Biliary (PB) cancer has a high morbidity and mortality (Valle et al., 2016). The primary staging for PB cancer in our institution is a late arterial phase CT abdomen followed by a portal venous CT thorax, abdomen and pelvis. Prompt cross-sectional staging and MDT discussion makes a significant difference in this patient cohort. The initial intervention tends to be biliary decompression, this is essential in enabling ongoing care, whether pathway is palliative or curative.

Purpose: We implemented a same day staging CT service for patients presenting to the Jaundice Hotline Service at our hospital who were found to have biliary dilatation or a mass on index ultrasound imaging. This was then assessed by looking at the effect of same day CT service on time from index US to staging CT, first MDT discussion and first attempt at biliary decompression. The first six months following commencement of the service was compared with the six months immediately prior. All cases of non-malignant causes for acute jaundice on CT were excluded. The average time from index US to staging CT reduced from 16 days to 0, US to first MDT discussion from 20 days to 3 and US to first attempt at biliary decompression 20 days to 13.

Summary of content: A same day staging CT service for jaundiced patients found to have biliary dilatation and/or a mass on US significantly reduced waiting times to staging CT, MDT discussion and biliary decompression. Our intervention could be easily replicated in other departments, even with limited resources.

Valle, J.W. et al. (2016) 'Biliary cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up ?', Annals of Oncology, 27, pp. v28-v37. Available at: https://doi.org/10.1093/annonc/mdw324.

P041 Abdominopelvic actinomycosis - a review with cases

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Lancashire Teaching Hospitals

Background: Actinomycosis is a chronic suppurative bacterial infection, caused most commonly in humans by *Actinomyces israelii*. Actinomycosis can affect a number of different body systems, with 20% of infections occurring in the abdomen and pelvis, where the organism is endogenous in the mouth, gastrointestinal tract and female genital tract 1.

Actinomycosis can pose a diagnostic challenge for radiologists, often mimicking malignancy or other inflammatory processes. The hallmark of infection with this organism is extensive spread across fascial and connective tissue planes, with an enhancing inflammatory mass and abscess formation 1. As such, these findings on imaging should raise the suspicion of actinomycosis, as correct diagnosis can avoid unnecessary surgical intervention and ensure appropriate antimicrobial therapy is commenced in a timely fashion.

Purpose: This poster presentation aims to highlight the classical imaging features of abdominopelvic actinomycosis. Important diagnostic pitfalls will be demonstrated, enabling the radiologist to identify the key radiological aspects of this disease entity and how it differs from the conditions it often mimics.

Summary of content: Multimodality imaging of cases of colonic and pelvic actinomycosis are used to illustrate typical radiologic appearances, whilst drawing attention to potential diagnostic pitfalls.

1. Heo, S.H., Shin, S.S., Kim, J.W., Lim, H.S., Seon, H.J., Jung, S., Jeong, Y.Y. and Kang, H.K. (2014) Imaging of Actinomycosis in Various Organs: A Comprehensive Review. RadioGraphics **34**(1), 19-33.

P042 A study to explore the variation of treatment verification matching of magnetic resonance imaging (MRI) derived prostate clinical target volumes (CTV) using cone beam computed tomography (CBCT)

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Mount Vernon Cancer Centre

Background: Advancements in prostate radiotherapy will increasingly mandate the use of MRI-derived CTV's. Therefore, careful consideration will be required to ensure the improved accuracy of MRI CTV's is retained when verifying radiotherapy treatment using CBCT in the absence of fiducial surrogates.

Method: A retrospective review of 5 patients who received 36.25Gy in 5 fractions inclusive of pre-treatment MRI for target volume delineation were reviewed. 10 radiographers were equally split into cohorts of trained (TR) or no training (NTR). The difference in the image match shift values in 3D were calculated against a peer-reviewed gold standard. 1 radiographer in each of the groups also rematched the images a second time to explore intraobserver variation. Descriptive statistics were calculated, and the Kappa (k) test was used to analyse the agreement of results.

Results: An overview of the results can be found in figure 1. The standard deviation (SD) of the difference in match values were Vrt:0.11cm, Lng:0.09cm and Lat:0.03cm for both TR & NTR participants, with an interquartile range of <0.05. k-value between NTR & TR overall was 1.00 ($p<0.05$), however comparison in the long shift was -0.019 ($p<0.669$) suggesting poor agreement between TR&NRT. The SD for intraobserver variation was <0.3cm for both TR & NTR participants, with an interquartile range of <0.05.

Conclusion: The results indicate there was overall good agreement between groups suggesting CBCT can be adequate for treatment verification without fiducials for MRI-derived CTVs. Whilst the k-value for the long suggests poor agreement, this value was not significant.

P043 Diagnostic performance of Pi-radsv2.1 in detecting clinically significant prostate cancer on pre-biopsy Mpmri.:

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[1]Manchester University NHS Foundation Trust; [2]Newcastle upon Tyne Hospitals NHS Foundation Trust

Background: mpMRI prostate is the optimal diagnostic tool for prostate cancer. PIRADS was created to allow for a more structured and homogenous reporting system with the goal of improving prostate cancer detection on MRI. This

audit looked to evaluate the diagnostic performance of PI-RADSv2.1 in detecting clinically significant prostate cancer (CSPCa) on pre-biopsy mpMRI.

Methods: Retrospective analysis of 216 patients with pre-biopsy mpMRI, specifically assessing serum PSA concentration, MRI findings using PI-RADSv2.1, and subsequent histopathological biopsy outcomes.

Results: 66 patients were eligible with 80 lesions. Of these, 53% were CSPCa. Cancer detection rates of the PIRADS assessment categories on a patient level performed as expected, with higher PSA levels having higher cancer detection rates. Of the PI-RADS category 5 lesions, there was an 85% positive predictive efficiency for the detection of CSPCa. Of the PI-RADS category 3 lesions, only 15% had CSPCa, giving rise to a negative predictive value of 64%. Additionally, there was a clear disparity in PI-RADS v2.1 scores between patients with or without CSPCa in the PZ cores, indicating that PI-RADS V2.1 is valuable in identifying CSPCa in the PZ.

Conclusion: Our results confirmed that PI-RADSv2.1 is a valuable tool for CSPCa detection. The audit further demonstrated that PIRADS category 3 lesions in our institution was associated with a low CSPCa probability, for which routine surveillance would be a more pragmatic approach rather than targeted biopsy. Although PI-RADS v2.1 does not include management recommendations, these results affirm its value in the decision-making process, taking into consideration clinical markers such as PSA density.

1. Kubihal, V., Kundra, V., Lanka, V., Sharma, S., Das, P., Nayyar, R., & Das, C. J. (2022). Prospective evaluation of PI-RADS v2 and quantitative MRI for clinically significant prostate cancer detection in Indian men - East meets West. Arab journal of urology, 20(3), 126–136. 2. Muller BG, Shih JH, Sankineni S, et al. Prostate cancer: interobserver agreement and accuracy with the revised prostate imaging reporting and data system at multiparametric MR imaging. Radiology. 2015. Dec;277(3):741–750. 3. Oerther, B., Engel, H., Bamberg, F. et al. Cancer detection rates of the PI-RADSv2.1 assessment categories: systematic review and meta-analysis on lesion level and patient level. Prostate Cancer Prostatic Dis 25, 256–263 (2022). 4. Patel NU, Lind KE, Garg K, et al. Assessment of PI-RADS v2 categories ≥ 3 for diagnosis of clinically significant prostate cancer. Abdom Radiol. Internet]. 2018. Aug 31 cited 2018 Nov 2; 43:1807–1812. 5. Peng Y, Jiang Y, Yang C, et al. Quantitative analysis of multiparametric prostate MR images: differentiation between prostate cancer and normal tissue and correlation with gleason score–a computer-aided diagnosis development study. Radiology. 2013. Jun;267(3):787–796. 6. Rudolph, M.M., Baur, A.D.J., Cash, H. et al. Diagnostic performance of PI-RADS version 2.1 compared to version 2.0 for detection of peripheral and transition zone prostate cancer. Sci Rep 10, 15982 (2020). 7. Vos EK, Kobus T, Litjens GJS, et al. Multiparametric magnetic resonance imaging for discriminating low-grade from high-grade prostate cancer. Invest Radiol. 2015. Aug;50(8):490–497. 8. Wei C, Jin B, Szewczyk-Bieda M, et al. Quantitative parameters in dynamic contrast-enhanced magnetic resonance imaging for the detection and characterization of prostate cancer. Oncotarget. 2018. Mar 23 9(22):15997–16007. 9. Westphalen AC, McCulloch CE, Anaokar JM, et al. Variability of the positive predictive value of PI-RADS for prostate MRI across 26 centers: experience of the society of abdominal radiology prostate cancer disease-focused panel. Radiology. 2020; 296:76–84.

P044 Geographical variations in the diagnostic pathway of muscle invasive bladder cancer does it exist?

Rachel Hubbard[1]; Ruey Zhe Lim[1]; Veronika Kuenkel[2]; Lin Ling Xue[1]; Ines Robach[3]; Rehan Ahmed[1]; Muneeb Qureshi[1]; Steve Kennish[1]; James Catto[3]; Syed Hussain[3]

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Background: Muscle Invasive bladder cancer (MIBC) comprises approximately 25% of bladder cancers and is associated with significant morbidity and mortality. There is 36%, 1 year survival if the patient presents with metastatic disease. Delayed MDT review of imaging and histology can delay treatment onset with adverse prognostic impact. In our region (South Yorkshire), referrals from four DGHs (are discussed centrally at Royal Hallamshire (RHH). We aim to assess whether there are geographical variations in healthcare within these hospitals resulting in an adverse impact on prognosis for the patient.

Methods: Retrospective audit of all patients referred to a regional tertiary uro-onclogy MDT. Two years data 01/01/19- 31/12/19(pre covid) and 01/04/21- 31/3/22 (post covid) was analysed including time from diagnostic staging to MDT, oncology clinic/ treatment and outcomes.

Results: 505 patients with suspected bladder cancer were discussed pre covid (44 excluded as referred without imaging) 152 RHH, 304 DGH, 443 post covid (23 excluded as no imaging) 145 RHH, 273 DGH. Average time (days) from CT scan to MDT were 37 RHH (SD 25), 40 DGHs (SD 31) (2019) and 35 RHH and 45 DGHs (2021/2022). One external site compared to central RHH took significantly more time from scan to MDT (68 days compared to 34). P value of 0.01 for post covid data set.

Conclusions: There is evidence of geographical disparities in health care with external smaller cities taking longer (in one case) double the time frame from initial imaging to central MDT discussion which can cause delays in oncology/radical treatment.

P047 Multi- disciplinary treatment of a rare prostatic sarcoma in a dog

Sharyn Bray; Gerard McLauchlan

AURA Veterinary

Background: A 4 year old Male (entire) Labrador Retriever presented with faecal tenesmus and abdominal distension of 2 weeks duration. A large cystic mass associated with the prostate gland was identified on ultrasound and CT; a prostatic inclusion cyst was suspected. This was managed by partial resection and omentalisation of the cyst, combined with castration and sub-total prostatectomy. Unexpectedly, histologic analysis of the prostatic tissue revealed a prostatic fibrosarcoma. Systemic chemotherapy with doxorubicin was started. Prostatic embolisation was also performed. Vascular access via the right carotid artery enabled selective angiography of the prostatic artery. Polyethylene-glycol microspheres were slowly injected under fluoroscopy guidance. Angiography confirmed complete statis of the left prostatic vasculature. Repeated CT imaging revealed a residual prostatic mass without distant metastasis. A second doxorubicin treatment was given. Unfortunately, 105 days after initial presentation, the dog was admitted as an emergency. Abdominal ultrasound demonstrated progression of the caudal abdominal tumour. The owners decided on humane euthanasia. Sarcoma of the prostate is rare in the dog. This is similar to humans, where prostatic sarcoma may account for only <0.1% of all primary prostatic cancers. Purpose This case report describes treatment of a rare cancer variant of the prostate in a dog. Although the prognosis of this tumour-type is universally poor, a multi-disciplinary approach in this case provided the dog with an excellent quality-of-life.

Summary of content The poster will summarise the clinical details of this case. Illustrations will include CT images and fluoroscopic images revealing the successful embolisation of the prostate gland.

Ding, B et al (2021) Adult primary prostate sarcoma: A multi-centre cohort study and comparison between Chinese and American cases. Asian J Surg **44**(1), 247-253

P048 Pictorial review of incidental findings in multiparametric prostate MRI

Kiran Lingaraju; Deepak Pai

Northern Lincolnshire and Goole NHS trust

Incidental findings are common in imaging. Although many of these findings are benign in nature and will not change patient management, around 5-10% of these are clinically significant and hence affect patient management and outcomes. We present here variety of clinically significant incidental findings identified in our routine imaging done for prostate.

P049 Audit of incidental findings in multi-parametric MRI of prostate

Kiran Lingaraju; Deepak Pai

Northern Lincolnshire and Goole NHS trust

Incidental findings are fairly common in imaging. Approximately 5-10 % of these are clinically significant (1, 2). We did a institutional review of 1300 MRI prostate examinations done in the year 2021. Studies with clinically significant incidental findings were referred appropriately and followed up. Although varies studies have reported up to 60% incidental findings, we have identified and referred only clinically significant findings which would affect patient management and outcomes. We had 6% significant incidental findings. Out of which, 93% have been actioned upon with 37% cases being other organ neoplasm. Hence it is important to actively look for incidental findings and act upon them to have better patient outcomes.

1. Sherrer RL, Lai WS, Thomas JV, Nix JW, Rais-Bahrami S. Incidental findings on multiparametric MRI performed for evaluation of prostate cancer. Abdom Radiol (NY). 2018 Mar;43(3):696-701. doi: 10.1007/s00261-017-1237-x. PMID: 28677001; PMCID: PMC8983105. 2. Yee J, Sadda S, Aslam R, Yeh B. Extracolonic findings at CT colonography. Gastrointest Endosc Clin N Am. 2010 Apr;20(2):305-22. doi: 10.1016/j.giec.2010.02.013. PMID: 20451819.

P051 What is the benefit of MR guided radiotherapy for Gastric MALT lymphoma?

Joseph Drabble; Ben George; Sara Mallandain; Andy Gaya; Ebison Chinherende; veni Ezhil

GenesisCare

Background: As the stomach is a deformable organ, a large planning target volume (PTV) margin is required with gastric mucosa-associated lymphoid tissue (MALT) lymphoma treatments to account for shape variation in conventional radiotherapy. This study assessed the benefits of using MR-guided radiotherapy (MRgRT) for these patients.

Method: The clinical Target volume (CTV) and nearby organs at risk (OARs) contours were manipulated each fraction to account for interfractional changes. Treatment plans were then re-optimised and adapted based on anatomical changes for each fraction. Predicted vs adapted plan statistics were used to assess the benefit of plan adaption. Intrafractional imaging was recorded through 2D MRI cine imaging and treatment was delivered through shallow inspiration breath hold with an 8mm gating boundary. Each fractional verification image was retrospectively fused to the baseline simulation to determine the total PTV margin size that would have been required to cover the CTV in all fractions.

Results: Adapted re-optimised plans achieved PTV dose criteria in all fractions. Predicted results of fractional anatomical changes without plan adaption showed all 12 fractions would not have achieved the PTV dose criteria. Four fractions required intrafractional interventions due to stomach variational changes during a treatment. The fractional average (± SD) CTV volume was 225cc ± 27cc compared to 260cc at baseline. A uniform total PTV margin of 2.7cm was required to cover the CTV volumes in all fractions.

Conclusion: MRgRT plan adaption of OAR contours and dose optimisation allowed for a smaller of PTV margins compared to conventional radiotherapy.

P052 Audit of ultrasonography findings in cases of abnormal magnetic resonance cholangiopancreatography (MRCP)

John Kelliher; Clare Roche

Galway University Hospital

Background: Royal College of Radiologists (UK) suggests 90% of cases with extrahepatic dilatation on a magnetic resonance cholangiopancreatography (MRCP) should be identified on a preceding ultrasound and 100% of ultrasound reports should have a specific comment referring to either the presence or absence of dilatation with an appropriate recommendation for further imaging or referral if the cause is not identified.

Methods: All patients who had an MRCP showing extrahepatic dilatation with a preceding abdominal ultrasound in the previous month between 10/07/2021 to the 10/10/2022 were included. Data was collected from hospital imaging software in a single institution.

Results: 105 patients were included in this study. In MRCP-confirmed extrahepatic dilatation, 77% (81/105) of abdominal ultrasounds performed in the previous month also identified dilatation. In the ultrasound reports, 87% (91/105) had commented on the presence or absence of extrahepatic dilatation. When the cause for extrahepatic dilatation was not identified, 56% (41/74) had an appropriate recommendation for further imaging or referral in the report.

Conclusion: Target percentage for detection of extrahepatic dilatation by ultrasound was not reached which suggests common bile duct dilatation may be overlooked on ultrasound. While the majority of ultrasounds had commented on the presence or absence of extrahepatic dilatation it was still below the target of 100%. Finally, only 56% of ultrasounds included further recommendations in the report when dilatation was identified without a cause. Imaging is essential for the management of patients but requires adequate communication of findings.

Audit of ultrasonography findings in cases of abnormal MRCP. The Royal College of Radiologists. Available at: https://www.rcr.ac.uk/audit/audit-ultrasonography-findings-cases-abnormal-mrcp (Accessed: February 11, 2023).

PAEDIATRICS POSTER PRESENTATIONS

P053 Paediatric neurogenic bladder caused by abnormal ossification of the sacrum: MR imaging findings

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

Background: The sacrum develops from 60 ossification centers, which ossify and fuse from the fetal period to the age of 30 years. Bony aberrations including unfused, partially or completely fused ossification centers may occur involving both the primary and secondary ossification centers. We describe a paediatric case where asymmetric, abnormal maturation of the sacrum was responsible for the development of neurogenic bladder.

Purpose: A 2-year-old male with recurrent episodes of urinary tract infection underwent MRI of the brain and spinal cord for investigation of the cause of symptoms. Careful evaluation of the sacrum disclosed multiple unfused ossification centers in the costal process of S1 vertebra. A cleft was formed between the costal process and sacral centrum. The exiting ventral S1 nerve was entrapped by abnormal sacral bony segments that exerted pressure on the nerve. Neural arch was fused to both costal processes. To decompress the offended nerve, surgical excision of redundant bone was performed along with mechanical release of S1 nerve and the symptoms improved promptly.

Summary of content: In children, neurogenic bladder occurs in association with spina bifida (myelomeningocele), cerebral palsy, or sacral agenesis. Neural entrapment of sacral nerve(s) due to abnormal maturation of the sacrum (developmental anatomic abnormality) as in this patient, to our knowledge, has not been described before and deserves reporting as an additional and challenging cause of paediatric neurogenic bladder. MRI proved indispensable for visualization of the sacral nerve itself and the documentation of sacral neuropathy accountable for neurogenic bladder and related urinary tract infections.

1. Cardoso H, Pereira V, Rios L (2014). Chronology of fusion of the primary and secondary ossification centers in the human sacrum and age estimation in child and adolescent skeletons. Am J Phys Anthropol 153(2): 214-252 . 2. Broome DR, Hayman L, Herrick R, Braverman R, Glass R, Fahr L (1998). Postnatal maturation of the sacrum and coccyx: MR imaging, helical CT, and conventional radiography. AJR Am J Roentgenol 170(4):1061-1066.

P054 A narrative review of EOS and projectional radiographic imaging in adolescent idiopathic scoliosis

Alex Lacken; Mudasser Panchbhaya

University of Liverpool

Background: Adolescent idiopathic scoliosis (AIS) patients receive ongoing projectional radiographic spinal imaging throughout their treatment during the time they are most susceptible to cancers from ionising radiation increasing their carcinogenic risks. The EOS system can significantly reduce dose in spinal imaging but is expensive to implement and the quality is comparable to projectional imaging. The aim of this review was to compare the image quality, radiation dose burden and costs of traditional projectional radiographic imaging and the EOS system.

Method: A narrative review of literature was undertaken, utilising medical databases such as Ovid Medline, Scopus, CINAHL, with specific search terms and Boolean operators. Prisma and CASP tools were used to appraise literature from the last ten years.

Results: Image quality is comparable between projectional imaging and EOS system images. The accuracy is dependent on protocols used within the EOS system. Radiation dose is significantly reduced to patients when using EOS system. There may be additional risk factors to scoliosis patients genetically linked to certain cancers. Although the cumulative dose of an adolescent patient is claimed to be under the threshold for IR(ME)R legislation, this is based on adult safety levels and does not consider patient age. Furthermore, research beyond the UK shows with a matched population AIS patients are five times more likely to develop cancer.

Conclusion: The EOS system could significantly reduce cancer risk in patients with AIS, with further research needed to be compare cost effectiveness and cancer risks in a matched population in the UK.

P055 A narrative review of paediatric magnetic resonance imaging (mri) scan completion rates, cost effectiveness, time efficiency and patient experience, when comparing general anaesthesia and sedation to alternative strategies in relieving patient anxiety

Ellie-Mae Smith; Colette Bennion

University of Liverpool

Background: Sedation and general anaesthesia (GA) are commonly used for children, too anxious to undergo awake magnetic resonance imaging scan (MRI). However, they pose further health risks to children and not all are tolerant to GA as a method of intervention. It is important to review alternative strategies to allow for successful scan completion of all children and reduce additional health risks. The aim of this study is to review strategies that could be used in terms of scan completion rates, cost effectiveness, time efficiency and patient experience.

Method: Literature was gathered from Scopus, MEDLINE and Google Scholar databases, using the most appropriate search terms. These were combined and replaced using the 'BOOLEAN' operators 'AND' and 'OR'. Duplicates were removed and papers were assessed for eligibility against suitable exclusion and inclusion criteria. This aimed to assess the currency of the literature and whether it addressed the research question and target population.

Results: The most interactive strategies (mock scanning, kitten scanning, virtual reality (VR) and artificial intelligence (AI) apps) are >80% successful when comparing scan completion rates and are enjoyed by paediatric patients; however, these strategies have also proven to be the most expensive and often time consuming.

Conclusion: With the current financial pressures on the National Health Service (NHS), investment of alternative strategies to GA and sedation, at present, cannot happen until 100% conclusive. If the NHS were to invest, the most successful, cost effective, time efficient and well-liked strategy by paediatrics was the use of AI app intervention.

P056 Paediatric abdominal ultrasound appearances in acute hepatitis patients in a tertiary paediatric hospital

Lorraine Walsh; Zishan Sheikh; Chayarani Kelgeri

Birmingham Women's and Children's Hospital

Background: There has been an increase in reports of acute hepatitis of unknown cause in children. Abdominal ultrasound including Doppler assessment (UABDO) is the first line imaging modality for paediatric patients with acute liver pathology. We aim to present our UABDO findings in a series of children with hepatitis referred to a single paediatric liver-transplantation centre between January 1st and July 24th 2022.

Method: A retrospective cohort of children (< 16 years old) with hepatitis meeting the U.K. Health Security Agency case definition for acute non-A-E hepatitis were identified from a local hepatology case list (UK Health Security Agency, 2022). Further blood tests enabled differentiation of acute hepatitis (AH) from cases of acute on chronic hepatitis (ACH). The images and reports from admission US exams of each patient were reviewed by a consultant sonographer and radiologist.

Results: A total of 24 children were included, of which 17 had AH and 7 had ACH. The median age was 5 years and male to female ratio was 1.4. The most common findings seen were a heterogenous liver echotexture in 75% (82% AH v 57% ACH), gallbladder wall thickening in 54% (71% AH v 14% ACH), splenomegaly in 46% (29% AH v 85% ACH) and hepatomegaly in 42% (41% AH v 43% ACH).

Conclusion: US findings in cases of acute hepatitis are described to assist clinical teams assessing children with AH and ACH. The aim is to raise awareness and improve US imaging technique and reporting.

1. UK Health Security Agency. (2022) Investigation into acute hepatitis of unknown aetiology in children in England. Technical briefing 4. London: UK Health Security Agency.

P057 Evaluating the role of diagnostic imaging in the diagnosis and management of a paediatric rhabdoid tumour of the neck - case study

Claire Evans

Birmingham Children's Hospital

Background: Making an accurate diagnosis of paediatric soft tissue tumours requires a combination of diagnostic imaging tests, each chosen for its ability to provide specific information about different aspects of the patient's condition. Each imaging modality has its own advantages and disadvantages, and it is important to remember that no single imaging test can provide all the data required for a thorough evaluation.

Purpose: Evaluating and diagnosing a soft tissue neck mass can be a multi-step process that involves considering the patient's symptoms, medical history, and physical examination results, as well as conducting various diagnostic imaging tests. This is a complex case study is of a 1-year-old female who presented with a large neck swelling which when diagnosed was a malignant Rhabdoid tumour of the left neck and base of skull. The tumour was complex and in a difficult location, encasing the carotid artery, making the patient not viable for surgery and underwent a variety of diagnostic imaging at our hospital. The patient experienced multiple complications throughout her time with us, including a venous thrombus of her internal jugular vein, left venous occipital infarct, volume loss in the cerebellar and eventually developed intracranial disease of hydrocephalus with evidence of leptomeningeal spread of disease and paralysis of vocal cords and larynx.

Summary of content: This poster will show how a variety of diagnostic imaging including ultrasound, CT and MRI was used to help with a prompt diagnosis and aid the patient's clinical treatment and management of a malignant rhabdoid tumour.

1.Bansal, A. G., Oudsema, R., Masseaux, J. A. & Rosenberg, H. K., 2018. US of Pediatric Superficial Masses of the Head and Neck. RadioGraphics, Volume 38, pp. 1239-1263. 2.Barbeito, S. et al., 2022. Post-Traumatic Neck Mass in a Pediatric Patient. Ear, Nose & Throat Journal, 101(1), pp. 40-41. 3.Clinical Imaging Board, 2016. BMUS Guidelines - Patient Identification: guidence and advice, Medical Ultrasound Examination. [Online] Available at: https://www.bmus.org/policies-statements-guidelines/professional-guidance/clinical-protocols/ [Accessed 8th May 2022]. 4.D'Arco, F. & Ugga, L., 2022. Pearls, Pitfalls, and Mimics in Pediatric Head and Neck Imaging. Neuroimaging Clinics of North America, 32(2), pp. 433-445. 5.Gov-Ari, E. & Hopewell, B. L., 2015. Correlation between pre-operative diagnosis and post-operative pathology reading in pediatric neck masses - A review of 281 cases. International Journal of Pediatric Otorhinolaryngology, Volume 79, pp. 2-7. 6.Junn, J. C., Soderlund, K. A. & Glastonbury, C. M., 2021. Imaging of Head and Neck Cancer with CT, MRI, and US. Seminars in Nuclear Medicine, 51(1), pp. 3-12. 7.Kim, W. H. et al., 2020. Ultrasound of Pediatric Superficial Soft Tissue Tumours and Tumour-Like Lesions. Korean Journal of Radiology, 21(3), pp. 341-355. 8.Koch, B. L., 2005. The child with a neck mass. Applied Radiology, Volume August, pp. 8-22. 9.Levine, M. C. et al., 2019. The use of point of care ultrasound in the evaluation of pediatric soft tissue neck masses. Americal Journal of Emergency Medicine, Volume 37, pp. 1466-1469. 10.Littooij, A., Ravesloot, C. & Beek, E., 2016. Radiology Assistant. [Online] Available at: https://radiologyassistant.nl/head-neck/neck-masses/neck-masses-in-children [Accessed 6th February 2023]. 11.Moretti, G. et al., 2010. Rhabdomyosarcoma of the head and neck: 24 cases and literature review. Brazilian Journal of Otorhinolaryngology, 76(4), pp. 533-7. 12.NHS Trust, 2022. s.l.:s.n. 13.Riva, G. et al., 2019. Pediatric neck masses: how clinical and radiological features can drive diagnosis. European Journal of Pediatrics, Volume 178, pp. 463-471. 14.Robson, C. D., 2010. Imaging of head and neck neoplasms in children. Pediatric Radiology, Volume 40, pp. 499-509.

OBS & GYNAE POSTER PRESENTATIONS

P059 Inclusive pregnancy status in a radiotherapy setting - implementation and evaluation

Natasha Parkin

Lancashire Teaching Hospitals NHS Trust

Background: Discussing pregnancy status can be a sensitive subject, specifically for patients with a cancer diagnosis, who may have existing or treatment related infertility1. The UK has 5-600,000 people who identify as transgender, gender diverse or intersex, which also challenges discussions surrounding pregnancy2. In light of this, the Ionising Radiation (Medical Exposure) Regulations (IR(ME)R) were updated in 2017 to include gender neutralised language and pregnancy checking prior to exposure for all patients aged 12-55 years regardless of gender3. The 2021 Society of Radiographers' (SoR) inclusive pregnancy status (IPS) guidelines recommended radiographers apply it in a sensitive, educationally informed manner2.

Method: In this presentation, we share findings and reflections relating to the local implementation of the SoR IPS guidelines, considering radiation safety and cultural responsibility. Impacts on patient care and staff education, ascertained from staff feedback questionnaires prior to and 6 months after implementation, will be discussed.

Results: Staff reported experiencing emotional and professional benefit from the changes and patients have welcomed the updated and improved conversations. Certain points from the training have enhanced a positive

culture within the staff team, with evidence of self-policing and collaborative sense making through informal discussion. Training has now been included as part of induction programmes.

Conclusion: Changing processes around inclusive pregnancy status has had positive benefits for staff, patients and departmental culture. The IPS process enables staff to use clinical judgement and perform patient centred care. Moving forward, IPS should be adopted as Trust policy, in line with IR(ME)R guidelines and patient experience.

1. Covelli et al. (2019). Clinicians Perspectives on barriers to discussing infertility and fertility preservation with young women with cancer. JAMA network open. vol. 2(11). https://10.1001/jamanetworkopen.2019.14511

2. The Society of Radiographers. (2021). Inclusive pregnancy status guidelines for ionising radiation: Diagnostic and Therapeutic Exposures. www.sor.org/Inclusive-Pregnancy-Status-Guidelines-for-Ionising-Radiation_LLv2, accessed 26.01.2023

3. UK Government. (2017) The Ionising Radiation (Medical Exposure) Regulations 2017. No. 1322. www.legislation.gov.uk/uksi/2017/1322/contetns/made. accessed 26.01.2023

P060 Aetiology of sub-chorionic haemorrhage: A narrative review

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Background: Sub-chorionic haemorrhage (SCH) refers to an area of bleeding located adjacent to the gestation sac and is commonly identified during ultrasound assessment of pregnancies. There is a disparity of opinion surrounding the risk SCH poses to pregnancies and the ultrasound features of SCH which may correlate with degree of risk. Much of the recent evidence base however fails to consider the aetiology of SCH, with poor consensus on what the leading cause of SCH may be.

Method: A narrative review was conducted, encompassing papers from 2012-2023. Multiple databases were searched such as CINAHL, PubMed, SAGE and Medline to enable a broad search. Key terms were chosen using an adapted PICO framework. Inclusion and exclusion criteria were applied; 7 papers were identified. Snowballing identified a further two papers, both of which were dated but were seminal pieces of research. Mind-mapping was used to identify themes to frame the research question, and a CASP tool was used to review the 9 papers.

Results: Four potential aetiologies were identified from the review: particular IVF protocols, presence of autoantibodies or similar immunological factors, thrombophilia or similar coagulation deficiencies and detachment of the chorionic membrane from the uterine wall.

Conclusion: The review identified the urgent need for future studies to examine more thoroughly each of the four potential aetiologies, in isolation and in combination, to determine the true aetiology of SCH and to ensure that those in the high-risk groups are clinically managed with greater surveillance in the future.

1. Asato et al (2014). Subchorionic hematoma occurs more frequently in in-vitro fertilisation pregnancy. Obstetrics and Gynecology and Reproductive Biology, 181(1), 41-44. 2. Chen, et al. (2013). Placental mesenchymal dysplasia associated with antepartum haemorrhage, subchorionic hematoma and intrauterine growth restriction. Taiwanese Journal of obstetrics and gynaecology, 52(1), 154-156. 3. Li et al. (2021) Autoantibodies in association with subchorionic haematoma in early pregnancy. Annals of Medicine, 53(1), 841-847. 4. Reich et al (2020). Comparison of subchorionic hematoma in medicated or natural single euploid frozen embryo transfer cycles. Fertility & Sterility 114(3), 595-600. 5. Truong et al. (2016) are increased in early pregnancy in women taking low-dose aspirin. Fertility and Sterility, 105(5), 1241-1246. 6. Wyand et al (2017). Association of retroplacental blood with basal plate myofibres. Paediatric and development pathology, 21(4). 7. Xiang et al (2014). Clinical significance of first trimester intrauterine haematomas detected in pregnancies achieved by IVF embryo transfer. Reproductive biomedicine online, 29(1), 445-451.

P061 Can miscarriage be accurately predicted in early pregnancy using transvaginal ultrasound parameters?

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Background: Ultrasound is often the first line of investigation when evaluating early pregnancy. Current NICE guidelines regarding confirmation of miscarriage are restrictive and can often mean that the first ultrasound scan is inconclusive leading to increased stress for patients and further scans and investigations. There have been several studies undertaken to evaluate the ultrasound parameters that can predict miscarriage that have the potential to be used in clinical practice allowing better counselling of patients regarding their risk of pregnancy loss.

Method: A systematic literature search as undertaken using PubMed and Science Direct including literature published from 2012 to 2022. Inclusion and exclusion criteria were applied and any literature suitable for inclusion was critically appraised using the CASP framework.

Results: Mean sac diameter, crown-rump length, yolk sac diameter and embryonic/fetal heart rate can be used to predict pregnancy loss. Multivariate predictive models combining these parameters demonstrated a sensitivity of 72.5% and specificity of 98.4% suggesting that they may prove useful in clinical practice however; these would need to be evaluated on a larger scale in multicentre trials to improve validity.

Conclusion: Multivariate predictive models using ultrasound parameters can predict miscarriage with a good degree of accuracy and could be used in clinical practice to facilitate better counselling of patients.

1. Abuelghar, W.M., Fathi, H.M., Ellaithy, M.I. and Anwar, M.A. (2013) 'Can a smaller than expected crown-rump length reliably predict the occurrence of subsequent miscarriage in a viable first trimester pregnancy?', The journal of obstetrics and gynaecology research; J Obstet Gynaecol Res, 39(10), pp. 1449-1455. doi: 10.1111/jog.12082.
2. Ashoush, S., Abuelghar, W., Tamara, T. and Aljobboury, D. (2016) 'Relation between types of yolk sac abnormalities and early embryonic morphology in first-trimester missed miscarriage', The journal of obstetrics and gynaecology research; J.Obstet.Gynaecol.Res, 42(1), pp. 21-28. doi: 10.1111/jog.12837.
3. Bogers, H., Rifouna, M., Overbeek, T., Koning, A., Willemsen, S., van der Spek, P., Steegers - Theunissen, R., Exalto and Steegers, E. (2019) 'First trimester physiological development of the fetal foot position using three-dimensional ultrasound in virtual reality', The journal of obstetrics and gynaecology research; J Obstet Gynaecol Res, 45(2), pp. 280-288. doi: 10.1111/jog.13862.
4. Bottomley, C., Van Belle, V., Kirk, E., Van Huffel, S., Timmerman, D. and Bourne, T. (2013) 'Accurate prediction of pregnancy viability by means of a simple scoring system', Human reproduction (Oxford); Hum Reprod, 28(1), pp. 68-76. doi: 10.1093/humrep/des352.
5. Carlson, B.M. (2019) Human embryology & developmental biology. sixth edition edn.
6. Critical Appraisal Skills Programme (2017) CASP Cohort Study Checklist. Available at: http://docs.wixstatic.com/ugd/dded87_5ad0ece77a3f4fc9bcd3665a7d1fa91f.pdf (Accessed: 13October 2021).
7. Chu, J., Hardy, P., Beeson, L. and Coomarasamy, A. (2020) 'What is the best method for managing early miscarriage?', BMJ; BMJ, 368, pp. l6438. doi: 10.1136/bmj.l6438.
8. Chudleigh, P. and Thilaganathan, B. (2004) Obstetric ultrasound: how, why and when. 3rd edn. Edinburgh: Churchill Livingstone.
9. Chudleigh, P., Smith, A. and Cumming, S. (2017) Obstetric and gynaecological ultrasound: how, why and when. Edinburgh: Elsevier.
10. Datta, M.R. and Raut, A. (2017) 'Efficacy of first-trimester ultrasound parameters for prediction of early spontaneous abortion', International journal of gynecology and obstetrics; Int J Gynaecol Obstet, 138(3), pp. 325-330. doi: 10.1002/ijgo.12231.
11. Detti, L., Francillon, L., Christiansen, M.E., Peregrin-Alvarez, I., Goeske, P.J., Bursac, Z. and Roman, R.A. (2020a) 'Early pregnancy ultrasound measurements and prediction of first trimester pregnancy loss: A logistic model', Scientific reports; Sci Rep, 10(1), pp. 1545. doi: 10.1038/s41598-020-58114-3.
12. Detti, L., Roman, R.A., Goedecke, P.J., Christiansen, M.E., Peregrin-Alvarez, I., Ikwuezunma, G. and Francillon, L. (2020b) 'Pilot study establishing a nomogram of yolk sac growth during the first trimester of pregnancy', The journal of obstetrics and gynaecology research; J Obstet Gynaecol Res, 46(2), pp. 223-228. doi: 10.1111/jog.14173.
13. DeVilbiss, E.A., Mumford, S.L., Sjaarda, L.A., Connell, M.T., Plowden, T.C., Andriessen, V.C., Perkins, N.J., Hill, M.J., Silver, R.M. and Schisterman, E.F. (2020) 'Prediction of pregnancy loss by early first trimester ultrasound characteristics', American Journal of Obstetrics and Gynecology; Am J Obstet Gynecol, 223(2), pp. 242.e1-242.e22. doi: 10.1016/j.ajog.2020.02.025.
14. Doubilet, P.M., Phillips, C.H., Durfee, S.M. and Benson, C.B. (2022) 'Fourfold Improved Odds of a Good First Trimester Outcome Once a Yolk Sac Is Seen in Early Pregnancy', Journal of ultrasound in medicine; J Ultrasound Med, . doi: 10.1002/jum.15971.
15. Doubilet, P.M., Phillips, C.H., Durfee, S.M. and Benson, C.B. (2021) 'First-Trimester Prognosis When an Early Gestational Sac is Seen on Ultrasound Imaging: Logistic Regression Prediction Model', Journal of ultrasound in medicine; J Ultrasound Med, 40(3), pp. 541-550. doi: 10.1002/jum.15430.
16. E-Learning for Health Image interpretation: Obstetric Ultrasound Available at: https://portal.e-lfh.org.uk/myElearning/Index?HierarchyId=0_33&programmeId=33 (Accessed: 24/08/2022)
17. European Society of Human Reproduction and Embryology Guideline on the management of recurrent pregnancy loss. Available at: https://www.eshre.eu/Guidelines-and-Legal/Guidelines/Recurrent-pregnancy-loss (Accessed: 13/10/2021).
18. Farren, J., Jalmbrant, M., Falconieri, N., Mitchell-Jones, N., Bobdiwala, S., Al-Memar, M., Tapp, S., Van Calster, B., Wynants, L., Timmerman, D. and Bourne, T. (2021) 'Differences in post-traumatic stress, anxiety and depression following miscarriage or ectopic pregnancy between women and their partners: multicenter prospective cohort study', Ultrasound in obstetrics & gynecology; Ultrasound Obstet Gynecol, 57(1), pp. 141-148. doi: 10.1002/uog.23147.
19. Farren, J., Jalmbrant, M., Ameye, L., Joash, K., Mitchell-Jones, N., Tapp, S., Timmerman, D. and Bourne, T. (2016) 'post-traumatic stress, anxiety and depression following miscarriage or ectopic pregnancy: a prospective cohort study', BMJ open; BMJ Open, 6(11), pp. e011864. doi: 10.1136/bmjopen-2016-011864.
20. Gaskins, A.J., Hart, J.E., Chavarro, J.E., Missmer, S.A., Rich-Edwards, J., Laden, F. and Mahalingaiah, S. (2019) 'Air pollution exposure and risk of spontaneous abortion in the Nurses' Health Study II', Human reproduction (Oxford); Hum Reprod, 34(9), pp. 1809-1817. doi: 10.1093/humrep/dez111.
21. Guha, S., Van Belle, V., Bottomley, C., Preisler, J., Vathanan, V., Sayasneh, A., Stalder, C., Timmerman, D. and Bourne, T. (2013) External validation of models and simple scoring systems to predict miscarriage in intrauterine pregnancies of uncertain viability.
22. Halligan, S., Altman, D.G. and Mallett, S. (2015) 'Disadvantages of using the area under the receiver operating characteristic curve to assess imaging tests: A discussion and proposal for an alternative approach', European radiology, 25(4), pp. 932-939. doi: 10.1007/s00330-014-3487-0.
23. Hardi, A.C. and Fowler, S.A. (2014) 'Evidence-based medicine and systematic review services at Becker Medical Library', Missouri medicine, 111(5), pp. 416-418. doi: ms111_p0416 [pii].

24. Hardy, K., Hardy, P.J., Jacobs, P.A., Lewallen, K. and Hassold, T.J. (2016) 'Temporal changes in chromosome abnormalities in human spontaneous abortions: Results of 40 years of analysis', American journal of medical genetics.Part A; Am.J.Med.Genet, 170A(10), pp. 2671-2680. doi: 10.1002/ajmg.a.37795.
25. Heller, H.T., Asch, E.A., Durfee, S.M., Goldenson, R.P., Peters, H.E., Ginsburg, E.S., Doubilet, P.M. and Benson, C.B. (2018) 'Subchorionic Hematoma: Correlation of Grading Techniques With First-Trimester Pregnancy Outcome', Journal of ultrasound in medicine; J Ultrasound Med, 37(7), pp. 1725-1732. doi: 10.1002/jum.14524.
26. Hobbins, J.C. (2008) Obstetric ultrasound artistry in practice. Malden, Mass: Blackwell Pub.
27. Idelson, A., Meiri, H., Wertheimer, A., Sammar, M., Tenenbaum-Gavish, K., Shufaro, Y. and Ben-Haroush, A. (2020) 'New predictors of early impaired placentation preceding miscarriage before 10 weeks of gestation in IVF pregnancies: A prospective study', Placenta, 100, pp. 30-34. doi: S0143-4004(20)30248-4 [pii].
28. Janssens, A. C. J. W. and Martens, F.K. (2020) 'Reflection on modern methods: Revisiting the area under the ROC Curve', International journal of epidemiology, 49(4), pp. 1397-1403. doi: 10.1093/ije/dyz274 [doi].
29. Jauniaux, E., Watson, A.L., Hempstock, J., Bao, Y., Skepper, J.N. and Burton, G.J. (2000) 'Onset of Maternal Arterial Blood Flow and Placental Oxidative Stress: A Possible Factor in Human Early Pregnancy Failure', The American journal of pathology; Am J Pathol, 157(6), pp. 2111-2122.
30. Marin, M., Pătru, C.L., Manolea, M.M., Novac, L., Dijmărescu, A.L., Boldeanu, M.V., Şerbănescu, M., Boldeanu, L. and Iliescu, D.G. (2021) 'Can Ultrasound Analysis of the Yolk Sac be a Predictor of Pregnancy Outcome?', Current health sciences journal; Curr Health Sci J, 47(4), pp. 547-552. doi: 10.12865/CHSJ.47.04.10.
31. Meaney, S., Corcoran, P., Spillane, N. and O'Donoghue, K. (2017) 'Experience of miscarriage: an interpretative phenomenological analysis', BMJ open; BMJ Open, 7(3), pp. e011382. doi: 10.1136/bmjopen-2016-011382.
32. McHugh M.L. (2009) The odds ratio: calculation, usage and interpretation. Biochem Med (Zagreb),19, pp120-126
33. Minter C. Personal communication with Melanie Modlin (Deputy Director/Public Liaison Officer, National Library of Medicine) (2019). Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6300231/ (Accessed: 19 July 2022)
34. Moore, K.L., Persuad, T . V. N. and Torchia, M.G. (2016) Before we are born: essentials of embryology and birth defects. Philadelphia, Pennsylvania: Elsevier.
35. Moradan, S. and Forouzeshfar, M. (2012) 'Are abnormal yolk sac characteristics important factors in abortion rates?', International journal of fertility & sterility; Int J Fertil Steril, 6(2), pp. 127-130.
36. Moscrop, A. (2013) ''Miscarriage or abortion?' Understanding the medical language of pregnancy loss in Britain; a historical perspective', Medical humanities; Med Humanities, 39(2), pp. 98-40. doi: 10.1136/medhum-2012-010284.
37. Naidoo, S., London, L., Burdorf, A., Naidoo, R. and Kromhout, H. (2011) 'Spontaneous Miscarriages and Infant Deaths among Female Farmers in Rural South Africa', Scandinavian journal of work, environment & health; Scand J Work Environ Health, 37(3), pp. 227-236. doi: 10.5271/sjweh.3133.
38. National Institute for Health and Care Excellence [NICE] (2019) Management of miscarriage. NG126. Available at: https://www.nice.org.uk/guidance/ng126/chapter/Recommendations#management-of-miscarriage (Accessed: 10 October 2021).
39. Nikčević, A.,V., Kuczmierczyk, A.R. and Nicolaides, K.H. (2007) 'The influence of medical and psychological interventions on women's distress after miscarriage', Journal of psychosomatic research; J Psychosom Res, 63(3), pp. 283-290. doi: 10.1016/j.jpsychores.2007.04.004.
40. Oates, J., Casikar, I., Campain, A., Müller, S., Yang, J., Reid, S. and Condous, G. (2013) 'A prediction model for viability at the end of the first trimester after a single early pregnancy evaluation', Australian & New Zealand journal of obstetrics & gynaecology; Aust N Z J Obstet Gynaecol, 53(1), pp. 51-57. doi: 10.1111/ajo.12046.
41. Odeh, M., Ophir, E., Grinin, V., Tendler, R., Kais, M. and Bornstein, J. (2012) 'Prediction of abortion using three-dimensional ultrasound volumetry of the gestational sac and the amniotic sac in threatened abortion', Journal of clinical ultrasound; J.Clin.Ultrasound, 40(7), pp. 389-393. doi: 10.1002/jcu.21957.
42. Odland Karlsen, H., Johnsen, S.L., Rasmussen, S., Trae, G., Reistad, H.M.T. and Kiserud, T. (2019) 'The human yolk sac size reflects involvement in embryonic and fetal growth regulation', Acta Obstetricia et Gynecologica Scandinavica; Acta Obstet Gynecol Scand, 98(2), pp. 176-182. doi: 10.1111/aogs.13466.
43. Park, J., Jardine, L., Gottgens, B., Teichmann, S.A. and Haniffa, M. (2020) 'Prenatal development of human immunity', Science (American Association for the Advancement of Science); Science, 368(6491), pp. 600-603. doi: 10.1126/science.aaz9330.
44. Pericic, T.P. Why systematic reviews matter. Available at: https://www.elsevier.com/connect/authors-update/why-systematic-reviews-matter (Accessed: 13/10/2021).
45. Philipp, T. and Kalousek, D.K. (2002) 'Generalized abnormal embryonic development in missed abortion: Embryoscopic and cytogenetic findings', American Journal of Medical Genetics; Am.J.Med.Genet, 111(1), pp. 43-47. doi: 10.1002/ajmg.10476.
46. Popovici, R., Pristavu, A. and Sava, A. (2017) 'Three-dimensional ultrasound and hdlive technology as possible tools in teaching embryology: 3D Ultrasound and Hdlive Technology', Clinical anatomy (New York, N.Y.), 30(7), pp. 953-957. doi: 10.1002/ca.22963.
47. Quenby, S., Gallos, I.D., Dhillon-Smith, R., Podesek, M., Stephenson, M.D., Fisher, J., Brosens, J.J., Brewin, J., Ramhorst, R., Lucas, E.S., McCoy, R.C., Anderson, R., Daher, S., Regan, L., Al-Memar, M., Bourne, T., MacIntyre, D.A., Rai, R., Christiansen, O.B., Sugiura-Ogasawara, M., Odendaal, J., Devall, A.J., Bennett, P.R., Petrou, S. and Coomarasamy, A. (2021) 'Miscarriage matters: the epidemiological, physical, psychological, and economic costs of early pregnancy loss', The Lancet (British edition); Lancet, 397(10285), pp. 1658-1667. doi: 10.1016/S0140-6736(21)00682-6.
48. RCOG. 2016. Early pregnancy loss, management. Green-top Guideline No. 25. [online] Available at: https://www.rcog.org.uk/guidance/browse-all-guidance/green-top-guidelines/early-pregnancy-loss-management-green-top-guideline-no-25/ [Accessed 10 October 2021].
49. Sadler, T.W.(., Leland, J. and Langman, J. (2006) Langman's medical embryology. 10th edn. Philadelphia, Pa. ;: Lippincott Williams & Wilkins.
50. Salamanca, A., Fernández-Salmerón, P., Beltrán, E., Mendoza, N., Florido, J. and Mozas, J. (2012) 'Early embryonic morphology sonographically assessed and its correlation with yolk sac in missed abortion', Archives of Gynecology and Obstetrics; Arch Gynecol Obstet, 287(1), pp. 139-142. doi: 10.1007/s00404-012-2499-8.
51. Shaamash, A.H., Aly, H.A., Abdel-Aleem, M. and Akhnowkh, S.N. (2020) 'Clinical and Ultrasound Evaluation of Early Threatened Miscarriage to Predict Pregnancy Continuation up to 28 Weeks: A Prospective Cohort Study', Journal of ultrasound in medicine; J Ultrasound Med, 39(9), pp. 1777-1785. doi: 10.1002/jum.15282.
52. Stamatopoulos, N., Lu, C., Casikar, I., Reid, S., Mongelli, M., Hardy, N. and Condous, G. (2015) 'Prediction of subsequent miscarriage risk in

women who present with a viable pregnancy at the first early pregnancy scan', Australian & New Zealand journal of obstetrics & gynaecology; Aust N Z J Obstet Gynaecol, 55(5), pp. 464-472. doi: 10.1111/ajo.12395.
53. Suguna, B. and Sukanya, K. (2019) 'Yolk sac size & shape as predictors of first trimester pregnancy outcome: A prospective observational study', Journal of gynecology obstetrics and human reproduction; J Gynecol Obstet Hum Reprod, 48(3), pp. 159-164. doi: 10.1016/j.jogoh.2018.10.016.
54. Swanson, K.M., Connor, S., Jolley, S.N., Pettinato, M. and Wang, T. (2007) 'Contexts and evolution of women's responses to miscarriage during the first year after loss', Research in nursing & health; Res.Nurs.Health, 30(1), pp. 2-16. doi: 10.1002/nur.20175.
55. Tan, S. (2014) 'Abnormal sonographic appearances of the yolk sac: which can be associated with adverse perinatal outcome?', Medical ultrasonography, 16(1), pp. 15-20. doi: 10.11152/mu.2014.2066.161.st1gt2.
56. Tavoli, Z., Mohammadi, M., Tavoli, A., Moini, A., Effatpanah, M., Khedmat, L. and Montazeri, A. (2018) 'Quality of life and psychological distress in women with recurrent miscarriage: a comparative study', Health and quality of life outcomes; Health Qual Life Outcomes, 16(1), pp. 150. doi: 10.1186/s12955-018-0982-z.
57. Taylor, T.J., Quinton, A.E., de Vries, B.,S. and Hyett, J.A. (2019) 'First-trimester ultrasound features associated with subsequent miscarriage: A prospective study', Australian & New Zealand journal of obstetrics & gynaecology; Aust N Z J Obstet Gynaecol, 59(5), pp. 641-648. doi: 10.1111/ajo.12944.
58. ten Donkelaar, H.J. and van der Vliet, T. (2006) 'Overview of the Development of the Human Brain and Spinal Cord', in ten Donkelaar, H.J., Lammens, M. and Hori, A. (eds.) Clinical Neuroembryology: Development and Developmental Disorders of the Human Central Nervous System Berlin, Heidelberg: Springer Berlin Heidelberg, pp. 1-45.
59. The Miscarriage Association (2021) Miscarriage. Available at: https://www.miscarriageassociation.org.uk/information/miscarriage/ (Accessed: 08/10/2021).
60. Tommy's Pregnancy loss statistics. Available at: https://www.tommys.org/baby-loss-support/pregnancy-loss-statistics (Accessed: 13/10/2021).
61. Wallace, Robin,M.D., M.A.S., DiLaura, Angela, RN,M.S.N., W.H.N.P.-B.C. and Dehlendorf, Christine,M.D., M.A.S. (2017) '"Every Person's Just Different": Women's Experiences with Counseling for Early Pregnancy Loss Management', Women's health issues; Womens Health Issues, 27(4), pp. 456-462. doi: 10.1016/j.whi.2017.02.008.
62. Wang, Y., Li, T., Zhang, L., Li, J., Zou, B. and Singh, B.K. (2021) 'The Clinical Value of 3D Ultrasonic Measurement of the Ratio of Gestational Sac Volume to Embryo Volume in IoT-Based Prediction of Pregnancy Outcome', Journal of healthcare engineering; J Healthc Eng, 2021, pp. 6421025-8. doi: 10.1155/2021/6421025.
63. Wie, J.H., Choe, S., Kim, S.J., Shin, J.C., Kwon, J.Y. and Park, I.Y. (2015) 'Sonographic Parameters for Prediction of Miscarriage: Role of 3-Dimensional Volume Measurement', Journal of ultrasound in medicine; J Ultrasound Med, 34(10), pp. 1777-1784. doi: 10.7863/ultra.15.14.09012.
64. Wilcox, A.J., Weinberg, C.R., O'Connor, J.,F., Baird, D.D., Schlatterer, J.P., Canfield, R.E., Armstrong, E.G. and Nisula, B.C. (1988) 'Incidence of Early Loss of Pregnancy', The New England journal of medicine; N Engl J Med, 319(4), pp. 189-194. doi: 10.1056/NEJM198807283190401.
65. Yi, Y., Lu, G., Ouyang, Y., lin, G., Gong, F. and Li, X. (2016) 'A logistic model to predict early pregnancy loss following in vitro fertilization based on 2601 infertility patients', Reproductive biology and endocrinology: Reprod Biol Endocrinol, 14(15), pp. 15. doi: 10.1186/s12958-016-0147-z.
66. Yoneda, S., Shiozaki, A., Yoneda, N., Sameshima, A., Ito, M., Shima, T., Nakashima, A., Yoshino, O., Kigawa, M., Takamori, R., Shinagawa, Y. and Saito, S. (2018) 'A Yolk Sac Larger Than 5 mm Suggests an Abnormal Fetal Karyotype, Whereas an Absent Embryo Indicates a Normal Fetal Karyotype', Journal of ultrasound in medicine; J Ultrasound Med, 37(5), pp. 1233-1241. doi: 10.1002/jum.14467.

P063 Maternal ART throughout pregnancy prevents caudate volume reductions in HIV- exposed uninfected neonates

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Background: Successful prevention of mother-to-child HIV transmission (PMTCT) programs have reduced the risk of infant HIV infection in South Africa from 8% in 2008 to an estimated 1.4% in 2015, resulting in an increasing population of HIV-exposed uninfected (HEU) children. However, the long-term effects of HIV and antiretroviral (ART) exposure on the developing brain are not well known. While HEU children perform better than their HIV-infected counterparts, they continue to demonstrate greater neurodevelopmental delay than HIV-unexposed uninfected (HUU) children, especially in resource-poor settings. The critical period of brain development spans the period between second and third trimester of pregnancy and in the first two years postnatal life. Therefore, it is particularly important to monitor the developmental milestones of HEU children which may be delayed due to exposure to the virus in utero and postnatally, and possible ART exposure. Using manual tracing of brain regions on magnetic resonance (MR) images, we investigate in early infancy subcortical volumetric differences related to HIV and ART exposure. Examining neuroimaging measures a few weeks after birth has the advantage of eliminating some cofounding factors, such as parenting differences and/or breast versus bottle feeding.

Methods: We included one hundred and twenty infants (59 girls; 79 HEU; mean gestational age (GA) at scan ± sd = 41.5 ± 1.0 weeks) born to healthy HIV-infected and uninfected Xhosa-speaking women attending a community antenatal clinic in Cape Town, South Africa where HIV sero-prevalence approaches 30%. Of the 79 HEU infants, 40 were exposed to ART throughout gestation (HEU-preconception).

Aizire, J., Fowler, M. G. & Coovadia, H. M. (2013). Operational issues and barriers to implementation of prevention of mother-to-child transmission of HIV (PMTCT) interventions in Sub-Saharan Africa. Curr HIV Res, 11, 144-59. Alimenti, A., Forbes, J. C., Oberlander, T. F., Money, D. M., Grunau., et

al., (2006). A prospective controlled study of neurodevelopment in HIV-uninfected children exposed to combination antiretroviral drugs in pregnancy. Pediatrics, 118, e1139-45. Jahanshad, N., Couture, M.-C., Prasitsuebsai, W., Nir, T. M., Aurpibul, L., Thompson, P. M., et al. (2015). Brain imaging and neurodevelopment in HIV-uninfected Thai children born to HIV-infected mothers. Pediatr. Infect. Dis. J. 34, e211–e216. doi: 10.1097/INF.0000000000000774 Jankiewicz, M., Holmes, M. J., Taylor, P. A., Cotton, M. F., Laughton, B., et al., (2017). White Matter Abnormalities in Children with HIV Infection and Exposure. Front Neuroanat, 11, 88. Le Doare, K., Bland, R. & Newell, M. L. (2012). Neurodevelopment in children born to HIV-infected mothers by infection and treatment status. Pediatrics, 130, e1326-44. Phelps, B. R., Ahmed, S., Amzel, A., Diallo, M. O., Jacobs, T., et al., (2013). Linkage, initiation and retention of children in the antiretroviral therapy cascade: an overview. AIDS, 27 Suppl 2, S207-13. Release, P. 2016. Early mother-to-child transmission of HIV stats plunge.pdf [Online]. South African Medical Research Council. Available: http://www.mrc.ac.za/Media/2016/13press2016.htm [Accessed 2 November 2017. SAMRC. 2016. Early mother-to-child transmission of HIV stats plunge.pdf [Online]. South African Medical Research Council. Available: http://www.mrc.ac.za/Media/2016/13press2016.htm [Accessed 2 November 2017]. Shetty, A. K. & Maldonado, Y. (2013). Antiretroviral drugs to prevent mother-to-child transmission of HIV during breastfeeding. Curr HIV Res, 11, 102-25. Tran, L. T., Roos, A., Fouche, J. P., Koen, N., Woods, R. P., (2016). White Matter Microstructural Integrity and Neurobehavioral Outcome of HIV-Exposed Uninfected Neonates. Medicine (Baltimore), 95, e2577. Van Schalkwyk, C., Mndzebele, S., Hlophe, T., Garcia Calleja, J. M., Korenromp, E. L., (2013). Outcomes and impact of HIV prevention, ART and TB programs in Swaziland--early evidence from public health triangulation. PLoS One, 8, e69437. National Department Of Health 2019. Annual Report (2019-2020): Department of Health, Republic of South Africa. 177 pages. WEDDERBURN, C. J., GROENEWOLD, N. A., ROOS, A., YEUNG, S., FOUCHE, J. P., REHMAN, A. M., GIBB, D. M., NARR, K. L., ZAR, H. J., STEIN, D. J. & DONALD, K. A. 2022. Early structural brain development in infants exposed to HIV and antiretroviral therapy in utero in a South African birth cohort. J Int AIDS Soc, 25, e25863. WEDDERBURN, C. J., YEUNG, S., REHMAN, A. M., STADLER, J. A. M., NHAPI, R. T., BARNETT, W., MYER, L., GIBB, D. M., ZAR, H. J., STEIN, D. J. & DONALD, K. A. 2019. Neurodevelopment of HIV-exposed uninfected children in South Africa: outcomes from an observational birth cohort study. Lancet Child Adolesc Health, 3, 803-813.

BREAST POSTER PRESENTATIONS

P065 Real world PIK3CA variant prevalence -- a single centre retrospective analysis

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Background: The SOLAR-1 trial showed that alpelisib--fulvestrant extends progression free survival in patients with PIK3CA variants in hormone receptor (HR) positive, HER2 negative breast cancer previously receiving endocrine therapy 1 The reported PIK3CA variant frequency is approximately 40%2. With the recent NICE approval of alpelisib, we sought to determine the real-world PIK3CA variant prevalence to gauge the eligible patient cohort for treatment.

Method: All patients with advanced HR positive HER2 negative breast cancer receiving or having previously received CDK4/6 inhibitors at our centre were tested for PIK3CA at the regional genomics hub. This data was collected and analysed by the presence of a variant, the nature of it and its potential sensitivity to alpelisib, based on the SOLAR-1 identified 11 hotspot variants.

Results: To date, 25 eligible patients were tested, with 13 harbouring a variant, giving a frequency of 52%. Two patients had variants outside of the 11 hotspot areas and are therefore of uncertain clinical significance. Notably, one patient had two coexisting variants, one of which being scarcely documented previously.

Conclusion: In our cohort, a markedly higher PIK3CA variance rate was found. Combining this data with that of other centres will be useful to establish the representative frequency of PIK3CA variants in the United Kingdom. This data would then accurately inform service demands and needs. Further analysis of rare PIK3CA variants is needed to understand their clinical and therapeutic significance.

1. André, F., Ciruelos, E.M., Rubovszky, G., Campone, M., Loibl, S., Rugo, H.S., Iwata, H., Conte, P., Mayer, I.A., Kaufman, B. and Yamashita, T., 2018. Alpelisib (ALP)+ fulvestrant (FUL) for advanced breast cancer (ABC): results of the phase III SOLAR-1 trial. Annals of Oncology, 29, p.viii709. 2. Koboldt, D.C., Fulton, R.S., McLellan, M.D., Schmidt, H., Kalicki-Veizer, J. and McMichael, J.F., 2021. Comprehensive molecular portraits of human breast tumours. Nature [Internet]. 2012; 490: 61-70.

P066 Implementation and evaluation of breast CBCT in a radiotherapy department

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Leeds Cancer Centre

Background: Historically, breast radiotherapy required two different planning and delivery techniques depending on nodal involvement: breast-only treatments used opposing single isocentre tangential beams whereas nodal fields

were treated with a separate isocentre field matched to the tangentials. A third technique was introduced in response to National Institute for Health and Care Excellence (NICE) guidelines (2018) for internal mammary nodal (IMN) involvement. Multiple treatment techniques necessitated distinct complex imaging and treatment protocols with varied tolerances, causing confusion and leading to incidents, therefore standardisation was needed.

Purpose/Application: The aim was to introduce a new, all-inclusive breast radiotherapy technique, benefitting the safety and experience of our patients using the technological capability to treat nodal regions alongside the breast as one volume where necessary. This new technique was to have a single isocentre regardless of nodal involvement as well as cone beam CT image verification to bring breast imaging in line with protocols for other radical treatment sites. Compromises were made between planning and treatment delivery, ensuring acceptable dose distributions; an isocentre position allowing plan deliverability and reproducibility of position which can be verified with one imaging modality throughout.

Summary of presentation:

1. Previous breast treatment techniques - planning/delivery technique and limitations
2. What we wanted to achieve - an IMN technique meeting NICE guidelines, a monoisocentric nodal technique and consistent imaging across the board
3. Benefits - safer, standardised positioning and verification, more robust planning and future proofing
4. Implementation
5. Audit results
6. Lessons learned
7. Future projects

1. National Institute for Health and Care Excellence. (2018). Early and locally advanced breast cancer: diagnosis and management (NICE guideline NG101)

P067 Clinical background factors that impact the performance of radiography advanced practitioners

Noelle Clerkin[1]; Chantal Ski[1]; Patrick Brennan[2]; Ruth Strudwick[1]

[1]University of Suffolk; [2]University of Sydney

Background: Accurate mammographic image interpretation forms the basis of an effective breast screening programme. A high standard of image interpretation maintains optimum cancer detection and the ability to differentiate malignant from benign appearances (1,2). Understanding the factors that impact upon reader interpretation skills is therefore critically important and whilst a plethora of data is available for radiologists, much less is known for reporting UK radiographers in the UK. For the first time, this study will identify clinical factors that account for performance variations within UK Radiography Advanced Practitioners (RAP).

Method: A test set of 60 mammograms with known outcomes were interpreted by 22 UK RAP's using the DetectedX platform. For each reader, lesion sensitivity and Jacknife free-response receiver operating characteristic (JAFROC) values were established. Student's T or Mann-Whitney tests were used to explore the impact of clinical background on image interpretation accuracy.

Results: Lesion sensitivity correlated against the weekly volume of reads >100 (<0.0001). JAFROC curves demonstrated significant difference between weekly volume reads ($P \leq 0.01$) and reliance of prior images ($P \leq .0001$). Benchmark performance values are indicated.

Conclusion: Factors that impact the performance of RAP's have been identified. Strategies can be explored to optimise image interpretation and set values for the future of radiographic reporting. This will develop a pioneering evidence base on which RAP standards can be derived.

1.Brennan PC, Trieu PD, Tapia K, Ryan J, Mello-Thoms C, Lee W, editors. BREAST: A Novel Strategy to Improve the Detection of Breast Cancer2014; Cham: Springer International Publishing. 2.Williams S, Aksoy U, Reed W, Cielecki L, Woznitza N. Digital mammographic interpretation by UK radiographer mammographers: A JAFROC analysis of observer performance. Radiography. 2021.

P068 Single centre breast medical oncology service evaluation

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Background: With improved breast cancer outcomes, service demands have increased (1). Particularly, survival has drastically improved for metastatic patients, meaning longer treatment times. This creates particularly acute challenges in centres serviced by a sole consultant, as was the case here, constraining clinical and research service provision. This reinforces the need to optimise patient pathways, improve recruitment and drive innovation in redesigning service models. By conducting a comprehensive service evaluation, a baseline patient cohort was established, allowing future service needs to be accurately mapped, informing operating policy.

Methods: All patients seen between 12/04/22-13/09/22 at a single centre breast medical oncology clinic were included. A retrospective review of clinic and prescription records was conducted to obtain this data. Patients were then classified by stage, receptor status, treatment duration and intent.

Results: In this period, 152 patients were seen. 77 had metastatic disease and 75 curative. Amongst curative patients 66.7% were HR positive compared to 81.3% of metastatic patients. 28% of curative and 26.7% of metastatic patients were HER2 positive. 20% of curative and 10.7% of metastatic patients were triple negative. The median treatment durations were 6 months for curative and 23 months for metastatic patients.

Conclusion: The significantly longer treatment duration for metastatic patients clearly demonstrates the increasing service demands. This creates a need to adapt our workflow through making use of allied professionals to reduce waiting times. This data will inform protocols for clinical assessments for different patient subgroups. It will also inform a requisite local standard for staffing levels.

1. Palmer, C. and Cumming, I. (2017) Cancer Workforce Plan. Health Education England

P069 Evaluation of multi-modal breast imaging using x-ray mammograms and thermal images for better interpretation: a pilot study

Anusha Paluri[1]; Sudhakar Sampangi[1]; Bharath Govindaraju[2]; Siva Teja[2]; Geetha Manjunath[2]

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Background: X-ray mammography is usually inconclusive in women with dense breasts where thermal imaging can add value as it detects abnormal physiological activity across breast densities. In this pilot study, we evaluated an AI-based multimodal system that analyzes thermal images to identify abnormal thermal activities and creates annotated mammographic images highlighting sectors containing suspicious hotspots.

Method: The study included 28 women for whom both mammography and thermal images were captured. 21 of them were diagnosed with breast malignancy. Interpretation results of original mammography images were compared with that of sector annotated mammography images. To remove bias, in the first phase, the interpreter was presented with raw mammograms of the first 14 women and sector marked mammography of the last 14 women. After a washout period of 30-days, the groups were swapped for the second phase. The time for interpretation was noted.

Results: Interpretation of raw mammography images resulted in 17 True Positives (TP), 1 False Negative (FN), 2 True Negatives (TN) , 1 False Positive (FP) and 7 inconclusive cases. Interpretation of annotated mammograms highlighting sectors containing suspicious hotspots resulted in 19 TP, 0 FN, 4 TN, 1 FP and 4 Inconclusive cases. Multimodal annotations improved interpretation accuracy by converting 4 inconclusive cases to 2 TP and 2 TN. One FN became inconclusive. Use of annotated mammograms saved interpretation time by 1 minute per scan.

Conclusion: This pilot study demonstrated the potential of an AI-based multimodal imaging tool that combined structural and functional breast imaging to improve interpretation accuracy and time.

P070 Eponymous syndromes affecting the breast: A pictorial review

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Background: Eponymous syndromes are often named after the person who first described the condition. With the current trend being towards descriptive names, many of these eponyms persist due to historical precedent and familiarity (Desikan et al, 2017). Numerous eponymous syndromes affecting the breast exist and it is important for breast imagers to be aware of these.

Purpose: To present an overview of and illustrate eponymous syndromes affecting the breast To provide historical background on the origin of the eponym To highlight those cases where eponymous syndromes have been renamed and why

Summary of content: In this pictorial review, we present a range of eponymous syndromes. We discuss features, its impact upon the breast and provide interesting historical background on the person who first described the condition. Klinefelter syndrome: 47XXY chromosome, gynaecomastia and infertility. Higher oestrogen levels increase breast cancer risk. Named after Harry Klinefelter whose name appeared first on the published paper. Lhermitte-Duclos syndrome: PTEN-mutation-related cerebellar-gangliocytomas. Breast, endometrium and thyroid imaging for cancers is also vital. Lhermitte was deeply religious and studied about demonic possession. The classic 'Lhermitte sign' suggestive of demyelination is also named after him (Louis, et al 2021). Mondor disease: Cord-like painful mass due to venous thrombophlebitis. Mammography demonstrates superficial, tubular, beaded densities. Henri Mondor was an accomplished doctor and historian of French literature (Kyle et al, 1986) Kikuchi syndrome: Benign, necrotising lymphadenitis with cervical node enlargement and B-symptoms. Masahiro Kikuchi self-diagnosed anaplastic large-cell lymphoma using his own biopsy. Despite this, he continued to work for 4 years until his death (Fujimoto et al, 1972)

1. Desikan RS, Barkovich AJ. Hazards of Neurological Nomenclature: Observations From Neurodevelopmental and Neurodegenerative Disorders. JAMA Neurol. 2017;74(10):1165-1166. doi:10.1001/jamaneurol.2017.1747 2. Fujimoto Y, Kojima Y, Yamaguchi K. Cervical subacute necrotizing lymphadenitis. A new clinicopathological entity. Naika. 1972;20:920-7. 3. Harry F. Klinefelter: 1912-1990. (2009) The Endocrinologist. 19 (1): 1. doi:10.1097/TEN.0b013e318197bead 4. Kyle R & Shampo M. Henri Mondor: Biographer and Surgeon. Mayo Clin Proc. 1986;61(7):563. doi:10.1016/s0025-6196(12)62005-9 5. Louis D, Perry A, Wesseling P et al. The 2021 WHO Classification of Tumors of the Central Nervous System: A Summary. Neuro Oncol. 2021;23(8):1231-51. doi:10.1093/neuonc/noab106 - Pubmed

P071 Breast cancer in young- clinical and mammographic outcomes

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King Fahad Military Medical Complex

Learning Objective: Breast cancer can occur at any age. Risk factors include personal history of breast cancer or a high-risk lesion (on biopsy), positive family history of breast cancer or genetic syndrome, history of radiation therapy to chest, certain genes, and Ashkenazi Jewish ancestry. We sought to highlight features of breast cancers detected on mammography in young women under 40.

Background: We retrospectively reviewed medical records of women under 40 for the period of last 2 years. Information about family histories of breast cancer was noted. Post-operative and mammoplasty cases were excluded. Digital mammographies were interpreted by a specialist or generalist with more than 10 years of experience. Breast parenchymal densities, nodule features, micro-calcification, and distribution were recorded. Biopsy findings were documented.

Findings: Out of 47 cases, 9 cases had breast cancer. Most (6/9) were having negative family histories. The majority (6/9) were found to have nodules (more than 2 cm in size, with additional features). Many of them (5/9) were reluctant (shy) to get medical advice, not aware of danger signs, or were afraid to get medical advice due to cultural limitations, while few could not find dedicated breast care facilities.

Conclusion: Diagnosing breast cancer in younger women can be difficult because of higher breast tissue density and routine screening is not recommended. Young women may ignore warning signs, leading to delayed diagnosis. Breast cancer awareness and early access to care should be promoted.

1. Fiorica JV. (2016) Breast Cancer Screening, Mammography, and Other Modalities. Clin Obstet Gynecol. 59(4):688-709. 2. Narayan AK, Lee CI, Lehman CD. (2020) Screening for Breast Cancer. Med Clin North Am. 104(6):1007-1021. 3. Løberg M, Lousdal ML, Bretthauer M, Kalager M. (2015) Benefits and harms of mammography screening. Breast Cancer Res. 1;17(1):63.

HEAD & NECK / NEURO / DENTAL POSTER PRESENTATIONS

P072 Incoherent intravoxel motion - a sequence of interest in the MR Imaging of Multiple Sclerosis in the spinal cord

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Introduction: Conventional MRI is a critical tool in Multiple Sclerosis (MS) for diagnosis and monitoring. Incoherent intravoxel motion (IVIM), an advanced MRI technique, assesses perfusion without contrast media. The aim of this study was to evaluate IVIM within the spinal cord of MS patients.

Method: Following ethical approval, 30 subjects (15 control, 15 with MS) were recruited and underwent 3 Tesla MR imaging. IVIM and anatomical sequences were performed. Processing included image co-registration, motion correction and spinal cord tissue segmentation for vertebral levels C2--C4. IVIM metrics for perfusion fraction (f), pseudo-diffusion coefficient (D*) and pure-diffusion coefficient (D) were calculated.

Results: Ratios were determined for each group for each IVIM metric in the spinal cord (SC), white matter (WM) and gray matter (GM). T-tests compared the control group ratios and MS group ratios for each metric.

SC:GM
f:Control 1.00(0.55-1.72), MS 0.95(0.53-1.99) p=0.204
D:Control 1.04(0.53-2.07), MS 1.03(0.52-5.22) p=0.955*
D:Control 1.02(0.50-2.16), MS 0.95(0.53-2.07) p=0.220
WM:GM
f:Control 0.99(0.80-1.08), MS 1.06(0.38-1.08) p=0.131
D:Control 1.00 (0.79-0.79), MS 1.05(0.39-1.90) p=0.256*
D:Control 0.99(0.81-0.81), MS 1.10(0.34-1.12) p=0.096
SC:WM
f:Control 1.01(0.93-1.24), MS 1.03(0.95-0.95) p=0.220
D:Control 1.00(0.93-1.24), MS 1.05(0.93-0.97) p=0.236*
D:Control 1.01(0.82-1.23), MS 1.03(0.93-0.94) p=0.237

Although not statistically significant, the perfusion fraction ratios for the control group compared with the MS group tended towards lower p-values; this is suggestive of changes in spinal cord perfusion for the MS group.

Discussion: In combination with the diffusion-weighted imaging, IVIM may be an additional biomarker sensitive to changes associated with MS in the cord. Further work is required to determine whether IVIM could replace contrast enhanced MRI for monitoring disease progression and treatment.

P073 Impact of gadopiclenol on decision making in patients with brain metastases: A post-hoc study

Gustavo Sarria[1]; Jens Fleckenstein[2]; Miriam Eckl[2]; Florian Stieler[2]; Martin Bendszus[3]; Leonard Schmeel[1]; David Koch[1]; Marco Essig[4]; Frederik Wenz[5]; Frank Giordano[2]

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Background: To evaluate the impact of contrast-enhanced MRI with gadopiclenol (EluciremT, Guerbet), a high relaxivity GBCA currently under review by EMA, on decision making and radiotherapy (RT) treatment planning of brain metastases (BM).

Method: In this post-hoc analysis of data from a phase IIb study, MR images of patients who underwent two separate contrast-enhanced MRIs with gadopiclenol and gadobenate dimeglumine at 0.1 mmol/kg, with ≥1 BM detected in any of both scans, were analyzed. For each MRI, treatment plans (stereotactic radiosurgery [SRS] or whole-brain radiotherapy [WBRT]) were determined, with the gross target volume (GTV) indicating the contrast-enhancing aspects of the tumor. Mean GTVs, normal tissue volumes receiving 12 Gy (V12), and the Dice similarity coefficient (DSC) were

obtained for the paired contours. The SpearmanÂ´s rank (ρ) correlation was additionally calculated. Three blinded experts subjectively evaluated the contrast enhancement of each lesion.

Results: A total of 13 adult patients were analyzed. Gadopiclenol depicted additional BM as compared with gadobenate dimeglumine in 7 patients (54%). Treatment indication was changed in 2 patients (15%), from no treatment to SRS and from SRS to WBRT. The mean GTVs and V12 were comparable between gadopiclenol and gadobenate dimeglumine (p=0.694, p=0.974). The mean DSC was 0.70 (Â± 0.14, ρ 0.82). From a total of 36 answers, an improvement in enhancement was qualified in 21 (58.3%) with gadopiclenol, 8 (22.2%) with gadobenate dimeglumine, while no difference was obtained in 7 (19.4%) evaluations.

Conclusion: Gadopiclenol at 0.1 mmol/kg improved BM detection and characterization with impact on RT treatment decisions.

1. Bendszus M., Roberts D., Kolumban B., et al. Dose Finding Study of Gadopiclenol, a New Macrocyclic Contrast Agent, in MRI of Central Nervous System. Invest Radiol. 2020;55(3):129-37. 2. Robic C., Port M., Rousseaux O., et al. Physicochemical and Pharmacokinetic Profiles of Gadopiclenol: A New Macrocyclic Gadolinium Chelate With High T1 Relaxivity. Invest Radiol. 2019;54(8):475-84. 3. Robert P., Vives V., Grindel A. L., et al. Contrast-to-Dose Relationship of Gadopiclenol, an MRI Macrocyclic Gadolinium-based Contrast Agent, Compared with Gadoterate, Gadobenate, and Gadobutrol in a Rat Brain Tumor Model. Radiology. 2020;294(1):117-26.

P074 Improving the concordance with hippocampal sclerosis on MRI by increased reporting consistency of FDG PETCT in refractory temporal lobe epilepsy pre-surgical assessment

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Background: Medical treatment of epilepsy remains challenging. In temporal lobe epilepsy (TLE) refractory to medical therapy, magnetic resonance imaging (MRI) identification of hippocampal sclerosis (HS) is important. 18F fluoro-deoxy-glucose (FDG) positron emission tomography combined with computed tomography (PETCT) in preoperative selection of patients is increasing. The aim of the study was to improve consistency of reporting PETCT for medically refractory TLE. We investigated whether consistent reporting of PETCT gave improved concordance with HS on MRI.
Method: A retrospective single centre study was performed on 49 patients consecutively scanned with PETCT which had a blinded review. We defined 4 quality standards for PETCT ; simple reproducible consistent intensity display methodology is described (applicable to all types of acquisition and scanner - 5 x 95% saturation regional grey-matter activity). Lateral temporal lobe activity in 4 x regions was defined as mild, moderate , severe (with clinical pattern described). Comparison of original PETCT report, blinded study PETCT, original MRI report (with blinded review) was recorded.

Results: Abnormal MRI and abnormal PETCT concordance improved from 18/28 (64%) to 27/28 (96%). Abnormal MRI and normal PETCT discordance reduced from 10/28 (36%) scans to 1/28 (4%) scans. Normal MRI report and abnormal PETCT discordance increased from 5/21 (23.8%) to 13/21(61.9%) scans.

Conclusion: Consistent qualitative analysis of PETCT increased findings of abnormality in PETCT and concordance with MR findings. 1/49 had MR abnormality with undetectable FDG abnormality. This improved surgical confidence in PETCT, increased referrals and acceptance of PETCT in presurgical planning.

1. Casse, R., Rowe, C.C., Newton, M., Berlangieri, S.U., and Scott, A.M. (2002) Positron emission tomography and epilepsy. Molecular imaging and biology. 4(5), 338-351. 2. Kilpatrick, C. (1996) Neuroimaging in epilepsy surgery: a review. Journal of clinical neuroscience. 3(4), 305-309. 3. Rosenow, F. and Luders, H. (2001) Presurgical evaluation of epilepsy. Brain: a journal of neurology. 124(Pt 9),1683-1700.

P075 Identifing spontaneous, uncontrolled coughing events for fMRI of the human brain

Matthew Dimmock[1]; Nabita Singh[2]; Michael Farrell[2]; Sharna Jamadar[2]; Aung Moe[2]; Stuart Mazzone[3]

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Background: The use of functional magnetic resonance imaging (fMRI) to investigate spontaneous uncontrolled coughing (SUC) (Sigh et al., 2020) has not been previously investigated. The mapping of neural correlates of SUC requires the development of a new technique for detecting cough events. In this paper we report a novel cough detection algorithm, the COugh Finder in fMRI (COFF).
Method: The COFF algorithm was developed using a pilot dataset of four participants. Scanning was performed on a

Siemens Magnetom scanner with a 32-channel head coil to collect structural and functional data. A facemask was fitted to each participant which delivered six blocks of either nebulised capsaicin (to evoke a cough), or saline (as a control) in a randomised order. Participants used a button-box to indicate the precise times of cough events. The accuracy of the COFF algorithm for determining the presence of cough events was measured and also compared to the established framewise displacement (FD) technique.

Results: Typical fMRI scans in cough research acquire several thousand consecutive volumes, therefore a false positive rate (FPR) of 1/5000 was used to establish the threshold from the receiver operating characteristic curves. The FD (mm) and COFF thresholds were 4.4 and of 4.0, respectively. The ratios of the true positive rates to FPRs to were 1.78 and 80.0 for the FD and COFF techniques, respectively -- demonstrating a significant improvement.

Conclusion: This new algorithm can be applied to identify cough events which is particularly important when investigating the neural representation of SUC in the brain.

1. Singh, N., Driessen, A.K., McGovern, A.E., Moe, A.A.K., Farrell, M.J. and Mazzone, S.B., 2020. Peripheral and central mechanisms of cough hypersensitivity. Journal of Thoracic Disease, **12**(9), 5179-5193.

P076 Necrotising otitis externa: Optimising the use of imaging for initial assessment, management and follow-up

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Background: Necrotizing otitis externa (NOE) is a rare complication of otitis externa, characterized by infection extending into the surrounding soft tissues and/or osseous structures. Radiological investigation is essential for prompt diagnosis and initial assessment, and may also be useful for monitoring disease activity. However, there is a lack of agreement among medical professionals regarding the optimal use of imaging, and capacity constraints for urgent imaging (e.g. Magnetic Resonance [MR] and nuclear medicine) in UK clinical practice, limits the use of advanced modalities in suspected NOE cases.

Purpose: This poster presents the results of a local education initiative and quality improvement project, aimed at ensuring consistent radiological investigation and improved patient outcomes. We have adopted a more standardized investigative approach, and we wish to share our findings and recommendations with a wider audience, along with a brief review of the literature.

Summary: We conducted a retrospective audit to examine the pattern of imaging in patients with NOE over a two-year period (2021-22). As per our local guidelines, Computed Tomography (CT) with or without MRI should be used to establish initial diagnosis, determine the extent of disease, and monitor progression at follow-up. Of the 17 patients initially diagnosed with NOE, 16 (94%) underwent a baseline CT scan, while only 2 (12%) had a baseline MRI. Additionally, 6 patients (35%) underwent follow-up CT scans, and only 2 (12%) had follow-up MRI. No patient underwent nuclear medicine-based imaging. Our findings demonstrate the lack of consensus and subsequent inconsistencies in imaging for NOE.

P077 FMRI Imaging the impact of cold-water immersion on brain function and emotion

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Background: Emerging evidence supports mental and physical health benefits of cold-water immersion with the number of participants in outdoor swimming growing rapidly. The aim of the study was to use functional magnetic resonance imaging (fMRI) to demonstrate how mood changes after cold water immersion are associated with changes in brain connectivity.

Method: 33 healthy adults naïve to cold water swimming undertook a 5-minute cold water (20 degrees) cold water bath. Self-reported emotional state and brain connectivity were measured with a validated questionnaire and with functional magnetic resonance imaging (fMRI) before and after immersion. MRI Data was acquired at 3Tesla with MPRAGE anatomical and BOLD functional series. Analysis at subject level was followed with normalisation into the Montreal Neurological Institute space from which group level inferential statistics were performed. A robust brain parcellation approach and multivariate analyses of neuroimaging data were combined with self-reported behavioural measurements.

Results: Participants felt more active, alert, attentive, proud and inspired following immersion. The increase in positive affect was associated with changes in coupling between brain areas involved in attention control, emotion and self-regulation. The relationship between changes in functional connectivity and positive affect remained consistent across the participant group A reduction in negative emotions did not show strong associations with changes in brain connectivity.

Conclusions: These results indicate that changes in interactions between large scale brain networks linked to positive affect can be demonstrated with fMRI. These changes may contribute to the reported positive improvements in mood following cold water immersion.

Yankouskaya, A et al (2023) Short -term head out whole body cold water immersion facilitates positive affect and increases interaction between large scale brain networks. Biology 12 (211) 1-20

P078 A critical review of the use of the PENTOCLO triple therapy medication regime for the management of stage III and/or refractory osteoradionecrosis of the jaw to improve quality of life

Lucy Koh

Lancashire Teaching Hospitals Foundation Trust

Background: Osteoradionecrosis of the jaw (ORNJ) is a debilitating late effect of head and neck radiotherapy. Incidence is 10%, however once diagnosed is difficult to treat. Severe cases can cause exposed bone, pathological fracture and oral fistulas. ORNJ is managed with regular follow up to achieve symptom control, if progression occurs other management options are explored, however there is no 'treatment protocol'. ORNJ is managed conservatively or surgically. Surgery is invasive and disfiguring with risk of poor healing in stage III and refractory ORNJ, therefore conservative management is usually employed, e.g., oral hygiene, antibiotics, sequestrectomy and analgesia. A triple therapy medication is showing promising results for ORNJ. Pentoxifylline (Vasodilator), Vitamin E (alpha tocopherol) and a new generation bisphosphonate, Clodronate (PENTOCLO). Published research demonstrated positive benefits, improving pain, increased oral nutrition and quality of life.

Methods: A systematic search and critical review of published literature was undertaken to ascertain benefits of using PENTOCLO for stage III/ refractory ORNJ by critically analysing the primary research and synthesising findings. Search/Key terms used: Pentoxifylline, Tocopherol, Clodronate, osteoradionecrosis, radiotherapy, head and neck cancer, mandible

Results: Data was analysed and synthesised using a 'narrative synthesis' (Ryan, 2013), a method that enabled arrangement of papers to be critiqued systematically. For stage III/refractory ORNJ, efficacy has demonstrated improved quality of life. Use of concurrent sequestrectomy where indicated demonstrated increased control of ORNJ whilst improving efficacy of PENTOCLO.

Conclusion: Off license prescribing of PENTOCLO is safe, well-tolerated and inexpensive for ORNJ and should be considered first line treatment.

1. Ryan, R. (2013). Cochrane Consumers and Communication Review Group; data synthesis and analysis. http://cccrg.cochrane.org June 2013

P079 The within-subjects reliability of fractional anisotropy (FA) in the cervical spinal cord of control participants

Hussein Al-shaari[1]; Jonthan Fulford[2]; Christine Heales[2]; Marios Politis[2]

[1]Exeter University and Najran University; [2]Exeter University

Background: Diffusion tensor imaging(DTI) represents a promising technique for examining the cervical spinal cord (CSC) in vivo. Fractional anisotropy(FA) is a DTI metric which assesses directional characteristics of water proton diffusivity in tissues. It is affected by many factors including changes in water content and the presence of crossing fibres. Its values range from 0-1, where 0 reflects isotropic molecular water mobility and 1 anisotropic water diffusion.

Aim: The study purpose was to determine within-subjects reliability for measurements of FA in the healthy human cervical spinal cord.

Methods: A total of twenty healthy controls (10 male, mean age:33.93.5 years, 10 female mean age:47.514.4 years), with no family history of neurological disorders or contraindication(s) to MRI, were recruited over a two-month period. Each participant was scanned twice (3T MRI scanner - Siemens Prisma). Data were corrected for motion

artefact, then segmented and registered to a template. Metrics were then computed using Spinal Cord Toolbox(SCT). Single and average within-subject intra-class correlation coefficients(ICC) of FA were determined between the 2nd and 5th cervical vertebrae for the total WM and WM regions: dorsal column(DC), ventral column(VC) and lateral column(LC).

Results: FA showed poor to excellent within-subjects reliability. The single ICCs were 0.42, 0.43, 0.49, and 0.46 in WM, DC, VC and LC, respectively, and the average ICCs of FA were 0.59, 0.60, 0.66, and 0.63 in WM, DC, VC and LC, respectively.

Conclusion: Outcomes from this reliability study demonstrate that FA is a potentially useful quantitative biomarker in assessing CSC changes. However, reproducibility results indicate technical constraints.

P080 Within-subject variability evaluation, between two visits, for the mean diffusivity of the healthy cervical spinal cord

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Background: Diffusion tensor imaging(DTI) has been shown to be a promising technique for assessing the cervical spinal cord in vivo. It provides a broad indicator of tissue structure of axonal white matter. It is thought to be sensitive to evaluating damage within spinal cord tracts. It is therefore important to assess within-subject reliability.. Mean diffusivity(MD) is a DTI metric used to measure average diffusion independent of tissue orientation.

Aim: The purpose of this study was to determine the within-subject reliability of MD in the healthy human cervical spinal cord.

Methods: 20 healthy controls (10 male, mean age: 33.93.5 years, 10 female, mean age: 47.514.4 years) with no family history of neurological disorders or contraindication(s) to MRI were recruited over two months. Each participant was scanned using a 3T MRI scanner (Siemens, Prisma) on two different occasions. Data were corrected for motion artefacts, then segmented and registered to a template. Metrics were computed using Spinal Cord Toolbox(SCT). The within-subject coefficients of variation(CV) were measured between the 2nd and 5th cervical vertebra for the total white matter (WM), and sub-regions: dorsal column(DC), ventral column(VC), lateral column(LC)).

Results: MD showed relatively small variation with values for CV (group mean and range) of 4 (2-6), 4 (3-7), 9 (5-12) and 5 (3-7) in the WM, DC, VC, and LC ,respectively.

Conclusion: The CV provides useful information for future studies that intend to evaluate within-subject changes. The CV were different across SC regions and this regional variability should be considered when assessing MD in clinical patients.

P081

The reliability and measurement error of magnetization transfer imaging within the healthy cervical spinal cord

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Background: Magnetization transfer imaging (MTI) is a quantitative approach that evaluates the interchange of bound and free water in tissue and generates a variable known as the magnetisation transfer ratio (MTR).

Aim: The purpose of this study was to evaluate the within-subject reliability and measurement error of the MTR measurement in the cervical spinal cord of healthy humans.

Methods: Over the course of two months, twenty healthy controls (10 males, mean age: 33.93.5 years, 10 females, mean age: 47.514.4 years) without a family history of neurological diseases or MRI contraindications were recruited. Each subject was scanned twice using typical MTI sequences on a 3T MRI scanner. Spinal Cord Toolbox (v5.3.0) was utilised for the post-processing of images. After segmenting and registering the data to the template, MTR was computed. Between the 2nd and 5th cervical vertebrae, the within-subject coefficients of variation (CV%), single and average within-subject intraclass correlation coefficients (ICC), and Bland-Altman (BA) plots were calculated for the total WM and for specific WM regions: dorsal column (DC), ventral column (VC), and lateral column (LC) (LC).

Results: MTR shown poor to excellent within-subjects reliability among the total WM, DC, VC, and LC with the

single/average ICC values of 0.03/0.06, 0.10/0.18, 0.39/0.75, and 0.001/0.002, while the CV% reported acceptable variation with values less than 10%. The (BA) plots demonstrated good intra-subject agreement between scan-rescan values.

Conclusion: This study suggests that clinical trials utilising the MTI approach are viable and illustrate that quantitative MTI may be used to track tissue changes in patients with degenerative WM.

1. Lévy, S., et al., Test-retest reliability of myelin imaging in the human spinal cord: Measurement errors versus region-and aging-induced variations. PloS one, 2018. 13(1): p. e0189944. 2. Taso, M., et al., Tract-specific and age-related variations of the spinal cord microstructure: a multi-parametric MRI study using diffusion tensor imaging (DTI) and inhomogeneous magnetization transfer (ihMT). NMR in Biomedicine, 2016. 29(6): p. 817-832. 3. Ropele, S., et al., Assessment and correction of B1-induced errors in magnetization transfer ratio measurements. Magnetic Resonance in Medicine: An Official Journal of the International Society for Magnetic Resonance in Medicine, 2005. 53(1): p. 134-140. 4. Tofts, P., et al., Sources of variation in multi-centre brain MTR histogram studies: body-coil transmission eliminates inter-centre differences. Magnetic Resonance Materials in Physics, Biology and Medicine, 2006. 19(4): p. 209-222. 5. Berry, I., et al., A multicenter measurement of magnetization transfer ratio in normal white matter. Journal of Magnetic Resonance Imaging: An Official Journal of the International Society for Magnetic Resonance in Medicine, 1999. 9(3): p. 441-446. 6. Barker, G., et al., A standardised method for measuring magnetisation transfer ratio on MR imagers from different manufacturers-the EuroMT sequence. Magnetic Resonance Materials in Physics, Biology and Medicine, 2005. 18(2): p. 76-80.

P082 Impact of planning target volume margins with different prescription isodose in gamma knife radiosurgery for brain metastasis: A phantom study

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The impact of Planning target volume margins with the selection of different prescription isodose (PI) on plan quality has not been well evaluated during inverse planning on brain metastasis. A CT scan of the STEEV head anthropomorphic phantom was imported into the Leksell GAMMA PLAN Treatment Planning System. A target was centrally contoured together with organs at risk. A set of plans were made with Planning target volume margin of 0mm at five levels of PI from 50% to 70% at 5% increment. Identical plans were generated with four Planning target volume margins; 0.5mm,1mm,1.5mm and 2mm. Each plan was fine-tuned to ensure the same target coverage. The impact of the planning target volume margins on the quality metrics [S], [GI], V12, [PCI] and [Tt] was analyzed using a one-way ANOVA test. The selectivity, gradient index, V12, Paddicks index increases gradually with increasing PTV margin with prescription isodose but no significant difference with same PTV margin and different Prescription Isodose. The results revealed that the 2.0mm PTV margin had the highest mean value selectivity (M = 0.93), PCI (M = 0.92), GI (M = 2.50), V12 (M = 16.17) and treatment time (M = 118.32min). The 0.0mm PTV margin had the lowest value for all the indexes except for the treatment time (M=105.58min) which was a little higher compared to the 0.5mm PTV margin (M= 86.36min). PTV margins beyond the GTV(0mm) significantly impact plan quality indexes, normal brain sparing and should be avoided when treating brain metastasis on the Gamma Knife.

1. Jhaveri J, Chowdhary M, Zhang X, et al (2019) Does size matter? Investigating the optimal planning target volume margin for postoperative stereotactic radiosurgery to resected brain metastases. J Neurosurg 130:797-803. https://doi.org/10.3171/2017.9.JNS171735 2. Dimitriadis A, Paddick I (2018) A novel index for assessing treatment plan quality in stereotactic radiosurgery. J Neurosurg 129:118-124. https://doi.org/10.3171/2018.7.GKS18694 3. Badloe J, Mast M, Petoukhova A, et al (2021) Impact of PTV margin reduction (2 mm to 0 mm) on pseudoprogression in stereotactic radiotherapy of solitary brain metastases. Tech Innov Patient Support Radiat Oncol 17:40-47. https://doi.org/10.1016/j.tipsro.2021.02.008

P084 Phenytoin-induced calvarial hyperostosis: Bighead for a reason

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Background: Although the effects of antiepileptic drug phenytoin on gingival growth have been studied, assessment of the effects on bone lags behind. With 1,5 million prescriptions/year, the adverse effects of phenytoin on bone need to be addressed because they can be seen more often affecting the burgeoning population of older persons and children.

Purpose: A 25-year-old woman with autism presented with skull injury after a fall. She had no focal neurologic deficits. The skull was enlarged and facial characteristics were coarse. Brain CT excluded subdural or subarachnoid haemorrhage/haematoma, bony injury, or hydrocephalus. Interestingly, there was massive expansion of the calvarium. The patient then reported long-term treatment with phenytoin for epilepsy. Prolonged administration of

phenytoin in patients with epilepsy, results in vitamin D deficiency, reduction of the serum calcium concentrations, and low calcitonin levels associated with loss of bone, which is compensated by secondary hyperparathyroidism. Elevated parathyroid hormone levels exercise divergent effects on the appendicular and axial skeleton (catabolic, causing osteoporosis) as opposed to the calvarium (proliferative, causing hyperostosis). Phenytoin activates the common molecular pathway of cAMP in bone, increasing bone turnover with excessive osteogenesis, manifest as hyperostosis. On radiographs and CT images calvarial hyperostosis is visualized as osteosclerosis, with thickening of the trabeculae and the skull cortices. MR images confirm the formation of excess diploic bone seen as expanded diploic space.

Summary of content: Osteoporosis is common in patients receiving antiepileptic drugs. With chronic phenytoin use, however, there is promotion of bone formation in the skull, manifesting with calvarial hyperostosis.

1. Kane SP (2021). Phenytoin, ClinCalc drug stats database, Version 2021.10. ClinCalc: https://clincalc.com/DrugStats/Drugs/Phenytoin. 2. Siddappa R, Martens A, Doorn J, et al (2008). cAMP/PKA pathway activation in human mesenchymal stem cells in vitro results in robust bone formation in vivo. Proc Natl Acad Sci USA; 105: 7281-6 3. Koide M, Kinugawa S, Ninomiya T, et al (2009). Diphenylhydantoin inhibits osteoclast differentiation and function through suppression of NFATc1 signaling. J Bone Miner Res 24:1469-80

DOSE / RADIATION PROTECTION POSTER PRESENTATIONS

P086 Optimisation of elements beam model and Integral Quality Monitor (IQM) dose calculation model for single isocentre multiple brainmets patient specific dosimetry

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Background: Elements treatment planning system (*Brainlab AG, Germany*) and IQM (*iRT Systems GmbH, Germany*) were acquired in our department to enable single isocentre treatment for multiple brainmets (MBM) and patient specific dosimetry (PSD) for Elekta Agility Versa HD linac. This study aimed to find the best fit Elements multi leaf collimator (MLC) parameters and improve the accuracy of the IQM dose calculation model for small field dosimetry.

Method: Area output factors were measured for field sizes down to 0.3x0.5 cm2 for fine tuning the IQM dose calculation model, performed by iRT. Elements beam models were generated for Elekta Agility 6MVFFF energy, Versa HD MLC with varying minimum MLC gaps ranging from 0 to 5 mm. Single isocentre treatment plans for 2-7 MBM were generated using all 5 beam models which were measured with IQM. Additionally, 20 clinical test plans were measured with the best fit beam model parameters.

Results: A minimum leaf gap of 0 mm gave the best agreement with IQM measurements as it accurately modelled the varying effective rounded end leaf gap of unused MLCs between lesions. The average segment by segment deviation between calculated and measured IQM signals for small fields were found to be within 3%. All clinical test plans matched the final cumulative signal deviation criteria.

Conclusion: Best fit MLC parameters for the Elements beam model were determined and IQM small field dose calculation model was improved enabling clinical implementation of IQM for PSD of single isocentre treatment for MBM.

P087 Understanding dose reduction - AEC vs manual exposure

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Background: A key method of reducing radiation dose is the use of an Automatic Exposure Control (AEC) over manual exposure. While well regarded in literature, it is unknown why manual exposure results in higher doses. This study tests claims that AECs reduce dose over manual exposure and determines whether radiographer experience causes the disparity in dose.

Methods: In a prospective 4 week study in 2019, 20 radiographers were selected from an acute care hospital. Age, level of seniority, and years of experience were recorded. Participants evaluated a phantom model before providing exposure factors for lumbar spine, abdomen, and pelvis x-ray projections. These factors and an AEC were used on equivalent phantoms to generate dose readings. Tests of variance and difference in values allowed statistical analysis of doses.

Results: Compared to AECs, manual exposure increased median dose for AP abdomen by 72.14 µGy·m² (+68%, p=0.001), pelvis by 62.22 µGy·m² (+44%, p=0.001), AP lumbar spine by 52.59 µGy·m² (+63%, p=0.004), and lateral lumbar spine by 156.64 µGy·m² (+213%, p=0.001). Manual exposure variance was significantly larger than AEC (p=0.044, 0.001, 0.023, 0.005). Experience levels showed no impact on dose or variance (p>0.05).

Conclusion: The AEC significantly reduced dose compared to manual exposure. Radiographer experience had no impact. Literature points to poor coordination within radiography education, poorly updated exposure factor training, and reliance on outdated methods. This perpetuates when passed down from radiographer to student. Radiography education should incorporate practical teaching of modern exposure manipulation beyond theory, available to both undergraduates and practicing radiographers.

1. Baldwin A, Mills J, Birks M, Budden L. Role modelling in undergraduate nursing education: an integrative literature review. Nurse Education Today 2014;34(6):18-26. Doi: 10.1016/j.nedt.2013.12.007. 2. Campbell SS, Morton D, Grobler AD. Transitioning from analogue to digital imaging: Challenges of South African analogue-trained radiographers. Radiography 2019;25(2):39-44. Doi: 10.1016/j.radi.2018.10.001 3. Carroll QB. Radiography in the Digital Age: Physics, Exposure, Radiation Biology. Springfield, Il: Charles C Thomas. 2011. 4. Demaio, DN, Noble LB, Peterson P, Odle TG. Best Practices in Digital Radiography. Albuquerque, NM: ASRT. 2019 5. Diagnostic Radiography UK Workforce Report 2018. Society and College of Radiographers. https://www.sor.org/sites/default/files/document-versions/diagnostic_workforce_census_+2018.pdf. Published 2018. Accessed September 20, 2019. 6. England A, Geers-van Gemeren S, Henner A, Kukkes T, Pronk-Larive D, Rainford L, McNulty JP. Clinical radiography education across Europe. Radiography 2017;23(1):S7-S15. Doi: 10.1016/j.radi.2017.05.011 7. Felstead IS, Springett K. An exploration of role model influence on adult nursing students' professional development: A phenomenological research study. Nurse Education Today 2015;37:66-70. Doi: 10.1016/j.nedt.2015.11.014 8. Graham DT, Cloke P, Vosper M. Principles and Applications of Radiological Physics 6th ed. London: Elsevier. 2012. 9. Greffier J, Pereira F, Macri F, Beregi J, Larbi A. CT dose reduction using Automatic Exposure Control and iterative reconstruction: A chest paediatric phantoms study. European Journal of Medical Physics 2016;32(4),:582-589. Doi: 10.1016/j.ejmp.2016.03.007 10. Hayre CM, Eyden A, Blackman S, Carlton K. Image acquisition in general radiography: The utilisation of DDR. Radiography 2017;23(2):147-152. Doi: 10.1016/j.radi.2016.12.010 11. Hayre CM. 'Cranking up', 'whacking up' and 'bumping up': X-ray exposures in contemporary radiographic practice. Radiography 2016;22(2):194-198. Doi: 10.1016/j.radi.2016.01.002 12. Health Protection Agency. Doses to Patients from Radiographic and Fluoroscopic X-ray Imaging Procedures in the UK - 2010 Review. The Government of the United Kingdom. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/342780/HPA-CRCE-034_Doses_to_patients_from_radiographic_and_fluoroscopic_x_ray_imaging_procedures_2010.pdf; Published 2012. Accessed September 20, 2019. 13. Higaki T, Nakamura Y, Fukumoto W, Honda Y, Tatsugami F, Awai K. Clinical application of radiation dose reduction at abdominal CT. European Journal of Radiology 2018;111:68-75. Doi: 10.1016/j.ejrad.2018.12.018 14. Le NTT, Robinson J, Lewis SJ. Obese patients and radiography literature: what do we know about a big issue? Journal of Medical Radiation Sciences 2015;62(2):132-141. Doi: 10.1002%2Fjmrs.105 15. Ma WK, Hogg P, Tootell A, Manning D, Thomas N, Kane T, . Kitching J. Anthropomorphic chest phantom imaging - The potential for dose creep in computed radiography. Radiography 2013;19(3):207-211. Doi: 10.1016/j.radi.2013.04.002 16. Motyer R, Matthews K. An Investigation into the use of Automatic Exposure Control in Paediatric Direct Radiography. European Society of Radiography. 2018. Doi: 10.1594/ecr2018/C-1984. Published 2018. Accessed September 18, 2019. 17. Scally AJ. Recommended Standards for the Routine Performance Testing of Diagnostic X-Ray Imaging Systems. IPEM Report 91, York: Institute of Physics and Engineering in Medicine. 2005 18. Söderberg M. OVERVIEW, PRACTICAL TIPS AND POTENTIAL PITFALLS OF USING AUTOMATIC EXPOSURE CONTROL IN CT: SIEMENS CARE DOSE 4D. Radiation Protection Dosimetry 2016;169(1-4):84-91. Doi: 10.1093/rpd/ncv459 19. White DR, Booz J, Griffith R V, Spokas JJ, Wilson IJ. Report 44. Journal of the International Commission on Radiation Units and Measurements. 1989;23(1). https://doi.org/10.1093/jicru/os23.1.Report44. 20. Whitley AS, Jefferson G, Holmes K, Sloane C, Anderson C, Hoadley G. Clark's Positioning in Radiography. 13th ed. Boca Raton, FL: CRC Press. 2016

P088 Gown artefacts on paediatrics -- how can we overcome this?

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Background: It has been noticed with the improved technology that gown artefact is a significant problem within general x-ray particularly within the paediatric demographic. This has caused a significant decrease in image quality associated with this. This poster aims to show the different options available for paediatrics and the best methods for imaging paediatrics. Aim to look at different body areas and the different effects/clothing artefact.

Method: With the use of a paediatric phantom, image the phantom in a variety of different "patient's own" clothing, hospital gown, different items for covering i.e pillow case or sheet and no gown on a variety of different body parts to assess the effect of the clothing options on the artefact to work out which is the best option when patient dignity is also required.

Results: To be portrayed in a pictorial format the overall outcomes with a table/diagram to grade best to worse for artefact.

Conclusion: Discuss the appropriateness of when no clothing is best with paediatrics -- with parental/guardian consent/guidance within the safe space of the x-ray room. When clothing is required for patient dignity which clothing/cover up options are best to reduce the artefact and the image quality risk to the patient.

Carver. E et al (2021) Medical Imaging: Techniques, Reflection and Evaluation Elsevier 3rd Ed. Whitley. S et al (2015) Clark's Positioning in Radiography CRC Press 13th Ed.

P089 An insight into the uses and misuses of digital radiography

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Introduction: The transition from conventional to digital radiography (DR) is one of the most significant changes in medical imaging. Radiology professionals must be trained to acquire new abilities and modify workflow procedures. Consequently, there is a definite and widespread need for thorough, hands-on teaching in digital image technologies. This study aims to identify gaps in the knowledge and skills of digital imaging by assessing radiology professionals' knowledge and practice regarding radiation protection, image post-processing, and image quality in digital imaging practice.

Methods: An exploratory cross-sectional survey was conducted among radiographers in the United Arab Emirates. The survey collected the participants' demographics, qualifications, experience, knowledge and practice during digital radiography.

Results: A total of 157 radiographers participated in the study. 50% of participants had training in DR, 34.4% adhered to proper collimation most of the time, and 32.5% used image crop instead of proper collimation sometimes. 45.2% sometimes depended on automatic exposure, and 55.4% mentioned they modified the exposure manually. 36.9% used image processing tools. 30.6% always monitored their repeat rate, and 12.1% mentioned they never did.
Conclusion: The study revealed that most participants had moderate knowledge and adherence to radiation protection. Education and training courses should be designed in collaboration between professional bodies and academic institutes to improve knowledge and skills. The curriculum should emphasise the typical errors that radiographers make when performing digital radiography.

1. Lee W, Lee S, Chong S, Lee K, Lee J, Choi JC, et al. Radiation dose reduction and improvement of image quality in digital chest radiography by new spatial noise reduction algorithm. PLoS one 2020;15(2):1-12. 2. Demaio DN, Herrmann T, Noble LB, Orth D, Peterson P, Young J, et al. Best practices in digital radiography. Radiol Technol. 2019;91(2):198-201. 3. Uffmann M, Schaefer-Prokop C. Digital radiography: The balance between image quality and required radiation dose. Eur J Radiol. 2009 Nov;72(2):202-8. 4. Hayre CM, Eyden A, Blackman S, Carlton K. Image acquisition in general radiography: The utilisation of DDR. Radiography [Internet]. 2017;23(2):147-52. Available from: http://dx.doi.org/10.1016/j.radi.2016.12.010 5. ICRP. International Commission on Radiological Protection, 2009 Annual Report. (2009). 6. Casey B. Digital radiography may be leading to "collimation creep." Aunt Minnie. 2019. 7. Butt A, Savage NW. Digital display monitor performance in general dental practice. Aust Dent J. 2015;60(2):240-6.

P090 Exploring advanced practice: An evaluation of the accuracy of therapeutic radiographer (RTT) dosimetrist clinical target volume (CTV) definition for low and intermediate risk prostate cancer

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[1]GenesisCare; [2]Sheffield Hallam University

Background: To demonstrate whether a therapeutic radiographer dosimetrist is competent to independently contour clinical target volumes (CTVs) for radiotherapy to the prostate +/- seminal vesicles on CT, as a possible component of advanced practice.
Method: A retrospective contour comparison of therapeutic radiographer outlined prostate and seminal vesicle contours across 55 datasets using CHHiP (ICR, 2010) guidelines for Group 1 and 2 risk cohorts. Contours were compared in terms of absolute volume, similarity using DICE coefficient and mean distance to agreement. This was

completed across a purposive sample of low and intermediate risk prostate cancer patients treated with radiotherapy by 26 different clinical oncologists within the institution. Both prostate and seminal vesicle contours were considered independently.

Results: Prostate contours alone were comparable to clinical oncologist contours across the sample with a mean DICE coefficient of 0.8. Contouring for seminal vesicles was less similar with a mean DICE coefficient of 0.64. Mean distance to agreement across prostate contours was 1.45mm. Mean distance to agreement across seminal vesicle contours was 1.39mm. Mean absolute volume difference for prostate was 3.45cc. Mean absolute volume difference for seminal vesicles was 1.75cc.

Conclusion: Prostate contours were generally comparable to the clinically-delivered clinical oncologist volumes, achieving a good standard (Velker et al, 2013) which is in keeping with this being a fairly stable anatomical structure, and that in radiotherapy planning the prostate itself is contoured in its entirety in all cases. Confounding factors for this included the potential inclusion of MR imaging by the consultant clinical oncologists, variations in practice amongst the clinical oncologists. Seminal vesicle contours had less overlap. Seminal vesicle contouring varies according to clinical risk factors, and although the therapeutic radiographer contoured according to CHHiP criteria as a chosen baseline, the clinical oncologist contours were not necessarily based on the same set criteria but rather their clinical judgement at the time of outlining the patient informed by clinical practice recommendations.

Institute of Cancer Research (2010). Conventional or Hypofractionated High Dose Intensity Modulated Radiotherapy for Prostate Cancer. Protocol Version 9.2 ICR-CTSU/2006/10007

Velker V M, Rodrigues G B, Dinniwell R, Hwee J, Louie A V (2013). Creation of RTOG compliant patient CT-atlases for automated atlas based contouring of local regional breast and high-risk prostate cancers. Radiation Oncology 8:188.

P091 CT KUB dose optimisation project

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Background: Our team were considering a change to our CT KUB protocol. Staff were scanning patients Cranio-caudally between fixed anatomical points. We wanted to assess potential radiation dose saving from, scanning caudo-cranially, and manually aborting the scan above the highest kidney.

Purpose of the Poster: Our audit demonstrated significant reductions in patient dose through simple protocol changes and staff education. Our lessons learnt around the impact of over-scanning can be applied to many CT scanning protocols. We aim to share our learning and highlight the utility of Dose Management System (DMS) in supporting Image Optimisation.

Summary: We reviewed a randomised sample of 50 male and 50 female patient CT KUB scans acquired over a 4-month period, to assess any gender variance in dose. Then utilised the interactive dosimetry module within Radimetrics to simulate the potential impact of reducing over-scanning. We re-calculated the dose the patient would have received if the scan-length had been limited to <0.5cm below the Symphysis Pubis, and <1 cm above the highest kidney. We found that there was potential to reduce patient dose by an average 15.82% (range 2.19% - 39.23%). As well as reduce Breast dose by an average 40.85% in women and testicle dose by an average 56.8% in men. The difference was considered significant, and the new protocol was implemented, and staff education delivered around the change in protocol. After 3 months we re-audited patient dose for all CT KUB scans performed within a calendar month and found our mean effective dose had actually reduced by 21.2%

1. West WG. How to Create a World Class Dose Reduction Program. Radiol Manage. 2014 Sep;36(5):39-41. PMID: 30514035. 2. Goldman AR, Maldjian PD. Reducing radiation dose in body CT: a practical approach to optimizing CT protocols. AJR Am J Roentgenol. 2013 Apr;200(4):748-54. doi: 10.2214/AJR.12.10330. PMID: 23521442. 3. Uldin H, McGlynn E, Cleasby M. Using the T11 vertebra to minimise the CT-KUB scan field. Br J Radiol. 2020 Jun;93(1110):20190771. doi: 10.1259/bjr.20190771. Epub 2020 Mar 25. PMID: 32208971.

P092 CT Colonography optimisation project assessing the impact and issues with dose mmodulation

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Background: After the installation of a new scanner in 2019 we implemented dose modulation in our CT Colonography (CTC) protocol. We wanted to assess the impact of the new scanner on patient dose, by comparing against patient doses on our old scanner and establish new LDRL's.

Purpose of the Poster: Our audit demonstrated the utility of Radiation Dose Management Software (DMS) in interrogating patient dose data to support Image Optimisation. We discovered significant reductions in dose were achieved using dose modulation, however, a significant number of outliers were found in larger patients. Using our DMS allowed us to interrogate this data in detail, educate staff, and further reduce patient dose through a simple intervention. We aim to share our learning and highlight the utility of DMS software in supporting Image Optimisation.

Summary of content: We reviewed all CTC scans performed within a 3 month timeframe, the DMS was utilised to benchmark current patient dose using dose modulation versus our old scanner. CTC recommendations suggest at least one scan should be performed low dose aiming for 30-50mAs. We found that dose modulation had correctly used less than 50mAs in many cases, however we found multiple outliers to >200mAs. We performed a dose optimisation project with radiographers manually overriding any mAs the scanner wanted to set over what would have been manually selected for patients of equivalent size previously. Re-auditing found that we had less outliers, no notable decrease in image quality, and the average mAs, and therefore patient dose, had reduced by a further 12.5%.

1. M.Callaway et al. Standards of practice for computed tomography colonography (CTC) Joint guidance from the British Society of Gastrointestinal and Abdominal Radiology and The Royal College of Radiologists. London; Royal College of Radiologists 2021. 2. http://www.gov.uk/government/publications/bowel-cancer-screening-imaging-use/bowel-cancer-screening-guidelines (last accessed 19/08/22). 3. Chang KJ, Yee J. Dose reduction methods for CT colonography. Abdom Imaging. 2013 Apr;38(2):224-32. doi: 10.1007/s00261-012-9968-1. PMID: 23229777. 4. Ginsburg M, Obara P, Wise L, Wroblewski K, Vannier MW, Dachman AH. BMI-based radiation dose reduction in CT colonography. Acad Radiol. 2013 Apr;20(4):486-92. doi: 10.1016/j.acra.2012.12.011. PMID: 23498991.

P093 Implementing from first principles gender-dependent radiotherapy

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Freelance

Clinical trials are the root, where an assumption of reference adult = reference man (70kg, caucasian, western lifestyle, 25-30y) lies deeply untrue. Consequently a gender data gap exists, which results in less than best practice evidence. Scientists when applying careful statistical manipulation to the collected data, often pool or remove gender differentials. Otherwise, studies would need twice the number of patients, time, and money. In radiotherapy, a small but significant difference in radiosensitivity (from a tumour control and normal tissue toxicity perspective) between genders has been well documented. Yet most radiotherapeutic guidelines are based solely on population averages (such as a person's BMI and effective dose) rather than demographic subgroups such as age, race and gender. Female are more radiosensitive, likely to be cured of cancer but worse side effects (greater toxicity). Male more radio-resistant, have fewer side effects, but shorter long-term survival rates. This is not considered in international guidelines for radiation dosages. Therefore, in clinical trials, males and females with non-sex-related cancers should be considered as biologically distinct groups, for whom specific treatment approaches merit consideration and further investigation. With oncological research and practice still largely sex and gender blind. This delay, may result in prescription of sub-optimal treatment doses and inaccurate long-term risk assessment. To accelerate precision medicine, a radiological concept and metric - personalised dose and personalised (long-term) risk index is discussed. This incorporates individual radiosensitivity; plus physiological, lifestyle and genomic variations. Addressing deep-rooted biases and challenging the status quo is vital to improving health outcomes for the female population.

1. Biegon, A. (2022) Modulation of Secondary Cancer Risks from Radiation Exposure by Sex, Age and Gonadal Hormone Status: Progress, Opportunities and Challenges. Journal of Personalised Medicine. 12(5), 725.

2. Criado Perez, C. (2019) Invisible Women: Data Bias in a World Designed for Men. Abrams Press. UK

3. De Courcy, L. (2020) Gender-dependent radiotherapy: The next step in personalised medicine? Critical Reviews in Oncology/Hematology. 147, 102881.

4. Fukunaga, H. (2019) Precision Radiotherapy and Radiation Risk Assessment: How Do We Overcome Radiogenomic Diversity? The Tohoku Journal of Experimental Medicine. 247(4), 223-235.

5. Mosconi, L. (2020) The XX Brain: The Groundbreaking Science Empowering Women to Prevent Dementia. Allen & Unwin. UK

6. Narendran, N. (2019) Sex Difference of Radiation Response in Occupational and Accidental Exposure. Frontiers in Genetics. 10(260).

7. Wagner, A.D. (2019) Gender medicine and oncology: report and consensus of an ESMO workshop. Annals of Oncology. 30(12),1914-1924.

P094 Evaluation of organ at risk dose constraints 1 year after implementing partial breast irradiation

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Background: Partial Breast Irradiation (PBI) is a radiotherapy treatment option for low-risk breast cancers (3). In the UK, it is standard practice to apply The Fast Forward Trial Whole Breast radiotherapy (WBRT) Organ At Risk (OAR) dose constraints (1, 4) to aid PBI dosimetry planning. OAR dose should always be kept as low as reasonably achievable (2). This audit will evaluate if there is scope to apply reduced OAR dose constraints for patients receiving PBI.

Method: Primary dose constraint quantitative metrics for lung V7.8Gy, lung mean and heart mean (left-sided only) were collected for 25 patients in each of the following groups: right PBI; left PBI (breath-hold); right WBRT; and left WBRT (breath-hold). The mean was calculated for all groups. Standard deviation to one place was calculated for PBI groups.

Results: V7.8Gy lung dose constraint was reduced in left and right PBI groups compared to left and right WBRT groups, by 2.8% and 3.3%, respectively. Mean lung dose was reduced in both left and right PBI groups compared to left and right WBRT groups, by 0.7Gy and 0.8Gy, respectively. Mean heart dose for those receiving left PBI was 0.2Gy less than left WBRT. A standard deviation to one place, applied to the means of all PBI OAR dose constraints, demonstrated a significant reduction across all OAR dose constraints.

Conclusion: Reduction of primary OAR dose constraints for PBI can be applied to ensure OAR dose is kept as low as reasonably achievable. Implementation of breath-hold for right PBI may reduce lung OAR doses further.

1. Brunt, A.M., Haviland, J.S., Wheatley, D.A. 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 (10237, May), pp. 1613-1626. 2. Department of Health and Social Care (2018) The Ionising Radiation (Medical Exposure) Regulations. The Department of Health, UK. 3. The Royal College of Radiologists (2016) Postoperative radiotherapy for breast cancer: UK consensus statement. London. 4. The Royal College of Radiologists (2021) Postoperative radiotherapy for breast cancer: hypofractionation RCR consensus statements. London.

P095 Dosimetric comparison of intensity modulated radiotherapy (IMRT) planning methods for partial breast irradiation. A service evaluation

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Background: Partial breast irradiation (PBI) offers an excellent treatment option for women with low risk breast cancer when compared to whole breast irradiation. PBI can be achieved using a variety of radiotherapy techniques. The purpose of this service evaluation was to compare four radiotherapy planning techniques and make local recommendations regarding the optimal technique for this department.

Method: Ten patients were randomly selected and SIMRT, DMLC, VMAT Full and Partial arc plans created. All plans were optimised to meet clinical constraints. Plans were compared for conformity, maximum dose and organ at risk dose (OAR) using clinical dose constraints and conformity (CI) and homogeneity indices (HI).

Results: The results revealed all plans met CTV coverage and maximum dose goals whereas PTV goals passed in 80 -- 90% of cases. Evaluation using CI and HI revealed both VMAT plan types had optimal CI and variable HI results whilst SIMRT demonstrated sub-optimal conformity. SIMRT and DMLC had improved OAR doses when compared to VMAT plans when comparing heart, ipsilateral lung and contralateral breast.

Conclusion: VMAT plans demonstrated excellent conformity, homogeneity and maximum dose, when compared to SIMRT and DMLC. SIMRT and DMLC showed better OAR doses with DMLC, demonstrating modest improvement when compared to SIMRT. Following this study the local recommendation is the implementation of DMLC technique for PBI, thus supporting standardisation of planning processes and training whilst offering modest improvement in OAR doses.

1. Coles, C.E., Griffin, C.L., Kirby, A.M., Titley, J., Agrawal, R.K., Alhasso, A., Bhattacharya, I.S., Brunt, A.M., Ciurlionis, L., Chan, C. and Donovan, E.M., 2017. Partial-breast radiotherapy after breast conservation surgery for patients with early breast cancer (UK IMPORT LOW trial): 5-year results from a multicentre, randomised, controlled, phase 3, non-inferiority trial. The Lancet, 390(10099), pp.1048-1060. 2. Early Breast Cancer Trialists' Collaborative Group, 2011. Effect of radiotherapy after breast-conserving surgery on 10-year recurrence and 15-year breast cancer death: meta-analysis of individual patient data for 10 801 women in 17 randomised trials. The Lancet, 378(9804), pp.1707-1716. 3. Haciislamoglu, E., Colak, F., Canyilmaz, E., Zengin, A.Y., Yilmaz, A.H., Yoney, A. and Bahat, Z., 2016. The choice of multi-beam IMRT for whole breast radiotherapy in early-stage right breast cancer. Springerplus, 5(1), pp.1-13. 4. Kataria, T., Sharma, K., Subramani, V., Karrthick, K.P. and Bisht, S.S., 2012. Homogeneity Index: An objective tool for assessment of conformal radiation treatments. Journal of medical physics/Association of Medical Physicists of India, 37(4), p.207. 5. Petrova, D., Smickovska, S. and Lazarevska, E., 2017. Conformity index and homogeneity index of the postoperative whole breast radiotherapy. Open access Macedonian journal of medical sciences, 5(6), p.736.

P096 Standardisation of CT ENT protocols across a multi-site trust: An evaluation of current practice

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Background: The Trust houses five CT scanners run by multiple radiographers across three hospitals. Whilst standardised projections are relied on in conventional radiography across the UK, the same cannot be said for CT. CT can provide intricate detail of minute anatomical structures, such as those within the sinuses and mastoids. Accurate and comparable CT sinus and mastoid studies are instrumental in achieving good diagnostic outcomes for patients (Sachs *et al.*, 2017). Furthermore, replicating scan parameters and patient positioning consistently across multiple hospitals could be challenging without a clear standard. The author aimed to evaluate current practice of CT sinus and mastoid examinations and determine whether standardised protocols are required.

Method: 60 of each examination were evaluated for positioning (degree of head tilt using the hard palette) and parameters (exposure factors, reconstruction filter, reconstructed slice thickness and interval).

Results: A neutral or "chin down" position was most popular, although a variety of patient positions are used across the organisation. Parameters varied across the hospital sites. For example, a range of mA was recorded between the sites along with various reconstructed slice thicknesses and intervals.

Conclusion: Positioning and scan parameters varied across the trust representing a lack of standardisation. Without standardised protocols and image appearances, pattern recognition within these complex anatomical areas becomes challenging for the radiologist (Guenette *at al.*, 2019). Standardised protocols and a re-audit 6 months after implementation was recommended. This evaluation could be conducted across a multitude of CT protocols to assess standardisation in the modality as a whole.

1. Guenette, J.P., Hsu, L., Czaikowski, B. and Nunex, D.B. (2019) 'Standardization of temporal bone CT planes across a multisite academic institution', *American Journal of Neuroradiology*, 40, pp. 1383 - 1387 2. Sachs, P.B., Hunt, K., Mansoubi, F. and Borgstede, J. (2017) 'Standardization of temporal bone CT planes across a multisite academic institution', *Journal of Digital Imaging*, 30, pp. 11 - 16

P097 Evaluation of dose reduction potential of a scatter correction software for AP lumbar spine X-ray imaging

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Background: For lumbar spine imaging, plain radiography is a crucial diagnostic technique. Radiation scattering is undesirable since it increases the patient dose. Radiation exposure must be kept as low as is practically possible (ALARP). Conventionally, an anti-scatter grid is used to reduce X-ray scattering. The inclusion of a grid increases patient dose because more X-ray photons are needed to compensate for the grid's absorption of primary X-rays. Image processing software (VG) has recently been developed to correct for scattered X-rays and reduce radiation dose. This study aims to compares radiation doses of virtual grid to conventional grid.

Method: An anthropomorphic phantom was scanned with different body mass index (BMI: 18.3, 29, 38, 42, 46 kg/m^2) using fat phantoms. AP lumbar spine X-ray projection was acquired with/without the physical grid (PG) and exposure factors kept constant (kVp and SID) with AEC was conducted. Image processing software was performed to Gridless images. Paired samples T-Tests were used to compare DAP values. PCXMC software calculated the effective dose E (mSv).

Results: DAP and mAs increase as BMI increased. A significant mean difference was found for mean DAP (Gy.m^2) between the virtual grid and physical grid (128.1, < 0.04) with 95% CI [5.5, 250]. The VG has far lower mean DAP values than the conventional grid (3425Gy.m^2) and (16265 Gy.m^2), respectively. The mean effective dose of VG was (0.030.02 mSv) and PG (0.200.15 mSv).

Conclusion: By comparison to PG, VG software promises to lower radiation dose levels in terms of DAP value and effective dose.

DIGITAL TECHNOLOGIES POSTER PRESENTATIONS

P100 Radiographer acceptance of a virtual reality tool for patients prior to MRI

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Background: A key part of a radiographers role within MRI is providing the required emotional support to help patient succeed with a scan. Many patients present with anxiety and concern which can present as claustrophobia due to the nature of the scan equipment. This can impact on patient outcomes as well as operational efficiency. Being informed is important to patients and despite use of information leaflets and videos, these are limited in their representation. This is where preparation using virtual reality could be beneficial. As part of a feasibility study looking at the use of a virtual scan experience for patients prior to MRI, the views of practitioners were sought to see how effective this might be and how best to implement its use in clinical practice.

Methods: 9 radiographers attended two focus group sessions to see the tool, undergo a virtual experience, complete a technology acceptance survey and participate in a discussion about its use.

Results: Perceived usefulness, ease of use, attitude and intention to use were all positive towards the virtual scan tool. All practitioners saw value in such a tool and how it could be implemented within practice, with insights into areas for improvement and development gained.

Conclusion: From a practitioner perspective, access to such a virtual scan experience could be of use to better prepare and support those patients needing extra support before a real scan. Acknowledgement of having time to discuss patient concerns was noted and this could provide a means of doing so away from busy scanning lists.

P101 A systematic literature review of clinical decision support systems utilised for radiology requesting

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Background: The impact of unnecessary imaging on healthcare systems is widely recognised. Interventions to reduce this include clinical decision support (CDS). We conducted a systematic literature review to evaluate the best evidence on the effectiveness of CDS for radiology requests.

Method: A systematic Boolean search in IEE Explore, MEDLINE, CINHL, Scopus, ProQuest, and Embase was performed, following the PRISMA framework. Studies reporting CDS interventions used within radiology requests, and outcomes including the number of examinations, positive yield rate, waiting times, and experiences were included. CDS as a teaching tool, or where the clinical decision rule was a simple tick box were excluded. Screening and quality appraisal were evaluated independently by two reviewers. Data extraction and synthesis were performed.

Results: The study is still in progress, a complete analysis is expected by May 2023. Thus far 60 articles have been identified. Studies are grouped by clinical indication or body area; most commonly pulmonary embolism (N=13), mild head trauma (N=7), appendicitis (N=4), and lumbar spine (N=4), with validated clinical decision rules embedded within the CDS. The predominant study design was before and after (n=23). The rationale of studies centered on high usage and a need to lower radiation dose.

Conclusion: Preliminary findings show referrer's attitudes factor in the success of CDS. Change management, experiences, and perceptions may impact effectiveness. Successful implementation can be affected when users are given the opportunity to override the computer decision, or when the computer decision is final, clinicians may view this negatively on their autonomy and be time-wasting.

P102 Knowledge, perceptions, and expectations of Artificial intelligence in radiography practice: A global radiography workforce survey

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Introduction: Artificial Intelligence (AI) technologies have already started impacting clinical practice across various settings worldwide, including the radiography profession. This study is aimed at exploring a world-wide view on AI technologies in relation to knowledge, perceptions, and expectations of radiography professionals.

Objectives: Findings from this study could provide an insight to regional differences in terms of expectations, knowledge, and level of skills of the workforce, helping to formulate a globally informed, integrated guidance for a customised implementation of AI in radiography practice.

Methodology: An online survey (hosted on Qualtrics) on key AI concepts was open to radiography professionals worldwide (August 1st to December 31st, 2020). The survey sought both quantitative and qualitative data on topical issues relating to knowledge, perceptions, and expectations in relation to AI implementation in radiography practice. **Results**: A total of 314 valid responses were obtained with a fair geographical distribution. Of the respondents, 54.1% (157/290) were from North America and were predominantly clinical practicing radiographers (60.5%, 190/314). The findings broadly relate to different perceived benefits and misgivings/shortcomings of AI implementation in radiography practice. The benefits relate to enhanced workflows and optimised workstreams. The shortcomings revolve around de-skilling and impact on patient-centred care due to over-reliance on advanced technology following AI implementation.

Conclusion: Radiographers are key in the integration of AI in clinical practice, working on the interface between technology and patient care, to facilitate a smooth transition for the benefit of the patients. As both theoretical knowledge and clinical uptake of AI in radiography are still under development, opinions of radiographers globally appear divided.

1- E.R. Ranschaert, A.J. Duerinckx, P. Algra, E. Kotter, H. Kortman, S. Morozov Advantages, challenges, and risks of artificial intelligence for radiologists E.R. Ranschaert, S. Morozov, P.R. Algra (Eds.), Artificial Intelligence in Medical Imaging: Opportunities, Applications and Risks, Springer, Cham (2019), pp. 329-346 2- C. Malamateniou, et al. Artificial intelligence in radiography: Where are we now and what does the future hold? Radiography, 27 (2021)S58-S62 3- M. Hardy, H. Harvey Review article artificial intelligence in diagnostic imaging: impact on the radiography profession Br J Radiol, 92 (2019), Article 20190840 2019 4- S.J. Lewis, Z. Gandomkar, P.C. Brennan Artificial Intelligence in medical imaging practice: looking to the future J Med Radiat Sci, 66 (4) (2019), pp. 292-295, 10.1002/jmrs.369 5- European Society of Radiology (ESR) What the radiologist should know about artificial intelligence - an ESR white paper Insights Imaging, 10 (1) (2019), p. 44, 10.1186/s13244-019-0738-2 Published 2019 Apr 4 6- C. Malamateniou, et al. Artificial Intelligence: Guidance for clinical imaging and therapeutic radiography professionals, a summary by the Society of Radiographers AI working group Radiography, 27 (4) (2021), pp. 1192-1202 7- National Institute for Health and Care Excellence (2021) Artificial intelligence in mammography. Medtech innovation briefing [MIB242]. Accessed on 25th April, 2022: https://www.nice.org.uk/advice/mib242/chapter/The-technologies. Google Scholar 8- A.D. Lauritzen, A. Rodríguez-Ruiz, M.C. Euler-Chelpin, E. Lynge, I. Vejborg, M. Nielsen, N. Karssemeijer, M. Lillholm An artificial intelligence-based mammography screening protocol for breast cancer: outcome and radiologist workload Radiology (2022), 10.1148/radiol.210948 0 0:0 9- A. Bitencourt, I.D. Naranjo, R.L. Gullo, C.R. Saccarelli, K. Pinker AI-enhanced breast imaging: where are we and where are we heading? Eur J Radiol, 142 (2021), Article 109882, 10.1016/j.ejrad.2021.109882 VolumeISSN 0720-048X 10- S. Pacilè, J. Lopez, P. Chone, T. Bertinotti, J.M. Grouin, P. Fillard Improving breast cancer detection accuracy of mammography with the concurrent use of an artificial intelligence tool Radiol Artif Intell, 2 (6) (2020), 10.1148/ryai.2020190208 Nov 4e190208PMID: 33937844; PMCID: PMC8082372 11- T. Ozturk, et al. Automated detection of COVID-19 cases using deep neural networks with X-ray images Comput Biol Med, 121 (2020), Article 103792 12- L. Wang, Z.Q. Lin, A. Wong COVID-Net: a tailored deep convolutional neural network design for detection of COVID-19 cases from chest X-ray images Sci Rep, 10 (2020), p. 19549, 10.1038/s41598-020-76550-z 13- T.N. Akudjedu, N.A. Mishio, W. Elshami, M.P. Culp, O. Lawal, B.O. Botwe, et al. The global impact of the COVID-19 pandemic on clinical radiography practice: a systematic literature review and recommendations for future services planning Radiography, 27 (4) (2021), pp. 1219-1226, 10.1016/j.radi.2021.07.004 14- N. Stogiannos, D. Fotopoulos, N. Woznitza, C. Malamateniou COVID-19 in the radiology department: what radiographers need to know Radiography, 26 (3) (2020), pp. 254-263, 10.1016/j.radi.2020.05.012 (Lond)Aug 15- D.J. Mollura, M.P. Culp, E. Pollack, G. Battino, J.R. Scheel, V.L. Mango, et al. Artificial intelligence in low- and middle-income countries: innovating global health radiology Radiology (2020), Article 201434, 10.1148/radiol.2020201434 16- Y. Duan, J.S. Edwards, Y.K. Dwivedi Artificial intelligence for decision making in the era of Big

Data - evolution, challenges and research agenda Int J Inform Manag, 48 (2019), pp. 63-71, 10.1016/j.ijinfomgt.2019.01.021 Volume2019ISSN 0268-4012 17- X. Tang The role of artificial intelligence in medical imaging research BJR Open, 2 (2020), Article 20190031 18- American Society of Radiologic Technologists The Artificial Intelligence Era: the Role of Radiologic Technologists and Radiation Therapists White Paper -ASRT Foundation (2020) 19- International Society of Radiographers and Radiological Technologists (ISRRT) and the The European Federation Of Radiographer Societies: Artificial Intelligence and the Radiographer/Radiological Technologist Profession: A joint statement of the International Society of Radiographers and Radiological Technologists and the European Federation of Radiographer Societies Radiography, 26 (2) (2020), pp. 93-95, 10.1016/j.radi.2020.03.007 (Lond) 20- The Topol Review (2019) Preparing the healthcare workforce to deliver the digital future. An independent report on behalf of the Secretary of State for Health and Social Care February 2019. https://topol.hee.nhs.uk/the-topol-review/ 21- B. Botwe, W. Antwi, S. Arkoh, T. Akudjedu 2021) "Radiographers' perspectives on the emerging integration of artificial intelligence into diagnostic imaging: the Ghana study J Med Radiat Sci, 68 (2021), pp. 260-268, 10.1002/jmrs.460 22- B. Botwe, T. Akudjedu, W. Antwi, P. Rockson, S. Mkoloma, E. Balogun, W. Elsham, J. Bwambale, C. Barare, S. Mdletshe, B. Yao, S. Arkoh The integration of artificial intelligence in medical imaging practice: perspectives of African radiographers Radiography, 27 (2021) (2021)861e866 23- M. Alelyani, S. Alamri, M.S. Alqahtani, A. Musa, H. Almater, N. Alqahtani, F. Alshahrani, S. Alelyani Radiology community attitude in Saudi Arabia about the applications of artificial intelligence in radiology Healthcare, 9 (2021), p. 834, 10.3390/healthcare9070834 2021 24- M. Ryan, T. O'Donovan, J. McNulty Artificial intelligence: the opinions of radiographers and radiation therapists in Ireland Radiography, 27 (2021) (2021) S74eS82 25- C. Rainey, T. O'Regan, J. Matthew, E. Skelton, N. Woznitza, K.Y. Chu, S. Goodman, J. McConnell, C. Hughes, R. Bond, S. McFadden, C. Malamateniou Beauty is in the AI of the beholder: are we ready for the clinical integration of artificial intelligence in radiography? an exploratory analysis of perceived ai knowledge, skills, confidence, and education perspectives of UK radiographers Front Digit Health, 3 (2021), Article 739327, 10.3389/fdgth.2021.739327 26- M. Abuzaid, W. Elshami, J. McConnell, et al. An extensive survey of radiographers from the Middle East and India on artificial intelligence integration in radiology practice Health Technol, 11 (2021), pp. 1045-1050, 10.1007/s12553-021-00583-1 2021 27- W.K. Antwi, T.N. Akudjedu, B.O. Botwe Artificial intelligence in medical imaging practice in Africa: a qualitative content analysis study of radiographers' perspectives Insights Imaging, 12 (2021), p. 80, 10.1186/s13244-021-01028-z 28- Currie, et al. Australian perspectives on artificial intelligence in medical imaging J Med Radiat Sci (2022), pp. 1-11, 10.1002/jmrs.5810 (0000) 29- M. Huisman, E. Ranschaert, W. Parker, et al. An international survey on AI in radiology in 1,041 radiologists and radiology residents part 1: fear of replacement, knowledge, and attitude Eur Radiol, 31 (2021), pp. 7058-7066, 10.1007/s00330-021-07781-5 30- C. Parker, S. Scott, A. Geddes, P. Atkinson, S. Delamont, A. Cernat, J.W. Sakshaug, R.A. Williams Snowball Sampling SAGE Research Methods Foundations (2019) 31- J. Kirchherr, K. Charles Enhancing the sample diversity of snowball samples: recommendations from a research project on anti-dam movements in Southeast Asia PLoS ONE, 13 (8) (2018), 10.1371/journal.pone.0201710e0201710 32- J. Schoonenboom, R.B. Johnson How to Construct a Mixed Methods Research Design KZfSS Köln Z Soziol Sozialpsychologie, 69 (2017), pp. 107-131, 10.1007/s11577-017-0454-1 33- J.F. Ebert, L. Huibers, B. Christensen, M.B. Christensen Paper- or web-based questionnaire invitations as a method for data collection: cross-sectional comparative study of differences in response rate, completeness of data, and financial cost J Med Internet Res, 20 (1) (2018), p. e24, 10.2196/jmir.8353 Published 2018 Jan 23 34- V. Braun, V. Clark Using thematic analysis in psychology Qual Res Psychol, 3 (2) (2006), pp. 77-101, 10.1191/1478088706qp063oa8 35- T.N. Akudjedu, O. Lawal, M. Sharma, J. Elliott, S. Stewart, T. Gilleece, S. McFadden, J.M. Franklin Impact of the COVID-19 pandemic on radiography practice: findings from a UK radiography workforce survey BJR Open, 2 (2020), Article 20200023 36- D.M. Rubio, M. Berg-Weger, S.S. Tebb, E.S. Lee, S. Rauch Objectifying content validity: conducting a content validity study in social work research Social Work Research, 27 (2) (2003), pp. 94-104, 10.1093/swr/27.2.94 37- Y. Chen, C. Stavropoulou, R. Narasinkan, A. Baker, H. Scarbrough Professionals' responses to the introduction of AI innovations in radiology and their implications for future adoption: a qualitative study BMC Health Serv Res, 21 (1) (2021), p. 813, 10.1186/s12913-021-06861-y 38- A. Wareing, C. Buissink, D. Harper, M. Gellert Olesen, M. Soto, S. Braico, P. Van Laer, I. Gremion, L. Rainford Continuing professional development (CPD) in radiography: a collaborative European meta-ethnography literature review Radiography, 23 (2017) (2017), p. S58eS63, 10.1016/j.radi.2017.05.016 A.R. Wuni, B.O. Botwe 39- TN Akudjedu Impact of artificial intelligence on clinical radiography practice: futuristic prospects in a low resource setting Radiography, 27 (2021), 10.1016/j.radi.2021.07.021 Supplement 1S69-S73, ISSN 1078-8174 40-L. Yang, I.C. Ene, R.A. Belaghi, D. Koff, N. Stein, P.L. Santaguida Stakeholders' perspectives on the future of artificial intelligence in radiology: a scoping review Eur Radiol, 32 (2022), pp. 1477-1495, 10.1007/s00330-021-08214-z 2022 41-F. Gama, D. Tyskbo, J. Nygren, J. Barlow, J. Reed, P. Svedberg Implementation frameworks for artificial intelligence translation into health care practice: scoping review J Med Internet Res, 24 (1) (2022), p. 12022 |isse32215 42- Z. Zhang, et al. The use of artificial intelligence in computed tomography image reconstruction - a literature review J Med Imaging Radiat Sci, 51 (4) (2020), pp. 671-677 43- W.T. Tran, et al. Personalized breast cancer treatments using artificial intelligence in radiomics and pathomics J Med Imaging Radiat Sci, 50 (4) (2019) S32-S41 44- M.J. Smith, et al. AI and ethics in medical radiation sciences J Med Imaging Radiat Sci, 50 (4) (2019) S24-S26 45- P. Bridge, et al. Artificial intelligence in radiotherapy: a philosophical perspective J Med Imaging Radiat Sci, 50 (4) (2019) S27-S31 46- G. Currie, et al. Machine learning and deep learning in medical imaging: intelligent imaging J Med Imaging Radiat Sci, 50 (4) (2019), pp. 477-487 47- A. Murphy, et al. Artificial intelligence and the medical radiation profession: how our advocacy must inform future practice J Med Imaging Radiat Sci, 50 (4) (2019) S15-S19 48- J. French, et al. Preparing for artificial intelligence: systems-level implications for the medical imaging and radiation therapy professions J Med Imaging Radiat Sci, 50 (4) (2019)S20-S23 49- D. Wiljer, et al. Developing an artificial intelligence-enabled health care practice: rewiring health care professions for better care J Med Imaging Radiat Sci, 50 (4) (2019)S8-S14 50-C. Chamunyonga, et al. The impact of artificial intelligence and machine learning in radiation therapy: considerations for future curriculum enhancement J Med Imaging Radiat Sci, 51 (2) (2020), pp. 214-220 51- A. Solomou, A. Apostolos, et al. Artificial intelligence in magnetic resonance imaging: a feasible practice? J Med Imaging Radiat Sci, 51 (3) (2020), pp. 501-502 52- R. Miner Developing an AI project J Med Imaging Radiat Sci, 51 (4) (2020), pp. 550-559 53- IS. Boon, et al. Artificial intelligence and soft skills in radiation oncology: data versus wisdom J Med Imaging Radiat Sci, 51 (4) (2020) S114-S115 54-C.T. Ng, S.N.A. Roslan, Y.H. Chng, D.A.W. Choong, A.J.L. Chong, Y.X. Tay, L. Lança, E.C. Chua Singapore radiographers' perceptions and expectations of artificial intelligence - a qualitative study J Med Imaging Radiat Sci (22) (2022), 10.1016/j.jmir.2022.08.005 Sep 14:S1939-865400339-3 55- M. Roberts, D. Driggs, M. Thorpe, et al. Common pitfalls and recommendations for using machine learning to detect and prognosticate for COVID-19 using chest radiographs and CT scans Nat Mach Intell, 3 (2021), pp. 199-217, 10.1038/s42256-021-00307-0

P103 An evaluation of a checklist in Musculoskeletal (MSK) radiographic image interpretation when using Artificial Intelligence (AI)

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Background: AI is being used increasingly in image interpretation tasks. There are challenges for its optimal use in reporting environments. Human reliance on technology and bias can cause decision errors. Trust issues exist amongst radiologists and radiographers in both over-reliance (automation bias) and reluctance in AI use for decision support. A checklist, used with the AI to mitigate against such biases, may optimise the use of AI technologies and promote good decision hygiene.

Method: A checklist, to be used in image interpretation with AI assistance, was developed. Participants interpreted 20 examinations with AI assistance and then re- interpreted the 20 examinations with AI and a checklist. The MSK images were presented to radiographers as patient examinations to replicate the image interpretation task in clinical practice. Image diagnosis and confidence levels on the diagnosis provided were collected following each interpretation. The participant perception of the use of the checklist was investigated via a questionnaire.

Results: Data collection and analysis are underway and will be completed at the European Congress of Radiology in Vienna, March 2023. The impact of the use of a checklist in image interpretation with AI will be evaluated. Changes in accuracy and confidence will be investigated and results will be presented. Participant feedback will be analysed to determine perceptions and impact of the checklist also.

Conclusion: A novel checklist has been developed to aid the interpretation of images when using AI. The checklist has been tested for its use in assisting radiographers in MSK image interpretation when using AI.

1. Goddard K, Roudsari A, Wyatt JC. Automation bias: a systematic review of frequency, effect mediators, and mitigators. (2012) Journal of the American Medical Informatics Association : JAMIA. 19 (1): 121-7. 2. Pesapane, F., Codari, M. and Sardanelli, F., 2018. Artificial intelligence in medical imaging: threat or opportunity? Radiologists again at the forefront of innovation in medicine. European radiology experimental, 2(1), pp.1-10. 3. Rainey, C., McConnell, J., Hughes, C., Bond, RR., & McFadden, S. (2021a). Artificial Intelligence for diagnosis of fractures on plain radiographs: a scoping review of current literature. Intelligence-Based Medicine, 5, [100033]. https://doi.org/10.1016/j.ibmed.2021.100033 4. Rainey, C., O'Regan, T., Matthew, J., Skelton, E., Woznitza, N., Chu, K-Y, Goodman, S., McConnell, J., Hughes, C., Bond, R., McFadden, S., Malamateniou, C. (2021b) Beauty is in the AI of the beholder: are we ready for the clinical integration of artificial intelligence in Radiography? An exploratory analysis of perceived AI knowledge, skills, confidence and education perspectives of UK radiographers. Frontiers in Digital Health https://doi.org/10.3389/fdgth.2021.739327

P105 The role of the radiographer in radiomics studies

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Background: Radiomics is the process of extraction of quantitative information from medical images with the aim of developing useful clinical biomarkers to improve diagnosis, disease monitoring and clinical decision making. Recent advances in machine learning and high-performance computing have increased interest in the potential of radiomics, particularly in the field of oncology (1). Multidisciplinary expertise is required for data and image curation, segmentation, feature extraction and model building, evaluation and validation (2). However, to date, there has been little reference to and understanding of the role and contribution made by diagnostic radiographers. Radiographers have the appropriate domain specific knowledge and skills and are therefore ideally placed to substantially contribute to successful delivery of radiomics studies.

Purpose: The development of a radiomics signature requires carefully curated clinical data, image processing and model development. This work provides the core information that a radiographer needs to know about radiomics and highlights the importance of radiographer involvement. Our local radiomics workflow is presented with particular emphasis on the radiographer role. We use examples of two oncology radiomics studies (involving germ cell tumours and sarcoma) to illustrate the workflow.

Summary of contents: This work will use 2 exemplars to illustrate a typical radiomics study, with an emphasis on radiographer involvement.

1. Papanikolaou, N., Matos, C. & Koh, D.M. (2020) 'How to develop a meaningful radiomic signature for clinical use in oncologic patients', *Cancer Imaging*, 20, 33. 2. Shur, J.D., Doran, S., et al. (2021) 'Radiomics in Oncology: A Practical Guide', *Radiographics*, 41, 6.

P106 A practical introduction to preparing a clinical radiography department for artificial intelligence

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Background: Implementation of artificial intelligence (AI) in imaging is increasing [1] and requires large, curated datasets with known, reliable ground truth for AI development and performance testing. Evidence based information is becoming available relating to frameworks, ethics, legalities, platforms, programs and teaching of radiographers [2]. However, there is no practical introduction for radiographers on preparing a clinical department for future implementation of AI and optimising current practices to facilitate retrospective data collection.

Purpose: Primary learning outcome:

*Early awareness of future requirements for AI to build into the routine change cycle in a clinical department. Informative: * For commissioning new scanners and imaging information systems, planning staff education, research and harmonisation across sectors. SUMMARY Scanners: * review AI packages available and assess what is useful for your department * consider (for example), auto align to increase consistency and reproducibility * schedule testing program to identify new artefacts, even in product packages, plus ongoing quality assurance Harmonisation: * sequences, sequence and protocol names across scanners, hospital and regions * reduce unnecessary variation while maintaining clinical expertise and patient specific care Data recording: * complete, comprehensive, in best format and location to create minable data Research: * AI trials require understanding of detailed imaging parameters as these images will also be interrogated by an algorithm that does not view images visually * early optimisation of workflow, even in the absence of immediate AI installation, will facilitate retrospective studies, especially multi-centre Education: * importance of consistency, while not reducing radiographer autonomy or clinical expertise * benefits to daily working life through good change management

1. Joshi, I. & Morley, J. (eds) (2019). Artificial intelligence: How to get it right. Putting policy into practice for safe data-driven innovation in health and care. NHSx https://www.sor.org/getmedia/26c8052b-86e7-4900-8057-d0852f9e5094/AI-Guidance-for-clinical-imaging-and-therapeutic-radiography-workforce-professionals_LLv1 2. Society and College of Radiographers (2021). Artificial intelligence: Guidance for clinical imaging and therapeutic radiography workforce professionals. https://www.sor.org/getmedia/26c8052b-86e7-4900-8057-d0852f9e5094/AI-Guidance-for-clinical-imaging-and-therapeutic-radiography-workforce-professionals_LLv1

P107 Evaluation of renal cortical stiffness in patients with type 2 diabetes mellitus (DM) by Point Shear Wave Elastography

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Introduction: Point shear wave elastography (pSWE) is an emerging quantitative imaging technique that can be used in the assessment of renal disease. Patients with type 2 diabetes mellitus (DM) are more likely to develop nephropathy. This study aimed to investigate the feasibility of pSWE to assess renal cortical stiffness (CS) in Type 2 diabetes mellitus (DM) patients compared to healthy subjects.

Method: This study comprised of 31 Type 2 diabetic patients (9 males, 22 females and mean age 58 ±14) and 31 healthy control group (15 males, 16 females and mean age 29 ± 11). In addition to routine renal ultrasound, CS was measured using pSWE. The measurements were obtained using ElastPQ (EPQ; Philips Healthcare, Bothell, WA). Three different valid measurements in each kidney were recorded. Ultrasound scanning and measurements were carried out by two certified experienced sonographers.

Result: The cortical stiffness measurements in the patients was significantly higher than the control group with 12.21 ± 12 kPa vs. 8.46 ± 43 kPa; $p<0.02$). The mean renal length in both patients and healthy were 10.53 ± 1.2 and 10.86 ± 1.3 cm, respectively ($p = 0.61$). CS was lower in patients than in healthy control, but with no significant difference; 7.2 mm vs 8.31 mm; $p = 0.23$).

Conclusion: This study revealed that assessment of renal CS using pSWE is feasible. DM patients have higher cortical stiffness measurements compared to healthy control. It is recommended that pSWE measurement of the renal CS should be used as part of routine screening in diabetic patients.

P109 Accuracy of the radiological protocols in detecting scaphoid fractures, a retrospective study

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Early and accurate diagnosis of scaphoid fractures is vital for improving patient outcomes. However, there is no international agreement on the optimal imaging examination for diagnosing suspected scaphoid fractures. This study aimed to assess the different imaging examinations of scaphoid fractures at three major hospitals in Najran, Saudi Arabia. Radiological strategies for imaging suspected scaphoid fracture were determined using a short cross-sectional survey. The accuracy of the different imaging techniques was compared, and the number of patients with a scaphoid fracture who underwent examination at these hospitals in the past year preceding the start of this study was also investigated. The results showed that a plain x-ray was the first line of imaging examination for suspected scaphoid fracture at the three hospitals. When the initial plain x-ray could not rule out scaphoid fracture, a repeated x-ray (10--14 days) was used as second-line imaging in two hospitals, while computed tomography (CT) was used as a third line of imaging. In the third hospital, a CT scan was used as the second line of imaging, while magnetic resonance imaging (MRI) was used as the third line of imaging. A total of 122 112 patients sustained scaphoid fractures in the three hospitals. Initial plain x-ray was able to diagnose 72% of all cases as the first imaging line. Repeated X-rays identified 60% of the fractures that were not detected on the initial plain radiograph, while CT scans identified 88% of the fractures that were not detected on the first plain radiograph.

1-Chunara, M.H., McLeavy, C.M., Kesavanarayanan, V., Paton, D. and Ganguly, A., 2019. Current imaging practice for suspected scaphoid fracture in patients with normal initial radiographs: UK-wide national audit. Clinical Radiology, 74(6), pp.450-455. 2- Duckworth, A.D., Jenkins, P.J., Aitken, S.A., Clement, N.D. and McQueen, M.M., 2012. Scaphoid fracture epidemiology. Journal of Trauma and Acute Care Surgery, 72(2), pp.E41-E45. 3- Groves, A.M., Kayani, I., Syed, R., Hutton, B.F., Bearcroft, P.P., Dixon, A.K. and Ell, P.J., 2006. An international survey of hospital practice in the imaging of acute scaphoid trauma. American Journal of Roentgenology, 187(6), pp.1453-1456. 4- Rhemrev, S.J., Ootes, D., Beeres, F.J., Meylaerts, S.A. and Schipper, I.B., 2011. Current methods of diagnosis and treatment of scaphoid fractures. International journal of emergency medicine, 4, pp.1-8.

P110 Diagnostic accuracy study of a machine-learning algorithm in the detection of abnormalities on chest X-Rays of emergency department and hospital patients

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Background: Chest X-rays (CXRs) are the most common imaging examination worldwide and the first line investigation for individuals with respiratory symptoms. Several artificial intelligence (AI) algorithms detect abnormalities on CXRs. We assess the diagnostic accuracy of Lunit Insight CXR, a CE marked AI, at detecting 10 common CXR abnormalities from emergency department and hospital ward patients. These are typically challenging to interpret as they are often technically suboptimal due to patients being acutely unwell.

Methods: 110 adult CXRs were collected retrospectively via consecutive sampling. All CXRs were reviewed by a thoracic radiologist to confirm the ground truth diagnosis to which the Lunit algorithm was assessed against. The algorithm provides a continuous probability score for the presence of each of the ten abnormalities, which we utilised for ROC analysis. Three cut-off values (15, 30, 45) were utilised for sensitivity and specificity analysis.

Results: The algorithm showed high accuracy at detecting all the abnormalities with an AUROC >0.9 ($p<0.0001$). Average sensitivities for each cut-off; 92% (15), 81% (30), 69% (45). Average specificities; 91% (15), 96% (30), 98% (45). Average positive predictive values; 77% (15), 86% (30), 91% (45). Average negative predictive values; 98% (15), 94% (30), 91% (45).

Conclusion: Our results demonstrate that the Lunit algorithm is highly accurate at detecting the specified ten CXR abnormalities in this cohort of patients even with the presence of multiple abnormalities on the same film. Going forward, we will assess the ability of the algorithm as a diagnostic aid for clinicians who interpret CXRs.

P111 Black box no more: A survey to explore knowledge and perspectives on AI governance in radiography in the UK

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Background: AI adoption in medical imaging is highly dependent on staff training, knowledge, and confidence about AI solutions. In addition, rigorous AI governance frameworks should be in place to facilitate effective validation and evaluation of AI tools, monitor their clinical effectiveness, and guide professionals throughout the models' life cycle. This study aims to assess the status quo around AI governance from the perspectives of medical imaging professionals in the UK.

Method: An online survey was built on Qualtrics and was administered to medical imaging professionals, AI vendors, and AI experts in the UK via email and the researchers' social media. Electronic informed consent was obtained from all participants, and data analysis was performed on the SPSS, employing both descriptive and inferential statistics.
Results: A total of 245 valid responses were received. Self-guided, online training was mostly reported. Many of them (42.1%) were not sure about using any AI governance frameworks, however, they generally comply with informed consent (41.5%) and data security (53.4%) protocols. Locally developed frameworks (35.8%) are often used for AI validation. Expected costs are routinely assessed before procurement (45.4%). Development of specific guidance on AI validation/evaluation, robust AI governance frameworks, and AI-related training were reported as top priorities for a successful AI adoption.

Conclusion: This study highlights the need for a robust AI governance framework to guide safe and successful AI adoption in medical imaging in the UK. The importance of AI-related training is also paramount, with medical imaging professionals eager to learn more on these technologies.

P112 Inter-operator precision of the bindex system for measuring fragility fracture risk based on measurements of the wrist and tibia

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Background: The Bindex is a quantitative ultrasound scanner and provides a bone mineral density index based on cortical bone thickness at the radius, proximal and distal tibia, which is an indicator of osteoporosis(NICE, 2021). The current DXA waiting list is highly variable(NHS, 2022) and Bindex might serve as an alternative for indicating osteoporosis(NICE, 2017). This study aims to explore the inter-operator precision errors for the combination of the radius, distal and proximal tibia using the Bindex.

Method: Thirty-seven participants were recruited. All three anatomical sites of each participant were scanned by two operators. A bone index was calculated for each patient based on wrist and tibia results obtained by each operator. Interclass correlation coefficient (ICC), root mean squared coefficient of variation (RMSCV), and the least significant change (LSC) were calculated to assess the reliability and agreement of measurements between operators.

Results: Inter-operator agreement was excellent (ICC = 0.954; p<0.001). The RMSCV was 2.73%, resulting in a LSC of 7.5%.

Conclusion: The high inter-operator reliability shows that Bindex allows reliable measurements between trained practitioners to diagnose osteoporosis. The LSC is higher than reported for DXA(Lewiecki *et al.*, 2016), indicating that it might not be suitable for treatment monitoring purposes. However, with simplicity in design, no ionising radiation, shorter scan time and being logistically convenient, Bindex could be a good compliment with DEXA for osteoporosis diagnosis. The small sample size and limited demographics of participants are limitations to this study as well as the leg and arm measurement marks remaining visible for the second operator.

1. National Institute for Clinical Excellence (NICE) (2021) *Osteoporosis - prevention of fragility fractures.* Available at: https://cks.nice.org.uk/topics/osteoporosis-prevention-of-fragility-fractures (Accessed: 1 May 2022).
2. NHS England and NHS Improvement. *NHS Diagnostic Waiting Times and Activity Report July 2022 Monthly report.* Available at:

https://www.england.nhs.uk/statistics/wp-content/uploads/sites/2/2022/09/DWTA-Report-July-2022_A84DA.pdf (Accessed 11 October 2022).
3. National Institute for Clinical Excellence (NICE) (2017) *Bindex for investigating suspected osteoporosis.* Available at: https://www.nice.org.uk/advice/mib106 (Accessed: 1 May 2022).
4. Lewiecki, E.M., Binkley, N., Morgan, S.L., Shuhart, C.R., Camargos, B.M., Carey, J. J., et al. (2016) 'Best Practices for Dual-Energy X-ray Absorptiometry Measurement and Reporting: International Society for Clinical Densitometry Guidance', *Journal of Clinical Densitometry: Assessment & Management of Musculoskeletal Health*, 19(2):127-140. Available at: http://dx.doi.org/10.1016/j.jocd.2016.03.003

P113 Radiomics: A quantitative approach to improve screening for breast cancer

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Background: Breast cancer prognosis improves if it is detected early. However, it can be challenging to identify breast lesions due to factors such as breast density and overlapping structures. To improve the accuracy of breast cancer screening, researchers are using AI algorithms, including radiomics. Radiomics involves using advanced mathematical analysis to extract data from medical images.

Purpose: The importance of early detection in breast cancer survival. The use of radiomics to optimize breast cancer screening accuracy and reduce false positives and negatives.

Summary of content: A radiomics model was tested on mammograms to detect breast cancer from ≈30,000 women and reduced false positives by 5.7% in the US and 1.2% in the UK, and false negatives by 9.4% in the US and 2.7% in the UK. It also reduced the workload of the second reader by 88%. Another radiomics model was used in a study of 222 patients and reduced false-positive results from 66 to 20 while maintaining a sensitivity of 98%. The radiologist had a specificity of 74.2% and sensitivity of 91.8%. In a study of 50 female patients with BI-RADS 4/5 on mammography, an expert radiologist had an accuracy of 97% and ROC AUC of 95.9%, whereas two radiomics models had ROC AUCs of 84.2% and 85.1% in differentiating malignant from benign lesions. However, it is noted that the expert's performance surpasses the average radiologist. These studies suggests that incorporating a radiomics model with the work of a radiologist may improve the effectiveness and accuracy of breast cancer screening.

1. Ferlay, J., Steliarova-Foucher, E., Lortet-Tieulent, J., ..., Bray, F. (2013). Cancer incidence and mortality patterns in Europe: Estimates for 40 countries in 2012. European Journal of Cancer. 49(6), P1374-1403. 2. Ghoncheh, M. , Pournamdar, Z., Salehiniya, H. (2016). Incidence and Mortality and Epidemiology of Breast Cancer in the World. Asian Pac J Cancer Prev. 17(S3), P43-6. 3. Lee, C., Chen, L., Elmore, J. (2017). Risk-Based Breast Cancer Screening: Implications of Breast Density. Med Clin North Am. 101(4), p725–741. 4. Tran, W., Sadeghi-Naini, Ali., Lu, F., ..., Curpen, B. (2020). Computational Radiology in Breast Cancer Screening and Diagnosis Using Artificial Intelligence. Canadian Association of Radiologists Journal. 72(1).

P114 Exploring the impact of different image reconstruction methods on the performance of iterative metal artefact reduction algorithm to improve the CT image quality of metal implants

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Metal artefacts resulting from implants such as knee prosthesis are one of the most common artefacts that affect Computed Tomography (CT) image quality. The artefact appears as dark and bright streaks across the image and obscures anatomical structures surrounding the implant. The aim of this study is to explore which combination of iterative metal artefact reduction (iMAR) algorithm and CT convolution kernel gives the best metal artefact reduction. Methods An in-house developed total knee replacement phantom was scanned twice using CT (Biograph, Siemens, Germany), the first with a metal prosthesis inserted in the phantom (artefact scan) and the second without metal insertion (reference scan). The artefact scan with metal artefacts was corrected using iMAR and reconstructed using 13 different CT kernels to produce 13 different images which were subtracted from the reference scan using MATLAB. On the difference images, 4 periprosthetic ROIs were drawn away from streaks while 8 ROIs were drawn on the streak artefacts around the prosthesis and the mean pixel value and the standard deviation from all ROIs were measured. These values were compared to find the best iMAR-kernel combination that gave results closest to the reference scan. Results The highest mean pixel value in ROIs away from streaks was with the Br36 kernel while the lowest was with the Br59 kernel. The highest mean pixel value in streak ROIs was with the Br36 kernel while the lowest was with the Br49 kernel. Conclusion iMAR with sharper kernels improves the overall CT image quality.

1. ABDOLI, M. 2013. Development and evaluation of metal artifact reduction and image segmentation techniques in PET/CT. 2. ABDOLI, M., DIERCKX, R. A. & ZAIDI, H. 2012. Metal artifact reduction strategies for improved attenuation correction in hybrid PET/CT imaging. Medical physics,

39, 3343-3360. 3. BLODGETT, T. M., MEHTA, A. S., MEHTA, A. S., LAYMON, C. M., CARNEY, J. & TOWNSEND, D. W. 2011. PET/CT artifacts. Clinical Imaging, 35, 49-63. 4. BOAS, F. E. & FLEISCHMANN, D. 2012. CT artifacts: causes and reduction techniques. Imaging Med, 4, 229-240. 5. DE MAN, B., NUYTS, J., DUPONT, P., MARCHAL, G. & SUETENS, P. 1999. Metal streak artifacts in X-ray computed tomography: a simulation study. IEEE Transactions on Nuclear Science, 46, 691-696. 6. ELDEVIK, K., NORDHOY, W. & SKRETTING, A. 2010. Relationship between sharpness and noise in CT images reconstructed with different kernels. Radiation Protection Dosimetry, 139, 430-433. 7. KACHELRIESS, M. & KRAUSS, A. Iterative Metal Artifact Reduction (iMAR): Technical Principles and Clinical Results in Radiation Therapy. 2016. 8. KATSURA, M., SATO, J., AKAHANE, M., KUNIMATSU, A. & ABE, O. 2018. Current and Novel Techniques for Metal Artifact Reduction at CT: 9. WELLENBERG, R. H. H., HAKVOORT, E. T., SLUMP, C. H., BOOMSMA, M. F., MAAS, M. & STREEKSTRA, G. J. 2018. Metal artifact reduction techniques in musculoskeletal CT-imaging. European Journal of Radiology, 107, 60-69.

P115 Missed lung cancers on CXR: A human audit

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Background: Lung cancer (LC) is the most common cause of cancer death in the UK. Since there are no specific signs or symptoms that reliably differentiate LC from a non-neoplastic chest pathology, radiography is usually the initial modality used in the investigation. To reduce time to diagnosis and improve overall care, high standards of reporting are imperative to detect LC at the earliest stage. A RCR audit template was used to assess the accuracy of human reporters prior to introducing an artificial intelligence (AI) programme.
Method: Current data uses 6 months. Final audit will include all 2022 patients. The sample included all patients referred to the lung MDT with a confirmed diagnosis of primary LC between July and December 2022. A retrospective review was performed of all chest x-ray (CXR) reports in the 12 months prior to formal diagnosis. All 'no lesion identified' reports were reviewed to determine whether the carcinoma was visible.
Results: Of 151 patients diagnosed with LC: 78 patients met the inclusion criteria. 24 reports were categorised as 'no lesion identified'. On expert review, 11 lesions were 'not visible' and 13 were 'missed cancers'. On review of the 'missed cancers', the most common overlooked areas included the right apex and para-tracheal region.
Conclusion: All 'missed cancers' and 'missed follow-ups' were fed back to reporting clinicians in line with departmental discrepancy policy. All 'missed cancers' will be assessed by the AI programme to compare human and AI accuracy. The audit cycle will be repeated to assess the impact of AI on lesion detection.

Nedumaran, P.A., Greenhalgh, R. and Spence, N. (2008) Missed Lung cancers on chest radiographs, Missed Lung cancers on Chest Radiographs | The Royal College of Radiologists. Available at: https://www.rcr.ac.uk/audit/missed-lung-cancers-chest-radiographs (Accessed: January 16, 2023).

P116 Automated progression monitoring of pulmonary nodules across follow-up lung CT scans

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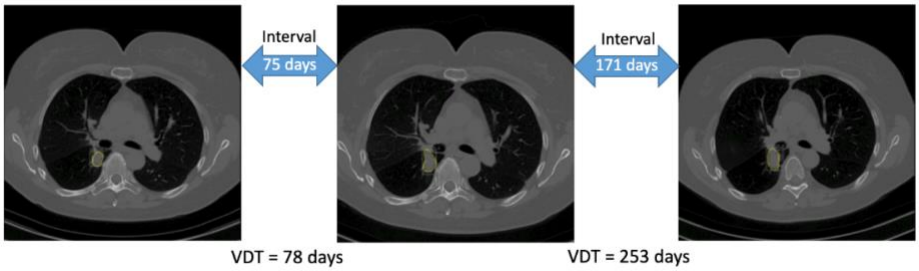
Background: Tracking the progression of nodule is a key practice in early detection of lung cancer. This study was conducted to assess the potential of a automated detection and monitoring algorithm to track and assess growth of clinician identified nodule.

Methods: 114 patients with the nodules at baseline and with at least one follow-up were included. A radiologist with 5-year experience identified the nodules and annotate the entire boundary in all slices. In follow-up scans the radiologist focussed on the same nodules and marked the boundary if present. A deterministic algorithm was used to calculate the volume of the nodule from the radiologist's marking. All follow-up scans were processed by our algorithm which comprise of the deep learning and image-based registration method. VDT of radiologist and our algorithm are compared.

Result: The radiologist identified 282 nodules at baseline. All 282 nodules persisted at first follow-up. Among the patients with two follow-ups, 63 nodules were present at baseline. Our algorithm correctly tracked 256 of the 282 nodules out of which 207 of the 219 nodules in first follow-up scan and 52 of the 63 nodules in both the first and second follow-up. There are 76 nodules which have VDT < 400 days in the ground truth, out of which our algorithm is able to pick up 54 nodules which have VDT < 400 days.

Conclusion: Our algorithm can automate nodule tracking and help radiologist to monitor progression of nodules



which may become malignant in follow-ups, thereby increase performance and improve patient management.

1. MacMahon, H., Naidich, D.P., Goo, J.M., Lee, K.S., Leung, A.N., Mayo, J.R., Mehta, A.C., Ohno, Y., Powell, C.A., Prokop, M. and Rubin, G.D., 2017. Guidelines for management of incidental pulmonary nodules detected on CT images: from the Fleischner Society 2017. Radiology, 284(1), pp.228-243. 2. Devaraj, A., van Ginneken, B., Nair, A. and Baldwin, D., 2017. Use of volumetry for lung nodule management: theory and practice. Radiology, 284(3), pp.630-644.

P117 Using artificial intelligence (AI) to diagnose pathology on chest x-rays

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Although Artificial intelligence (AI) has been around for decades, due to the recent advances in technology interest and use continues to expand in clinical practice. From the introduction of radiological imaging being digitised and stored electronically, it has advanced the construction of deep learning (DL) models by collecting datasets and ground truth labelling. This in theory could aid health professionals to reach a diagnosis promptly when there is a lack of radiology expertise to assist. Chest x-rays are one of the most useful tools for diagnosis due to fast turnaround, however, due to a shortfall in expected workforce, DL could prove to be beneficial in alleviating reporting turnaround time pressures. From a radiographer's perspective, AI has the potential to assist with clinical decision making, enhance education and extend radiography led research. Using a narrative literature review, this poster demonstrates a basic introduction into AI for chest x-ray image interpretation. It provides a brief explanation into the construction of a DL model and performance measurement. Plus, highlighting advantages and disadvantages of this being applied into clinical practice. This poster contains nine sections (including references) summarising a literature review of five articles on the topic.

RADIOTHERAPY SERVICE DEVELOPMENT POSTER PRESENTATIONS

P118 Pain flare following palliative radiotherapy for bone metastases: A systematic literature review

Rachel Shaw

Lancashire Teaching Hospitals NHS Foundation Trust

Background: External Beam Radiotherapy (EBRT) is an effective treatment for palliation of symptomatic bone metastases (Spencer et al, 2018). One potential side effect of EBRT is pain flare, a transient increase of pain in the treated area, with varying incidence. This review aimed to determine the incidence and timing of pain flare following EBRT for bony metastatic disease, and whether this toxicity could be predicted, improving informed consent.

Method: A systematic search and critical review of published literature was performed. Electronic databases searched included PubMed, CINAHL complete and the Cochrane library using keywords including 'pain flare', 'palliative radiotherapy' and 'bone metastases'. Primary studies written in English, published between January 2005 and December 2020 were eligible for inclusion. Additional inclusion criteria comprised studies conducted in adult humans

receiving palliative EBRT for bony metastatic disease arising from any primary cancer. Single patient case reports, abstracts, newsletters and commentaries were excluded.

Results: 674 articles were identified. Of these, 5 studies met the inclusion criteria, comprising a total of 400 patients. Incidence of pain flare occurred in 30-40% of patients. Pain flare lasted for an average of 1.5-3 days, most commonly occurring in the first five days following EBRT. No relationships were identified between pain flare and dose and fractionation, age, gender, treatment site or primary tumour site.

Conclusion: Pain flare following EBRT is common and unpredictable. Patients should be counselled and supported to manage a flare effectively through analgesic optimisation, potential prophylactic steroids and telephone follow up.

1. Spencer, K., Parrish, R., Barton, R. and Henry, A. (2018) Palliative radiotherapy. Bmj, 360, 1-12.

P119 Therapeutic radiographer awareness of the signs and symptoms of neutropenic sepsis in patients undergoing concurrent chemoradiotherapy

Hannah Shakeshaft; Pete Bridge

University of Liverpool

Background: Neutropenic sepsis is a life-threatening combination of neutropenia and infection (NICE 2012). Patients undergoing concurrent chemoradiotherapy are at high risk of neutropenic sepsis and thus are likely to present in a clinical setting (Okera 2011). This study aimed to evaluate levels of Therapeutic Radiographers' understanding of sepsis signs and response pathways along with the impact of a training session on this.

Method: A teaching session at the trust was conducted by the Lead Sepsis Nurse and utilised a range of active learning techniques including scenario-based questions and a sepsis game. Pre- and post-training questionnaires were completed by participants; these comprised multiple-choice questions related to sepsis identification and response. Respondents were asked to rate their confidence in each answer (Gardner-Medwin 1995). This enabled scoring to award penalties for higher levels of confidence in incorrect answers and reward high confidence in correct answers. Lower levels of confidence attracted or lost smaller marks.

Results: There was a statistically significant ($p < 0.0002$) improvement in questionnaire scores after the training session from 42% to 66%. Lower scores on the pre-test survey mainly related to incorrect selection of responses to scenario questions.

Conclusion: This service evaluation has highlighted a potential lack of awareness of sepsis signs and in particular correct response pathways among clinical Therapeutic Radiographers. It also demonstrates that an active-learning based training session can significantly improve understanding of this. Sepsis training utilising scenario and response questions should be provided to Therapeutic Radiographers who are likely to work with patients undergoing concurrent chemoradiotherapy.

1. Gardner-Medwin, A.R. (1995) Confidence assessment in the teaching of basic science. ALT-J; 3: 80-85. 2. National Institute for Health and Care Excellence (NICE) (2012) Neutropenic Sepsis: Prevention and Management of Neutropenic Sepsis in Cancer Patients [cited 2022 Apr 11]. Available from: https://www.nice.org.uk/guidance/cg151 3. Okera, M., Chan, S., Dernede, U., Larkin, J., Popat, S., Gilbert, D. et al. (2011) A prospective study of chemotherapy-induced febrile neutropenia in the South West London Cancer Network. Interpretation of study results in light of NCAG/NCEPOD findings. Br J Cancer. 104(3): 407-412.

P122 Developing a therapeutic radiographer workforce strategy for career progression and succession planning for advanced practice roles

Hannah Woodbridge; Claire Reynolds; Katie Fisher

Lancashire Teaching Hospitals

Introduction: Within radiotherapy, role development has moved into advanced and consultant level practice. However, for radiographers wishing to remain in patient-facing roles, there has been a lack of defined career progression.

Aims: To work collaboratively with radiographers to develop team leader roles and investigate the role of specialisms within radiotherapy, including progression to expert generalist practitioner. This can be used to create individual career progression plans and succession planning for existing ACP and Consultant roles.

Methods: Utilising the model of appreciative inquiry, small focus groups were interviewed to establish which areas of current practice led to a sense of fulfilment, as well as where the radiographers would like to see their careers developing. Investigations into regional and national specialist roles were also carried out. Several one-to-one meetings were also held, according to staff preference.

Results: of the focus groups aided development of ideas for career pathways with unlimited potential. Phase 2 involved scoping provision of training for different specialisms and how pathways and job descriptions could change based on the findings.

Conclusions: This project has identified frustration over a lack of clear career progression. Outcomes will look to build elements of the four domains of advanced practice into job descriptions for staff at all career stages and build cases for specialist practice. This will create robust and fluid mechanisms of career progression and facilitate succession planning for advanced and consultant roles. This aligns with the updated 2022 CoR Education and Career Framework publication.

P123 Evaluating how prepared UK student therapeutic radiographers are to support transgender and gender diverse patients

Dearbhla Doherty

Clatterbridge Cancer Centre

Introduction: Transgender and gender diverse people face multiple health disparities and often have to educate their Health Care Professionals on how to provide appropriate and inclusive care. Gender diverse patients having radiotherapy may require additional needs in regards to language, education and inclusivity on pregnancy status to prevent unintended radiation exposure to individuals of childbearing age. With a lack of evidence in the literature of education within the radiotherapy undergraduate curriculum, this research project aimed to evaluate how much transgender or gender diverse education is being distributed into the United Kingdom (UK) radiotherapy curricula.
Method: An online survey questionnaire was distributed to final year therapy radiography students studying in the UK. Search strategy and terms, eligibility criteria and peer review of questions were all predefined prior to ethical approval. The survey recruited participants via email sent from the Heads of Radiotherapy Education.

Results: There were a total of 45 responses to the survey. Almost all participants agreed transgender patients require additional needs in regards to language and 98% felt it was important a therapeutic radiographer was aware their patient was transgender. Many students who received training felt this was not enough to prepare them to support a transgender/ gender diverse patient.

Conclusion: Final year therapy radiographers understand basic terms and concepts of gender diversity; however, many do not feel prepared to treat a gender diverse patient. Future studies are needed to identify where development is required.

P124 Radiotherapy management priorities for embedding a research culture

Kirsty Farnan; Damian Parr; Zoe Monteith

NHS Tayside

Background: AHP led research ensures working practices are evidence based and committed to continually improving (Health Education England, 2022). Embedding research within the workplace culture is not an easy task (Comer et al., 2022). Existing frameworks offer guidance for managers to support this transition (Harris, Cooke and Grafton, 2022).

Purpose:
- Share local experience of embedding research culture
- Share local experience of evaluating impact of change

Summary of content: The management team identified 3 priorities to introduce about a culture change: embed, disseminate and translate.

Embed: Research will be added as a standing agenda item to internal meetings where relevant, demystifying research and ensuring it is a regular topic of conversation for all. All team members will fulfil aspects of the research pillar,

reflected in personal objective settings aligned with departmental and individual visions. The management team will lead by example sharing their own objectives such as utilise workforce planning tools to support.

Disseminate: Ongoing work will be regularly disseminated with the staff group and wider team. This will further embed the culture change by raising awareness and reinforcing the overall strategic vision. Networking is an important aspect of successful dissemination. The management team will engage with Radiotherapy and AHP research streams.

Translate: Engagement of all staff will strengthen confidence level with research skills. Placing value on all projects regardless of size will allow a build up of skills sets. Sharing resultant changes in practice relating to patient care directly or indirectly demonstrates the impact of embedding a research culture strengthening the strategic vision.

1. Comer, C., Collings, R., McCracken, A., Payne, C., and Moore, A. (2022) *Allied health professionals perceptions of research in the United Kingdom national health service: a survey of research capacity and culture.* BMC Health Serv Res **22**, 1094. https://doi.org/10.1186/s12913-022-08465-6.
2. Harris, J., Cooke, J., and Grafton, K. (2019) *Shaping Better Practice Through Research: A Practitioner Framework*. CAPHR (Council for Allied Health Professions Research) and NIHR (National Institute for Health Research).
3. Health Education England. (2022). *Allied Health Professions Research and Innovation Strategy for England.* Available at: https://www.hee.nhs.uk/our-work/allied-healthprofessions/enable-workforce/allied-health-professions-research-innovationstrategy-england.

P125 To provide an overview into becoming a therapeutic radiographer in the speciality field of Gamma Knife Stereotactic Radiosurgery by delivering treatment with high intensity radiation sources to treat a variety of lesions within the brain. To aim is to provide an education poster to promote the career in this field

Sindy Nancy Figueroa Merino

The National Centre for Stereotactic Radiosurgery

The shortages of therapeutic radiographers have been noted as mentioned by the Society of Radiographers in their publish work on "Shortage of therapeutic radiographers will have 'critical effect' if decisive action is not taken to" mentioning the negative impact that shortage of qualified therapeutic radiographers could have in the delivery of treatment for cancer patients, how this issue has been going for years and how universities are finding it very difficult to recruit people in this profession or difficult to retain them(1). For the Stereotactic Radiosurgery Department this not only represent the impact in cancer patients but also in so many other areas that are supported by this treatment technology presenting a non-invasive alternative treatment for vascular lesions e.g. AVMs (Artero Venus Malformation), Functional lesions e.g. Trigeminal neuralgia, non-malignant tumours among others. The aim of this educational poster is to showcase what is Gamma Knife treatment and how therapeutic radiographers support it. For an easy comprehension it has been broken into the following sections: · How Gamma Knife and Stereotactic Radiosurgery works · Which conditions do we treat · An outlook into the Patient's Journey · How does the Multidisciplinary team looks · A day in the life of a therapeutic radiographer in Stereotactic Radiosurgery · Career progression and social media QR codes for people to follow us. It is aim for this poster to give us a platform by which we can create awareness of this career and to promote more therapeutic radiographers in this field.

1) Deeson, D. (2018). Shortage of therapeutic radiographers will have 'critical effect' if decisive action is not taken to. Title. Society of Radiography. https://www.sor.org/news/import/shortage-of-therapeutic-radiographers-

RESEARCH / SHARING BEST PRACTICE POSTER PRESENTATIONS

P126 Using aria carepaths to enhance the clinical trial quality assurance process both pre-trial and on-trial

Chloe Wilkinson; Donna Caldwell

NHS Greater Glasgow and Clyde

Background: Trial Quality Assurance (QA) exists in two forms, Pre-trial and On-trial. Our existing ARIA carepaths/tasks and current process was not sufficient to cover the variety of trial QA requirements. We wanted to create and implement carepaths to ensure the QA process was functionally efficient for all staff groups involved in the patient journey.

Method: We proposed the adaptation of existing tasks and creation of new tasks along with their associated questionnaires and checklists to meet the requirements of our most complex trials, with the intention that unnecessary tasks would be removed if not needed. Two new carepaths, Pre-Trial QA and On-Trial QA were created. **Results:** Previously a carepath for Pre-Trial QA had never existed. Creating a carepath has provided a familiar process which mirrors an actual patient and creates a task list more integrated into workload. The On-Trial QA carepath is now adapted to suit each individual patient and their specific journey. Previously we relied upon memory, personal motivation and email reminders to fulfil these requirements, now we have an integrated electronic carepath within ARIA that presents staff with QA related tasks and reduces email traffic.

Conclusion: The creation and implementation of the new carepaths has formed a structured and familiar process for the tracking and completion of pre-trial and on-trial QA. It has created a resource of information, reduced email communication and produced a more representative reflection of the clinical trial workload.

P127 Conducting qualitative research interviews online: Guidance on good practice

Jamie Beck; Andrew Wilson; Maryann Hardy; Bev Snaith

University of Bradford

Background: The utilisation of qualitative research in diagnostic imaging has previously been identified as an area for growth (1). The research has the potential to offer insights into imaging practice that traditional quantitative methods may not provide. Whilst different methods of data collection exist, the interview is regarded as an established method and this presentation will provide an account of the use of semi-structured interviews but were conducted online as opposed to the traditional "face to face" approach.

Purpose: The COVID pandemic had implications for the conduct of research in terms of avoiding the close proximity of participants unless essential (3). This, coupled with benefits of time management and a desire to ensure research is environmentally sustainable makes the conduct of research interviews using online platforms a more appealing proposition. The important ability to observe during the interview is, due to technological advances, now more possible. The presentation will provide a reflective account of conducting research interviews online and provide guidance on good practice for those contemplating data collection using a similar approach (3).

Summary of content: The presentation will consider different interfaces available for use, the need for audio and video recordings, transcription, benefits and limitations of the online approach plus good practice in ensuring rigour in the research (4,5). Significantly, the importance of reflexivity and taking the online nature of the interview into account when engaging in reflexivity as a researcher will be discussed (2).

1. Bolderston A (2014) Five Percent Is Not Enough! Why We Need More Qualitative Research in the Medical Radiation Sciences. Journal of Medical Imaging and Radiation Sciences 45 (3) 201-3 2. Braun V and Clarke V (2022) Thematic Analysis: A practical guide. London, Sage 3. Naylor S, Booth S, Harvey-Lloyd J and Strudwick R (2022) Reflecting on the Use of Virtual Focus Groups for Exploring the Experiences of Diagnostic Radiographers During the COVID-19 Pandemic. In Doing Research Online; London, Sage. 4. Noble H and Smith J (2015) Issues of validity and reliability in qualitative research. Evidence Based Nursing 18(2) 34-5 5. Murphy FJ and Yielder J (2010) Establishing rigour in qualitative radiography research. Radiography 16 (1) 62-7

P128 Breaking down barriers: Understanding positive deviance in the context of undergraduate radiography research culture

K Louise McKnight[1]; Robert Higgins[2]; Jeremy Lima[1]; Lianne Potter[1]; James Michael[1]; Judith Dyson[1]

[1]Birmingham City University; [2]University of Salford

Background: Positive deviance describes the behaviour of successful people in clinical situations (Baxter et al. 2016; Lawton et al. 2014). Diagnostic Radiography students in two higher education settings were asked what skills or attributes they felt were important in becoming a successful researcher in radiography.

Method: This qualitative study used a creative interviewing method to explore six students' perceptions of success in relation to research. They were asked about their understanding of the importance of research for radiography and to describe and draw what they felt were the ideal skills and attributes held by successful research radiographers and students, meaning those who they thought were overcoming barriers placed in their way, and how they felt they matched these ideals themselves.

Results: Data were analysed and presented using Co-Constructed Depiction method (McKnight 2022). Students mentioned skills such as organisation and keeping informed, and attributes such as a willingness to learn, being inquisitive, confident, and having a collaborative approach to research Overall, they identified positive deviants in radiography research as being critical practitioners who are keen to implement knowledge into care.

Conclusion: What students believed would enable high achievement in their studies and as practitioners is informed by their beliefs in what an 'ideal research radiographer' might look like. By asking about how barriers are surmounted, rather than the nature of those barriers, it seems that some barriers are internal. With this knowledge, educators can encourage self belief and help students build their own skills and attributes to model positive deviants themselves.

1, Baxter, R., Taylor, N., Kellar, I. and Lawton, R. (2016). "What Methods Are Used to Apply Positive Deviance within Healthcare Organisations? A Systematic Review." BMJ quality & safety 25, no. 3: 190-201.

2. Lawton, R., Taylor, N., Clay-Williams, R. and Braithwaite, J. (2014). "Positive Deviance: A Different Approach to Achieving Patient Safety." BMJ quality & safety 23, no. 11: 880-883.

3. McKnight, K. L. (2022) Research pedagogy in a UK radiography education setting. Radiography (Lond), 28(1), pp. 80-87.

P129 Supporting students who struggle to learn radiographic science through action research

Phil Andrews

Keele University

Background: Struggling to learn radiographic science is cited as a reason for attrition and poor performance on undergraduate radiography programmes (McAnulla et al, 2020), reflected in student performance in our institution in the 2020/21 academic session. Learner variability in aspects including prior education, academic motivation, physical and mental health, and neurotype contribute to variation in outcomes (Richardson et al, 2012, Pino and Mortari, 2 OFS, 2018). Confident that engaged radiography undergraduates can master radiographic science, and challenged by the failure rate, the author set out to investigate.

Purpose: The presentation outlines the findings of the reconnaissance phase of Action Research addressing the question *"How can I support students who struggle to learn radiographic science?"* and reports planned actions arising from a qualitative investigation into student perceptions of learning. The findings are specific to the local context but might find resonance for other educators.

Summary of content: Reflexive thematic analysis of survey responses collected by interview and online questionnaire generated four main themes. (1) *There is a context* in which we design learning, (2) *There are things we can do to make learning more effective*, (3) *Developing metacognition and self-regulation is important*. (4) *Students can make decisions about how they learn*.

Consideration of this interpretation of the data led to planned actions (a) addressing learner variability and diversity by the application of Universal Design for Learning principles, (b) reflecting on feedback practices and (c) embedding the development of metacognition.

The researcher gained interpretivist skills and knowing reflexivity to take forward into evaluation of the action phase.

1. McAnulla, S. J., Ball, S. E. and Knapp, K. M. (2020) Understanding student radiographer attrition: Risk factors and strategies. Radiography 26(3), 198 - 204.
2. Office for Students (2018) Degree outcomes - overview, Differences in student outcomes. Available at: https://www.officeforstudents.org.uk/data-and-analysis/differences-in-student-outcomes/degree-outcomes-overview/ (Accessed: 31 December 2021).
3. Pino, M. and Mortari, L. (2014) The inclusion of students with dyslexia in higher education: A systematic review using narrative synthesis. Dyslexia 20, 346 - 369
4. Richardson, M., Abraham, C. and Bond, R. (2012) Psychological correlates of university students' academic performance: A systematic review and meta-analysis. Psychological Bulletin, 138(2), 353 - 387

P131 Radiographer experience of establishing radiostereometric imaging for a research study involving novel ceramic hip resurfacing

Clare Moody[1]; Martin Downing[2]

[1]Newcastle Hospitals NHS Trust; [2]Downing Imaging Limited UK

Background: Radiostereometric analysis (RSA) is a proven specialised radiological imaging method, assessing implant stability and predicting longer-term implant survival. RSA is particularly useful to evaluate new implant technologies before large numbers of patients receive the new technology, protecting patients from undue risk. RSA is a new imaging technique at this hospital site and this is where the first UK patient was imaged for the research study 'ReCerf'. This study aims to assess a subgroup of patients with RSA as part of a larger clinical investigation of the ReCerf hip resurfacing device (MatOrtho Ltd., UK).

Purpose: Radiographers worked in collaboration with an imaging training and analysis company (Downing Imaging Ltd.,UK)) to devise a robust and repeatable imaging guide for RSA imaging. This required precise scientific testing involving several hours of cadaver and Sawbone (phantom) imaging to establish repeatability and assess guide limits for x-ray exposure for sufficient image quality. The first research patient was successfully imaged in December 2022. This RSA study design, set up alongside routine practice, allows a wider range of hospitals to safely engage with new technologies for the benefit of patients. This reduces barriers to innovation and collects clinical data to demonstrate the safety of a device during early years of use.

Summary of content The aim of this presentation is to provide an educational written and pictorial/photographic review on how the radiographic team have set up RSA imaging, utilising standard x-ray room and mobile imaging equipment at this hospital site.

1. Pijls, B.G., Nieuwenhuijse, M.J., Fiocco, M., Plevier, J.W., Middeldorp, S., Nelissen, R.G. and Valstar, E.R., 2012. Early proximal migration of cups is associated with late revision in THA: a systematic review and meta-analysis of 26 RSA studies and 49 survival studies. Acta orthopaedica, 83(6), pp.583-591. 2. Valstar, E.R., Gill, R., Ryd, L., Flivik, G., Börlin, N. and Kärrholm, J., 2005. Guidelines for standardization of radiostereometry (RSA) of implants. Acta orthopaedica, 76(4), pp.563-572. 3. ISO 16087:2013 Implants for surgery — Roentgen stereophotogrammetric analysis for the assessment of migration of orthopaedic implant

EDUCATION AND WORKFORCE POSTER PRESENTATIONS

P132 Advanced practice reporting radiographers and radiology trainees -- together everyone achieves more?

Freya Johnson

NHS Greater Glasgow & Clyde

Advanced practice reporting radiographers are a key part of reporting services and have long established input for radiographic staff for education on first line interpretation and improvement of imaging quality. Less well published however are the wider training benefits of reporting radiographers into the future reporting workforce, regarding radiologist trainees. This poster/presentation explores the impact reporting radiographers can make regarding trainee radiologist reporting training. In collaboration with consultant radiologist education leads a pilot to explore outcomes within a single health board area based in a pilot of reporting radiographers verifying and providing reporting feedback on reporting for first year radiology trainees. Learning outcomes to be discussed for the UKI0 congress based on survey feedback from reporting radiographers, trainee radiologists and educational consultant radiologists. Summary of governance in place to support implement change. How did participants feel the pilot has affected training and were there any wider culture changes experienced. Wider benefits and how we measure these will also be discussed as well as looking critically at what input to training in the context of current staffing levels means to not only capacity but also training of radiographic staff. Future consideration of how we manage capacity and education/training input to ensure sustainable solutions. Feedback to build education to support the teams to develop for the future, are there any consideration we learned from reflection of our own team through educating medical rather than radiographic staff. Wider benefits and key areas of improvement which became apparent during the pilot.

P133 Using advanced practice to develop a radiographer and nurse led, on treatment review (OTR) service

Rachel Rigby; Clare Watson; Catherine Lunney; Colleen Martin; Caroline Brindle; Jacqueline Hudson

Lancashire Teaching Hospitals Foundation Trust

Introduction: The ACP in radiotherapy OTR contributed to service development and redesign with involvement in the recruitment and training of a review team, consisting of radiographers and a nurse. The review team has significantly increased the number of non-medical reviews offered and is contributing to modernising our radiotherapy service (Cancer Research, 2017). With a newly established team and changes to traditional working practices an evaluation was implemented to assess patient satisfaction with communication and interactions during OTR consultations with the review team.

Aims and Objectives: * Evaluate patient satisfaction with communication * Improve communication between patients and health care professionals * Encouraging patient participation to shape radiotherapy services * Ensure patients feel involved in their care, listened to and well informed * Improve the patient experience Method Patients having OTR with the review team outside of the clinicians' sessions were the chosen cohort. The EORTC QOL communication questionnaire (EORTC QLQ-COMU26) was used for data collection. * Questionnaires given to all patients during the specified time * Questionnaire responses were anonymous * Data collection and analysis was undertaken by the ACP
Results: The EORTC questionnaire uses six multi-item scales to assess responses based on behaviours and relationships: Scores are calculated from 0- 100, a high score indicates good communication. Results showed all sections scored over 90 reflecting high levels of patient satisfaction across all multi-item scales.

Conclusion: A theme was identified from the lowest scoring results relating to checking the patients understanding, prior to and after delivering information. These results were shared and used to formulate an action plan for further training and development

1. Cancer Research. (2017). Full Team Ahead: Understanding the Non-Surgical Cancer Treatments Workforce. Retrieved from: cancerresearchuk.org 2. European Organisation for Research and Treatment of Caner (2021). QOL Questionnaires and tools. Retrieved from: qol.eortc.org/questionnaire/qlq-comu26/

P134 Expanding diagnostic radiography student capacity by utilising accident and emergency, theatre, fracture clinic and advanced practitioners

David Stuart[1]; Kathryn Nettleship[2]

[1]University of Derby; [2]Nottingham University Hospital Trust

Background: A Student's clinical education, experience and support are the joint and equal responsibility of the clinical placement site and the University. The quality of this service needs to be maintained through collaborative relationships and regular dialogue (Coleman, 2012). With, approximately 50% of each radiography programme being practice-based, Coleman, (2012) states that quality practice placement experiences which are situated within a positive learning environment, are essential to support the development of learners to deliver safe and effective person-centred care. However, Plain Film clinical placements are limited due to finite equipment, staffing, and space. To reduce the burden on these providers, innovative ways are needed to create new opportunities for students through simulation, care placements and the independent sector (Partner, Shiner et al, 2022).

Purpose: This poster aims to share the experience of one UK university in partnership with a large major trauma centre in setting up new and innovative ways to expand Diagnostic Radiography student placement capacity.

Summary of content: Two new placement opportunities were created. A 'trauma pathway' week for 3rd years, with time spent in ED triage, hot reporting sessions and with doctors in fracture clinic. The aim of this week is for students to understand the hospital trauma pathway the patient goes through, and possibly put themselves in the patient's "shoes", which will in turn improve patient-centred care (Hyde, E & Hardy, M, 2021). The placement week for 1st years was an operating department practitioner exchange. ODP students experienced CT and Radiography students experienced emergency theatres/anaesthetics.

Timetable

Day	Department	Student 1	Student 2
Monday	ENP (Head to Minor Injuries for this day)	ENP 8-6	Fracture Clinic
Tuesday	Reporting Radiography/ED	ED 8-9 Hot Reporting 9-11 ED 11-1 ED 1.30 – 3 Image review 3-6	ED 8-12.30 Hot Reporting 1-3 Image review 3-6
Wednesday	TC Fracture Clinic	Fracture Clinic 8-6	ENP 8-6

1. Coleman, L., (2012). Quality Standards for Practice Placements. [ebook] The College of Radiographers. Available at: [Accessed 2 August 2022].

2. Hyde, E. And Hardy, M. (2021). Patient centred care in diagnostic radiography (Part 3): Perceptions of student radiographers and radiography academics. radiography. 27(3), pp.803-810. [Online]. Available at: https://doi.org/10.1016/j.radi.2020.12.013 [Accessed 1 September 2022].

3. Partner, A., Shiner, N., Hyde, E. and Errett, S., 2022. First-year student radiographers perceptions of a one-week simulation-based education package designed to increase clinical placement capacity.¨Radiography, 28(3), pp.577-585.

P135 Collaborative approach to learning from discrepancy within the emergency department team and advanced practice teams

Jeanette Carter

University Hospitals of North Midlands NHS Trust

Background: Discussion with the ED consultants to assist with the learning of x-ray "misses" by ED to whole team as a collaborative approach to include the advanced practitioner reporters to help with the education of image assessment to reduce the number of misses within ED.

Purpose: To demonstrate a different approach of working outside imaging team to reduce the risk of "misses" of pathologies within the emergency department.

Methodology: Learning from discrepancy meeting set up by emergency department (ED) consultants to feedback missed pathologies to all levels of the ED teams. The ED registrars will review the cases and go through individual cases. These cases have been provided by the imaging department, the full patient pathway reviewed by ED registrar, presented. Advanced practitioners/consultant radiographers present on the meeting to offer advice and feedback on the cases for future reference.

Results: Early stages -- some short feedback statements from attendees from both parties as feedback to meetings.

O'Carroll. V et al (2015) Health and social care professionals' attitudes to interprofessional working and interprofessional education: A literature review Journal of Interprofessional care Volume 30 Issue 1 RCR (2014) Standard for learning from discrepancy meetings Available at: https://www.rcr.ac.uk/sites/default/files/publication/BFCR(14)11_LDMs.pdf

P136 Cross boundary interprofessional sustainable educational resources for the future workforce

Freya Johnson

NHS Greater Glasgow & Clyde

To build a sustainable workforce through provision of high-quality training and education is a current challenge for radiology services with pressures in both acquisition and reporting, it is vital we work together to build resources to grow our workforce. We developed a six-month education schedule so how can we develop resource to counter these pressures, we piloted a system of interprofessional teamworking across a large multi board geographical area to

provide education which focused on trauma reporting for radiology trainees and trainee reporting radiographers as well as this education then being disseminated to all health boards for radiographic staff. We propose that by working together to bring new pathways and interprofessional working you can achieve sustainable education to support. This presentation/poster will feedback on the pilot to bring reporting radiographers together across traditional health board boundaries, sharing the workload to create and present education for the mutual benefit of trainee radiologists, trainee reporting radiographers and radiographic staff as a CPD resource. Learning outcome to be discussed for the UKI0 congress based on a survey of participants involved. Can we overcome geographical and professional boundaries provide educational resources that support and build our future teams in radiology. Did this provide a valued education resource relevant to participants. Learning points from organisation of structure and content of education. Issues we encountered and had to provide solutions for will be summarised. Effect on reporting radiographers to fulfil the four pillars of advanced practice. Future wider benefits based on feedback.

P137 Supporting international radiographers transitioning to working in the UK healthcare system: A collaboration between a university and local NHS trusts

Dorothy Cox; Rebecca Howell

University of Gloucestershire

A national shortage of healthcare workers has led to an increase in international recruitment; in the South West, over 10% of the NHS workforce are trained outside of the UK (Baker, 2021). Within local NHS Trusts, Band 5 radiographers have been recruited predominantly from overseas in order to fill long term outstanding vacancies, but receive no formal support in adapting to working within the UK healthcare system. This can affect job satisfaction and personal wellbeing, as evidenced in literature investigating experiences of international healthcare staff (Bond et al., 2020; Kehoe et al., 2016). 'Welcome to the UK' is a workshop provided by the GMC for international doctors adapting to UK practice, however to our knowledge no such programme exists to support international radiographers. At our institution we are trialling a study day targeted at aiding international radiographers from local NHS trusts in their development within UK healthcare practice, with the hope that it will grow into an accredited programme in the future.

1. Baker, C. (2021) NHS staff from overseas: statistics. House of Commons Publishing, London.
2. Bond, S., Merriman, C. and Walthall, H. (2020) The Experiences of International Nurses and Midwives Transitioning to Work in the Uk: A Qualitative Synthesis of the Literature from 2010 to 2019, International Journal of Nursing Studies, 110. doi: 10.1016/j.ijnurstu.2020.103693.
3. Kehoe, A. et al. (2016) Supporting International Medical Graduates' Transition to Their Host-country: Realist Synthesis, Medical Education, 50(10), pp. 1015-1032. doi: 10.1111/medu.13071.

P138 Clinical competency: What is it, how is it defined and why does this matter?

Lizzie Clark[1]; Christine Heales[2]; Demelza Green[2]

[1]Royal Devon University Healthcare NHS Foundation Trust; [2]University of Exeter

Background: The aim of pre-registration radiography programmes, and some post-graduate provision such as Ultrasound or Advanced Clinical Practice, is to ensure graduates are equipped for practice. This, by definition, includes assurance that required levels of clinical competence have been achieved.

Purpose: The purpose of this poster is to consider the implications of there not being a single universally agreed definition of clinical competence and how this impacts upon assessment strategies, particularly for pre-registration diagnostic radiography programmes.

Summary of content: This poster will provide example definitions of clinical competence and outline why such definitions are important. It will consider that, whilst there is no single universally agreed definition, there does seem to be consensus that competence requires knowledge to underpin skills and behaviours.

Miller's Pyramid of Professional Competence [1] will be utilised to indicate how different assessment tools can assess different elements of competence. Consideration will also be given to the limitations of Miller's model.

The poster will then discuss how, in the absence of a universally agreed definition of clinical competence for diagnostic radiography, education providers utilise a heterogeneous approach. The advantages of having variety is laid out but consideration is also given to the workload of clinical staff who are increasingly supporting students from

more than one education provider. The poster concludes by highlighting the research gap in relation to assessment of clinical competency in diagnostic radiography.

GE Miller, (1990), The Assessment of Clinical Skills Competence / Performance, Acad Med, 65 (9), 63-67

P139 Early findings of a scoping survey exploring UK sonographers views on professional supervision

Gillian Coleman[1]; Emma Hyde[1]; Ruth Strudwick[2]

[1]University of Derby; [2]University of Suffolk

Background: Professional supervision is a formal process whereby two or more professionals meet, share clinical information, reflect on practice and on the emotional aspects of the clinical role2-4. Within the UK, professional supervision is incorporated into practice across many health professions however, it does not currently appear to be part of UK Radiography or Sonography practice1. The Society of Radiographers and Health and Care Professions Council provide guidance on the use of professional supervision, but it is not a mandatory requirement. This two-stage research project was designed to explore the use of professional supervision for the sonography profession within the UK.

Methods: An online survey was conducted to establish the current use of professional supervision within the sonographer population. The survey explored the current use of professional supervision and views on the process of support and professional supervision for four subgroups of sonographers; clinical specialist/consultant sonographers, ultrasound managers and professional officers/members of professional organisations such as Consortium for the Accreditation of Sonographic Education, Society of Radiographers or British Medical Ultrasound Society.

Results: Data collected from this survey is currently being analysed. Early findings will be presented at UKIO.
Conclusion: The survey's findings will identify the current level of professional supervision in the UK and explore the current levels of support in place for sonographer wellbeing. The findings from the survey will inform the questions for the stage 2 focus groups. It is hoped that the findings will lead to recommendations for the implementation of professional supervision for all sonographers practice.

1. Coleman, G., Hyde, E. (2022) Is there a role for professional supervision in supporting the professional and personal wellbeing of the sonographic workforce? A literature review. Radiography. 28, 991-998. 2. Lynch, L., Hancox, K., Happell, B., Parker, J. (2009) Clinical supervision for nurses. Wiley Blackwell, UK. 3. Lyth, G.M. (2000) Clinical Supervision: A concept analysis. J Adv Nurs. 31: 3: 722-729 4. Wallbank, S., Hatton, S. (2011) Reducing burnout and stress: the effectiveness of clinical supervision. Community Practi. 84: 7: 31-35.

P140 Assessment of clinical competence -- current tools and future directions

Lizzie Clark[1]; Christine Heales[2]; Demelza Green[2]

[1]Royal Devon University Healthcare NHS Foundation Trust; [2]University of Exeter

Background: A radiographer graduating from a pre-registration radiography programme, and practitioners from various post-graduate programmes (including Ultrasound and Advanced Clinical Practice) are expected to be competent within their sphere of practice.

Purpose: The purpose of this poster is to review the wide range of clinical assessment tools currently reported upon within the literature and to determine how they assess the various elements of clinical competence. It will conclude by making a case for further exploration of the role Virtual Reality could play in simulation based assessment.

Summary of content: This poster will describe a range of clinical assessment tools in terms of their benefits and limitations. Consideration will be given to the particular area of focus of the assessment type, namely whether it assesses knowledge, skills and / or behaviours. The discussion will then move onto how this results in a range of tools being needed in order to ensure all elements of competence are fully assessed.

The poster will conclude by making a case for further exploration of use of Virtual Reality as an assessment tool. There is a need to continue to increase the numbers of newly qualified radiographers entering the workforce but this is limited by placement capacity including workforce pressures. Hence the potential of Virtual Reality based assessment to even slightly reduce the assessment burden, thereby relieving the pressure on clinical colleagues, means there is a real benefit for research to explore its potential.

P141 Overview of the clinical skills suite

Karis Vercoe

University of Leeds

Background: The Clinical Skills Suite (CSS) is a new teaching concept to the BSc (Hons) Diagnostic Radiography course. It is situated within a Radiology department and has facilities to support blended learning - combining guided professional practice, evidence-based theory and simulation. Students attend the CSS throughout their clinical placement blocks.

Purpose Theory: When in the suite, theory is based upon a range of evidence-based elements from within Radiography. This link provides imaging technique knowledge to Students before, during and after attending the CSS. Through hospital affiliation, the CSS follows imaging protocols used during scenario work and live patient lists. Students can use resources throughout the weeks such as books and articles. Radiograph labelling, tutorials, medical abbreviations worksheets and clinical skills related quiz papers are also provided to link theory and practice.
Professional Practice: As real-time patients attend the CSS., students can instantly transfer theory into practice. This is achieved through guided supervision from a qualified Radiographer. Patient lists can be adapted, offering Students increased opportunities. The equipment used is the Agfa Healthcare DR 600 System. Practice sessions are held prior to clinical blocks. On return to the suite during placements blocks, positioning simulation is carried out prior to patient lists. Live-streaming of patient lists into the adjacent office is planned to allow further observation Simulation The suite offers a range of low to high-fidelity simulation through the use of various factors from mannequins to live patients.

Summary: A blended-learning experience allowing multiple learning tools to create a unique clinical experience for placements.

1. Cronin, K.,et al. (2018). Mapping University Skills labs in Radiography: Students' Perspectives. OPTIMAX 2018, p.99. 2. Hazell, L.,et al. (2020). Simulation based learning to facilitate clinical readiness in diagnostic radiography. A meta-synthesis. Radiography, 26(4), pp.e238-e245. 3. Holmström, A.. (2019). Radiography Students' Learning of Plain X-Ray Examinations in Simulation Laboratory Exercises: An Ethnographic Research. Journal of Medical Imaging and Radiation Sciences, 50(4), pp.557-564. 4. Kong, A., et al. (2015) 'The role of simulation in developing clinical knowledge and increasing clinical confidence in first-year radiography students.', Focus on Health Professional Education. ANZAHPE: Australian & New Zealand Association for Health Professional Educators, 16(3), pp. 29-44. 5. Zorn, C., et al. (2019). Motivation of student radiographers in learning situations based on role-play simulation: A multicentric approach involving trainers and students. Radiography, 25(1), pp.e18-e25.

P142 Development of a clinical skills x-ray room

Helen Harcus; James Harcus; Voyin Pantic; Karis Vercoe

University of Leeds

Background: Clinical education and experience within radiography education is fundamental, with most pre-registration courses typically comprising around 50% clinical time. With workforce shortages there is a demand to increase the number of graduates but one of the major limiting factors on increasing the number of trainees is clinical capacity and a lack of supervising staff to allow this increase (1). Simulation has been demonstrated to provide an alternative to traditional clinical experience, though has limitations in its own right. This project developed a clinical skills X-ray facility which acted to offer simulation, traditional clinical experience, and additional clinical placement capacity.

Purpose: The purpose of this paper is to outline the development of the clinical skills X-ray facility as a collaboration between a University, NHS Trust, and manufacturer to act as a potential blueprint for similar future projects. It aims to outline the development of the project from start to finish which resulted in the facility being heavily incorporated into the pre-registration programme.

Summary of content: This paper will outline the history, rationale, aims and vision of the clinical skills facility and offer perspectives from a range of stakeholders. It will consider aspects of the project such as room design, equipment selection, staffing and the roles of each stakeholder involved. It will also outline some of the barriers and problems encountered as well as the proposed ways in which the facility can be utilised to support and enhance radiographer education, as well as increase cohort sizes.

1. Shiner, N. (2018) Is there a role for simulation based education within conventional diagnostic radiography? A literature review. *Radiography.* 28, 262-271

P143 Using a microsoft teams for regular and accessible continuous professional development (CPD) and support development of the modern radiology workforce

Freya Johnson[1]; Sarah Zycinski[2]; Stephen Moore[2]

[1]NHS Greater Glasgow and Clyde; [2]NHS

To support staff CPD the use of microsoft teams introduced a platform which facilitates provision of accessible relevant education to staff and sharing of knowledge on a larger scale than traditional hospital clinical environments can provide. Workforce staffing pressures and requirements to balance education needs with service provision can be challenging, a coordinated approach has built a resource which staff can work over multiple hospital sites to share knowledge and improve support in place for staff to develop. Learning outcomes to be displayed in a poster presentation for the UKI0 congress based on our experiences in setting up and scaling up an online CPD platform survey for a large health board and also using staff feedback surveys. To provide reflection on experiences and work required to establish and maintain this resource. Reflection on resources required to set up and maintain this resource with indication of how we want to develop in the future. Discussion on staff feedback regarding job satisfaction and communication. Future considerations and how we can adapt to link to provide a hybrid of in person and virtual events and to encourage input from service development for sustainable education development.

P144 Radiographic clinical reporting monthly continuing professional development series

Holly Mee; Sophie McWhirter; Marie Gibson; Paul O'Riordan; Team Reporting Radiographer

University Hospitals of Leicester NHS Trust

Background: Continuing professional development is a standard set by the HCPC where by all practicing radiographers must comply. This includes maintaining an accurate, current record of a variety of CPD activities, all of which contribute to learning and therefore benefit patients though service improvement[1].

Purpose: Our presentation captures a process of reflective practice developed by our radiographic clinical reporting teams. The process encourages the cycle of reflective learning on challenging cases, and in doing so, develops the knowledge base of the learner. The two stage process of presentation involves the practitioner radiographer team in an interactive learning process and maintains an appreciation of the relationship between image quality and image diagnosis. Each case study presents a teaching opportunity whilst encouraging radiographers to actively engage in CPD and explore their potential in image interpretation. The cases can be used as a tool to highlight specific technique considerations such as: how poor positioning or artefact can obscure pathology. We want to share our poster with UKIO participants to inspire other clinical reporting radiographers to deliver engaging CPD activities for all imaging staff.

Summary of content: This poster demonstrates the process of case creation and distribution with examples of feedback. An example question and answer sheet is included to showcase our CPD activity.

[1] HCPC. Standards of continuing professional development [Internet]. Health & Care Professions Council. 2018 [cited 2022Nov21]. Available from: https://www.hcpc-uk.org/standards/standards-of-continuing-professional-development/

P145 Documenting radiology opinions within multi-disciplinary meetings: Quantitative and qualitative assessment of pathway implementation and barriers to success

Clare Price; Geeta Kapoor

Norfolk and Norwich University Hospitals NHS Foundation Trust

Background: The Royal College of Radiologists1 and the General Medical Council2 emphasise the importance of clear documentation within Multidisciplinary Team Meetings (MDTMs). Radiologists are responsible for authorising accurate, contemporaneous and accessible supplementary reports after imaging review. Prior to 2022, no formal system existed for documenting radiology input at cancer MDTMs at the Norfolk and Norwich University Hospital. An electronic pathway has since been implemented.

Method: A radiology MDTM review request was created within the Trusts' electronic healthcare record (EHR), which generates a radiology information system (RIS) request. MDTM reviews are authorised on RIS by the MDT radiologist and are accessible on EHR. A retrospective search was performed for all MDTM review entries authorised over a 6-

month period. Structured feedback surveys were sent to consultant radiologists and clinicians attending cancer MDTMs after the initial 6-month period.

Results: Over a 6-month period, 3972 electronic MDTM radiology reviews were generated by 40 radiology doctors. MDTM review report numbers grew incrementally over the initial 2-month period. 24 consultant radiologists provided feedback, of whom 96% found referencing previous reviews helpful. 63% of consultant radiologists felt the process increased preparation time and 54% felt there was insufficient administrative support. 15 consultant MDTM clinicians provided feedback of whom 86% found the process helpful.

Conclusion: A pathway for electronic documentation of MDTM radiology input has been developed and implemented at our Trust. Qualitative feedback from consultant radiologists and clinicians suggests communication and safety has improved. Barriers to implementation include time and administrative support.

1 https://www.rcr.ac.uk/publication/cancer-multidisciplinary-team-meetings-%E2%80%93-standards-clinical-radiologists. Accessed 10/02/2023. 2 https://www.gmc-uk.org/ethical-guidance/ethical-guidance-for-doctors/good-medical-practice. Accessed 10/02/2023.

P147 Introduction of a radiographer led ultrasound cannulation service

Colin Stuckey; Peter Cantin; Kerrie Killeen; Luke Popplestone

University Hospitals Plymouth NHS Trust

Background: Difficulty in obtaining venous access is an increasing problem in health care with significant numbers of patients having difficult venous access (as judged by multiple cannulation attempts). Given that large numbers of patients attending for imaging require a peripheral venous cannula for administration of contrast media as part of their imaging procedure, difficulty in accessing patient vasculature can result in significant delays to service delivery. Multiple cannulations can also cause pain and anxiety for patients attending for scans and can delay diagnosis when suitable access cannot be obtained. In 2020 an audit was performed to measure time delays caused by the wait for specialist support to arrive for patients with difficult venous access. This demonstrated a delay to patient scanning totalling 6 hours for just 11 difficult to cannulate patients. As a result of the findings, a radiographer led ultrasound guided cannulation service was introduced within the department to reduce the delays and improve patient experience and safety.

Purpose: Audit of the improvement to service delivery from the introduction of a radiographer led ultrasound cannulation service How implementation of an ultrasound guided cannulation service within the imaging department has improved patient experience and scan success whilst reducing extravasation incidents How the implementation of this service can lead to increased staff retention and upskilling through internal training. Evidence of best practice with governance, clinical audit and management of risk.

Summary of content: A0 poster detailing project detail, methodology and pre/post implementation audit results, governance considerations, training plan and next steps.

P148 Computer vision syndrome (cvs) amongst sonologists and sonographers

Ogechukwu Patience Anike

Association of Radiographer Registration Board of Nigeria

Background: Ultrasound machine over the years had implored the use of screen which has now been modified to flat screen to provide high resolution and high definitions to make well informed and accurate diagnosis hence Sonologists and Sonographers alike are exposed to the risk of long and extended use of digital screen thereby increasing the susceptibility to Computer Vision Syndrome. Computer Vision Syndrome, also referred to as Digital Eye Strain, describes a group of eye and vision-related problems that result from prolonged computer, tablet, e-reader and cell phone use. Many individuals experience eye discomfort and vision problems when viewing digital screens for extended periods. The level of discomfort tends to increase with the amount of digital screen use. There are a number of factors that determine the amount of strain your body feels as you work on a computer or other digital devices, including lighting in the room, distance from the screen, and glare on the screen, seating posture, and the angle of your head -- not to mention any existing vision problems you may have. One or all of these may combine to cause an uncomfortable amount of strain on your eyes.

Objectives: I. Create awareness II. The effects of Computer Vision Syndrome III. Precaution and steps to prevent the effect of CVS.

Source and Reference American Optometric Association https://www.aoa.org/patients-and-public/caring-for-your-vision/protecting-your-vision/computer-vision-syndrome

P149 Investigating the ability and willingness of stage 3 radiography students to justify emergency CT head requests

Hoi Ching Au; Siu Yau Lo; Geri Ng; Yui Tsz Tang; Robert Meertens

University of Exeter

Background: CT is a commonly used frontline imaging modality in emergency departments. According to IR(ME)R 2017, all CT requests must be justified by a radiologist or trained operator, typically a senior CT radiographer. With the escalating 24/7 demand for emergency CT head scans, role extension of junior radiographers to vet CT head scan requests may improve efficiency without compromising patient safety. This study aims to assess the ability and willingness of stage three radiography students in vetting emergency CT head requests.

Method: An online questionnaire with open and closed questions was given to stage three radiography students at the University of Exeter. Respondents were asked to vet ten common emergency CT head requests as justified, unjustified, or requiring further discussion using NICE guidelines and provide their confidence in decision-making. Data analysis was based on percentage agreement and Cohen's Kappa agreement with NICE guidelines and thematic analysis.

Results: Strong agreements can be observed when justifying most of the CT requests (7/10) with the mean percentage agreement of 91%. The Kappa coefficient (0.805) has also indicated strong agreement. Respondents have a higher mean confidence level in identifying justified CT head requests than unjustified ones. Two-thirds of respondents were willing to vet CT requests upon graduation, yet further training and experience were desired.

Conclusion: This study reflects stage three students possess encouraging potential for emergency CT head scan vetting upon graduating. It also implies more training and real-life experience may help boost junior radiographers' confidence and competency, particularly when refusing unjustified requests.

1. National Institute for Health and Care Excellence. (2019) *Head injury: assessment and early management (NICE guideline CG176)* [online]. Available at: https://www.nice.org.uk/guidance/cg176 [Accessed 14 Oct 2022].

2. National Institute for Health and Care Excellence. (2019) *Stroke and transient ischaemic attack in over 16s: diagnosis and initial management (NICE guideline NG128)*[online]. Available at: https://www.nice.org.uk/guidance/ng128 [Accessed 14 Oct 2022].

3. Society of Radiographers. (2013) *Education and Career Framework for Radiography Workforce* [online]. Available at: https://www.sor.org/learning-advice/professional-body-guidance-and-publications/documents-and-publications/policy-guidance-document-library/education-and-career-framework-for-the-radiography [Assessed 14 October 2022].

4. The Royal College of Radiologists. (2021) *Vetting (triaging) and cancellation of inappropriate radiology requests* [online]. Available at: https://www.rcr.ac.uk/system/files/publication/field_publication_files/bfcr214-vetting- triaging- cancellation-inappropriate-radiology-requests.pdf [Assessed 14 October 2022].

5. UK gov. (2018) *The Ionising Radiation (Medical Exposure) Regulations 2017* [online]. Available at: https://www.legislation.gov.uk/uksi/2017/1322/contents/made [Accessed 14 Oct 2022].

P150 Utilising video conferencing from pandemic and beyond - supporting the education and quality of a radiographer reporting service

Helen Baxter; Rachel McGuckin

Betsi Cadwaladr University Healthboard Trust

Background: Provide a description of a large geographically challenging cross-site radiographer reporting service including delivery of peer review and learning and its compliance with guidance set by the RCR 2020.

Purpose: The aim of this poster is to describe the challenges faced, delivering an established cross-site peer review and learning meeting, during the pandemic and how this has impacted on current and future delivery.

Summary: The poster will consider the practice of peer review and learning. Describe a local cross-site radiographer reporting service and their experiences of changing the Peer and Learning Meeting (PLM) from face to face to remote

video conferencing. The limitation and benefits, pertinent to remote meetings, will be summarised. This will conclude with a brief synopsis of how these changes were adopted and continue to support standards and facilitate learning, even after the peak of the pandemic is over.

1. The Royal College of Radiologists (2020) Standards for radiology events and learning meetings. Available https://www.rcr.ac.uk/system/files/publication/field_publication_files/bfcr201-standards-for-radiology-events-and-learning-meetings.pdf

P152 Degree apprenticeships in diagnostic radiography - experiences and perspectives three years in

Christine Heales; Demelza Green

University of Exeter

Background: The first degree apprenticeship programme in diagnostic radiography launched in 2020. The first cohort are graduating in March 2023.

Purpose: The purpose of this poster is to share experiences of delivering a diagnostic radiographer degree apprenticeship through to fruition by considering the perspectives of each of the following: education provider, workplace (employer) and degree apprentice.

Summary of content: The poster will outline experiences from each of the three parties, including highlights and challenges that the apprenticeship brought with it.

The educational perspective will consider challenges such as the need for careful balancing of curriculum content such that the volume of taught material fits within the 20% off the job time.

The workplace perspective will consider a number of issues such as the need to balance workforce needs versus the elements needed to provide a continual, consistent quality learning experience for the degree apprentice, and the potential benefits that employing degree apprentices can bring.

The apprentice perspective will include personal experiences of undertaking a degree level programme delivered in this format, including the opportunities presented by this route and implications for work-life balance.

The poster will conclude by emphasising that, whilst the route to qualification is different, degree apprentices achieve to the same educational level as learners on other types of programme, thus opening up access to a profession that may otherwise not be available to some.

P153 An evaluation of our radiography apprenticeship journey

Elizabeth Kirkpatrick

Frimley Health NHS Foundation Trust

Background: Apprenticeships in Radiography are slowly starting to become more integrated amongst Radiology departments across the country. Awareness is being raised to highlight apprenticeships as an alternative route into the career which is required with our growing workforce demand. This route encourages departments to 'grow your own' workforce and has been used as an internal development opportunity to our radiology support workers.

Purpose: The learning outcomes encourage UKIO participants to consider utilising the radiography apprenticeship pathway and highlights the actions we have put in place based on the feedback from our apprentices. This learning can be used for other departments considering developing a radiography apprenticeship pathway and encouraging them to use apprenticeships to help meet workforce challenge.

Summary of content: Background - Explains how we started utilising the apprenticeship route and our status along the journey. Barriers - A summary of the barriers to implementing the apprenticeship including, entry requirements, raising awareness, organising placements and placement capacity. Apprentice Feedback - Direct quotes from our end of year evaluation with our apprentice radiographers Actions - A summary of the solutions and actions we have implemented including clinical educators, annex 21 training contract, awareness, and structure.

Conclusion: Summarises the learning outcomes and recommendations to UKIO participants considering using a radiography apprenticeship pathway within their departments.

P154 The role of the practice educator in the implementation of a successful apprenticeship programme

Emily McElwaine

Somerset Foundation Trust

Background: In March 2020 Degree apprentices in diagnostic imaging were introduced into a busy radiology department that already supported 2 HEI's with their undergraduate programmes . To facilitate this a Clinical Practice Educator role was established. The aim was to support, coordinate and advise the apprentices throughout their training.

Purpose: The aim of the poster is to outline the specific challenges faced by the practice educator during the training of the apprentices. Challenges that include rota planning the apprentices whilst maintaining a safe level of clinical supervision, increasing clinical capacity to facilitate the apprentices without impacting the current undergraduates and the grasp of a new programme and the work that brings.

Summary: This poster will discuss how these challenges were overcome and the benefits now being seen following the implementation of the apprentices from the point of view of the practice educator.

1. The institute for apprenticeships & Technical Education (2023) {Online} Available at: Diagnostic radiographer (integrated degree) / Institute for Apprenticeships and Technical Education (Accessed: 10/2/2023) 2. NHS Health Education England (2023) Practice Educators {Online} Available at: Practice Educators | Health Education England (hee.nhs.uk) (Accessed: 10/2/2023)

P155 The age of degree apprenticeships in health and social care

David Smith; Nicole Watkin; Tejal Patel; Anthony Walker

Sheffield Hallam University

The need for more NHS staff has become a focus of recent government policy with a strategic objective of delivering 50,000 more nurses and tackling Allied Health Professional workforce shortages to support the NHS long term plan 1. Current demand for NHS staff outstrips the supply available through traditional training routes 2. This has created a need for innovative and effective training methods which includes the development of apprenticeships for healthcare professions.

Within the last 7 years, healthcare apprenticeships have been developed across a wide range of professional groups. In the early advent of the apprenticeships there was limited courses available and a small number of higher education institutions (HEI's) 3. More recently this offer has grown in include pre-registration undergraduate and postgraduate apprenticeship provision across a plethora of professional areas.

Apprenticeships form an important aspect of the NHS and social care workforce strategy. By working towards addressing the challenges presented by the implementation and delivery of degree level apprenticeships, it is likely that these will form part of a long term, high impact tool for delivering new professionals into roles across health and social care.

As the diagnostic radiography apprenticeship at Sheffield Hallam University enters its third year, this poster explores the benefits, challenges, impact and future of the apprenticeship route.

1. Health Education England HEE strategic goals and 2021/22 objectives https://www.hee.nhs.uk/about/work-us/recovery-delivery-hee-business-plan-202122/hee-strategic-goals-202122-objectives [Accessed 04 November 2022]

2. The Kings Fund NHS workforce: our position https://www.kingsfund.org.uk/projects/positions/nhs-workforce [Accessed 04 November 2022]

3. Hubble S. Bolton P. Degree Apprenticeships House of Commons Library Number 8741 2019

P156 Celebrating the invaluable role of radiographic assistants: A showcase of how supporting staff to maximise their potential has improved patient experience and strengthened the workforce

Alison Kilburn; Rebecca John; Margaret Johnson

The Christie NHS Foundation Trust

Background: Radiographic assistants (RAs) account for a significant proportion of clinical staff, enabling imaging departments to function effectively and meet ever increasing demands. Their value is often overlooked because little has been documented about the evolution of their role, with the perception that some clinical duties can only be

performed by a radiographer. With structured support and training RAs can be enabled to work at the top of their scope of practice (1). Clinical duties can include cannulation, accessing and maintaining PICC/Hickman lines, TIVAD/port needle insertions, taking bloods, NEWS observations, giving oral prep and assisting with biopsies. In an oncology setting this provides invaluable support to vulnerable patients, releasing radiographers to fulfil their technical duties. Individuals can be enabled to progress their careers and aspirations further by accessing the increasing number of funded apprenticeship programmes available in diagnostic imaging (2).

Purpose: Showcasing how the role of RAs has evolved to support changing service needs in an oncology setting. Leading to increased workforce capacity, enhanced career development for individuals and a solution to the ever increasing demands on imaging services.

Summary of content: An overview of the processes, clinical governance, support and training required to utilise the skills of RAs and the positive impact it can make to Trusts. Case studies highlighting the successes of RAs who have gone on to achieve professional qualifications in radiography, medicine and physics. How embedding a culture of development and encouraging staff retention through offering opportunities can make individuals feel valued and respected.

1. Society of Radiographers (2022) Developing career pathways for diagnostic imaging support worker roles: guidance on roles and responsibilities
2. Health Education England (2021) Allied Health Professions' Support Worker Competency, Education and Career Development Framework

P157 A student evaluation of learning through a holistic blended delivery format: The undergraduate diagnostic radiography degree at the University of Exeter

Blessing Mayiza; Dise Ockri; Sue McAnulla

University of Exeter

Background: The University of Exeter's Diagnostic Radiography Programme introduced its holistic blended learning approach due to the COVID-19 pandemic. Limited research surrounding blended learning in radiography excludes niche modern-day learning techniques such as virtual reality simulations. This prompted exploration into students' perspectives on each of the different learning methods that the degree is comprised of.
Method: A survey was formulated and focussed on obtaining students' opinions on learning methods that contributed to exam preparation (pre-recorded lectures (PL), in-person lectures/seminars (IL), online-quizzes/self-assessment sheets (OQ), online reading) and placement preparation (Virtual Reality sessions (VR), positioning labs, Exeter YouTube videos). The survey was distributed to 3rd year radiography undergraduates. The data was analysed using descriptive and content analysis.
Results: With a response rate of 41%, the majority of students found PL(94%), IL(97%) and OQ(87%) helpful with 58% stating that none of the learning methods contributing to exam preparation should be removed. 62% found positioning labs very helpful for placement preparation with 43% opting for VR to be removed. Content analysis showed that the most prominent themes were time-management, applying theory to practice, interactivity, inclusivity, workload and that usefulness was module-dependent.
Conclusion: The holistic blended approach to learning radiography at Exeter generally appears well-received as each learning method was significant in contributing to their learning experience. Specific learning methods were found to be more useful for particular modules with varied preferences for different learning methods. Overall, students stated they would appreciate more opportunities to apply theory to practice.
Limitations: Limited sample size.

P159 Accuracy of diagnostic radiography students' measurement of Bohler's angle: An experimental study

Katie Ferrie; Anthony Manning-Stanley; Mudasser Panchbhaya; Victoria Kinsley

University of Liverpool

Background: Bhler's angle (BA) can be used to diagnose calcaneum fractures and is used in Radiographer Abnormality Detection Schemes (RADS) such as red-dotting and Preliminary Clinical Evaluations (PCEs), which allow radiographers to make immediate comments regarding pathologies on radiographs, prior to a report. Newly qualified radiographers being able to accurately measure radiographic angles is an essential skill within RADS. The aim of this study was to determine the accuracy of students' measurements of BA.

Method: Following University ethical approval, 3rd year BSc and 1st year MSc Diagnostic Radiography students were recruited and randomly assigned to intervention or non-intervention groups, split equally amongst 30 participants. The students completed a questionnaire on their knowledge of BA and were shown a video about using RadiAnt DICOM viewer software. The intervention group were shown an additional video on how to measure BA. All participants measured BA on 14 lateral ankle radiographs, 6 containing calcaneal fractures, 4 were 'normal', 4 images were repeated. Two qualified radiographer's measurements were considered the 'gold standard'.

Results: There was a statistically significant difference ($p<0.001$) between the intervention group's average angle (23.3) compared to the non-intervention group (42.6). Similarly, there was a statistically significant difference ($p<0.001$) of the mean difference to the gold-standard for the intervention group (3.1) compared to non-intervention (20.9).

Conclusion: The significant inaccuracies within the non-intervention group indicate that students require more training on measuring BA. The Diagnostic Radiography curriculum should include dedicated teaching sessions on measuring radiographic angles to prepare students for creating PCEs once qualified.

SERVICE DELIVERY AND INNVOATION POSTER PRESENTATIONS

P160 The HCPC standards of proficiency are changing -- what does this mean in practice?

Christine Heales; Lucy Banfield; Demelza Green; Jenny Shepherd

University of Exeter

Background: In order to be eligible to apply for registration with the Health and Care Professions Council (HCPC) upon graduation, programmes that are undertaken by radiography students and degree apprentices must be approved by the HCPC. To gain approval education providers need to demonstrate how they fulfil the HCPC's Standards of Education and Training [1]. This includes demonstrating that successful graduates applying for entry onto the HCPC register have met the Standards of Proficiency for their chosen profession.

Purpose: The Standards of Proficiency (SoPs) for diagnostic radiography will change for all new learners commencing programmes on or after the 1st September 2023 [2]. The change in emphasis within the SoPs will require a broader range of clinical skills to be developed [3]. The purpose of this poster is to outline the changes and discuss the opportunities presented for meeting current and future workforce needs. It will also seek to raise understanding of how and why education providers design the clinical elements of their programmes in the way they do i.e. to align with the SoPs.

Summary of content: The poster will summarise key differences between the current and incoming SoPs for diagnostic radiography, with an increased emphasis on cross-sectional imaging being of note. It will highlight how changes in key terminology can create flexibility in how the SoPs are interpreted by education providers and clinical departments leading to a more readily adaptable workforce. Challenges and potential tensions arising from the changes will also be outlined.

1. https://www.hcpc-uk.org/resources/standards/standards-of-education-and-training/ (Accessed 7th December 2022)
2. https://www.hcpc-uk.org/news-and-events/news/2022/sop-revisions-aug-2022/ (Accessed 7th December 2022)
3. https://www.hcpc-uk.org/globalassets/standards/standards-of-proficiency/reviewing/radiographers---new-standards.pdf (Accessed 7th December 2022)

P161 Quality standard for imaging in the independent healthcare sector

James Mico

Practice Plus Group

The Quality Standard for Imaging (QSI) is a framework to "help diagnostic imaging services ensure their patients consistently receive high quality services, delivered by competent staff working in safe environments" UKAS (2023). As an independent healthcare provider this e-poster highlights the differences in approach and the growing support

options available for independent providers. As more independent providers of imaging services push for QSI accreditation to support their quality improvements, safety and patient experience, this poster intends to signpost the resources, knowledge and networks connections that can aid growth. We hope to support the spread of QSI in the independent healthcare imaging sector. We aim to highlight available resources from independent providers when starting the QSI journey to accreditation. The poster also demonstrates the overlap and resources available from sources such as the Future NHS website and the wealth of knowledge on tap supported by the RCR, SOR, NHS and UKAS. The e-poster hopes to convey our journey as an independent healthcare imaging service. The poster will identify the similarities, differences and unique challenges when working through the stages as an independent healthcare service. How we started the conversation and gained support for QSI both with the company board, but also with the staff across the business. The business case and how independent funding can differ. Working through the gap analysis and the tools, resources and lessons learned. The action planning and service deployment stage as well as building the quality manual, to support the application stage for accreditation.

1. FUTURE NHS Collaboration Platform (2023) NHS Choices. NHS. Available at: https://future.nhs.uk/QSINetworking (Accessed: February 10, 2023). 2. Quality Standard for Imaging (QSI) accreditation (2022) UKAS. Available at: https://www.ukas.com/accreditation/standards/quality-standard-imaging/ (Accessed: February 10, 2023). 3. The Quality Standard for imaging (QSI) process (no date) The Quality Standard for Imaging (QSI) process | The Royal College of Radiologists. Available at: https://www.rcr.ac.uk/clinical-radiology/service-delivery/quality-standard-imaging-qsi/quality-standard-imaging-qsi (Accessed: February 10, 2023)

P162 Development of new MRI protocol for peritoneal surface malignancies, detecting previously underestimated disease and reducing the need for laparoscopies

Sarah O'Connell; Rohit Kochhar; Michelle Johnson

The Christie NHS Foundation Trust

Background: Peritoneal surface malignancies are a range of diseases involving the peritoneum. Surgical cytoreduction and heated intraperitoneal chemotherapy (HIPEC) are standard management for trreatment.1 Surgery is complex, lengthy and not all patients are suitable. Decision making and planning is based on disease burden and distribution.2Historically CT and PET CT have been used to measure disease but have a limited ability to detect small volume disease. This results in an underestimation of disease, potentially leading to unnecessary surgery in patients whose tumours are too extensive to be adequately cytoreduced. Gadolinium enhanced MRI has a sensitivity for depicting peritoneal tumours <1cm of 85-90% compared to 22-33% for CT. 3
Method: A literature review was conducted on the use of negative contrast agents in gastrointestinal imaging. Experiments on the MRI scanner using phantoms tested the efficacy of diamagnetic contrast agents. New scan sequences were developed by the clinical specialist radiographers and tested on volunteers. A final protocol was approved and shared with the colorectal MDT.
Results: 75 scans were performed in 12 months. The new protocol drastically reduced the need for additional liver and pelvic imaging, saving the equivalent of 21 scanner days.
Conclusion: The new protocol was found to detect disease below the resolution of PET CT and CT and patients are no longer exposed to ionising radiation. It reduced the need for laparoscopic surgeries and avoided major surgery in patients not suitable for cytoreduction, enabling MDTs to plan more affectively and ensuring the right surgical specialities are involved.

1. National Institute of Clinical Excellence Published March 2021 www. NICE.org.uk Cytoreduction surgery with hyperthermic intraoperative peritoneal chemotherapy for peritoneal carcinomatosis. Interventional Procedures Guidance (IP688) (accessed 20 Nov 2022)

2. Sugarbaker PH and Jablonski KA (1995) Prognostic features of 51 colorectal and 130 appendiceal cancer patients with peritoneal carcinomatosis treated by cytoreductive surgery and intraperitoneal chemotherapy. Ann Surg. Feb; 221(2): 124–132.

3. Low, RN (2016) Preoperative and surveillance MR imaging of patients undergoing cytoreductive surgery and heated intraperitoneal chemotherapy Journal of Gastrointestinal Oncology 7 1:58-71

P164 Evaluation of resource allocation for reactive adaptation pathway

Kirsty Farnan; Ashley Lambert; Kirsty Muir; Damian Parr

NHS Tayside

Background: Deformable image registration (DIR) offers additional information in decision making regarding re-active adaptation of a treatment plan, with no additional dose where there is a daily volumetric imaging protocol (The Royal College of Radiologists, 2021). This route aims to ensure only those requiring re-plans have additional CT scans. Therapeutic radiographers, medical physicists and the oncologist are required. The resource implications are less than those associated with a query re-plan route via an additional CT alone. Evaluating impact on resource allocation is useful.

Method: A review was performed of dosimetric assessments requested on CBCT's for thoracic lung patients. A total of 34 cases were identified for analysis. The data captured included treatment site, reason for request, quality of the dosimetric assessment, and resultant decision.

Results: In 32% of cases a re-CT was requested with 29% resulting in a re-plan. A reduction in 68% of additional CT scans was seen due to the use of DIR. This equates to approximately 3 days on CT, and although harder to quantify similarly impactful for resources required for tasks associated with importing and contouring 4DCT's.

Conclusion: DIR offers a means of reducing additional dose to patients when evaluating the need to replan. The value of DIR is seen in not only reduction in additional dose to the patient but also the Radiotherapy resource implications overall. The next step of evaluating the pathway will be to review the data to indicate if any further guidance can be given for decision making regarding requesting a DIR.

1. The Royal College of Radiologists. (2021) *On target 2: updated guidance for image-guided radiotherapy.* London: The Royal College of Radiologists.

P165 Radiographer led administration of beta-blocker and gtn for ct coronary angiography: mobile ct

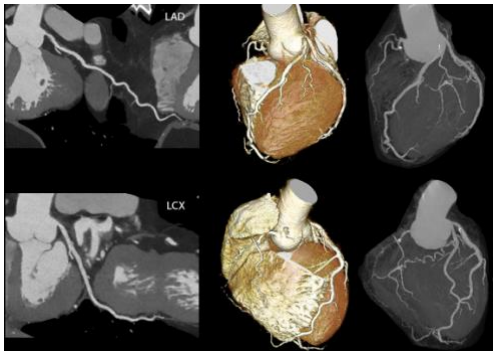
Aoife Murphy; Rachael Mullen; Emma Cheasty

Medneo

Background: Coronary Computed Tomography Angiography (CCTA) is increasingly used as a non-invasive technique to assess the coronary blood vessels for a variety of cardiac diseases including coronary artery disease. In order to achieve high spatial resolution images at low radiation doses, ECG gating is utilised and requires patients to have a low and regular heart rate. Administration of beta-blockers including IV Metoprolol reduces heart rate, reduces heart rate variability and reduces ectopic activity. Coronary artery vasodilation to aid the assessment of vessel stenosis is achieved by administering sublingual Glyceryl Trinitrate (GTN) spray.

Purpose: Administration of controlled drugs, deciding on acquisition protocol and image assessment usually require direct and time-consuming supervision by a radiologist or cardiologist. Hence, in order to reduce strain on stretched resources our independent mobile diagnostic imaging company trained CT radiographers to administer IV metoprolol and GTN spray to undertake CCTA examinations independently, whilst acquiring scans using industry leading one-beat, whole-heart acquisition AI assisted CT scanning fleet.

Summary: With a reported 30% shortfall of consultant radiologists in England, direct supervision of Cardiac CT list's is an obstacle to providing timely cardiac CT examinations. However, by maximising the potential of highly trained cardiac CT staff, we can contribute significantly to imaging departments productivity whilst providing safe, effective patient care and high quality images for diagnosis. Further benefits include a streamlined patient pathway resulting in reduced waiting times for patients, cost saving mechanisms for imaging departments as radiologists have greater time to focus on other work and valuable career progression for radiographers.



1. National Institute for Health and Care Excellence (NICE) (2016) Recent-onset chest pain of suspected cardiac origin: assessment and diagnosis. CG95. Available at: https://www.nice.org.uk/guidance/cg95/chapter/Recommendations

2. Reid, K., Rout, J., Brown, R., Forton, M.B., Crawford., M.J., Bennie, J.J., Curtin (2016) Radiographer advanced practice in computed tomography coronary angiography: Making it happen, Radiography, 22, 319-326. Available at: https://doi.org/10.1016/j.radi.2016.03.006

3. Royal College of Radiologists (RCR) (2014) Standards of practice of computed tomography coronary angiography (CTCA) in adult patients. Available at: https://www.rcr.ac.uk/publication/standards-practice-computed-tomography-coronary-angiography-ctca-adult-patients

P166 Capacity utilisation and flow improvement within a ct department of a district general hospital

Jasmine Turner

Maidstone and Tunbridge Wells NHS Trust

An audit was completed which demonstrated an under utilisation and poor flow of four CT scanners across two sites of a district general hospital. Long lead times, outsourcing at significant cost, inpatient delays, a lack of understanding of demand, activity and capacity was resulting in poor utilisation and staff feeling fatigued and demoralised with constant demands on their time. GANTT charts were created from the cycle time data that was collected and all staff were encouraged to complete an analysis of where they thought the issues were. Late starts, portering issues, long cycle times and patient cancellations were identified as some of the issues. Outsourcing was costing the trust £325k per annum with a DNA rate of 20% and scanners left empty at a cost of £400 per hour. Through engagement with stakeholders, we were able to eliminate all outsourcing, separate acute and elective pathways as per the Richards Review, have a dedicated porter, train all RDAs to cannulate, adjusted cycle times, removal of some carve out, allow all appointments to be made by phone, cross site vetting and booking, increase of clerical support and introduction of POCT. This resulted in, better outcomes and experiences for both in and out patients, improved relationships with key stakeholders and improved morale for staff. Poster to include GANTT charts, vitals charts, issues, actions, findings and outcomes.

P167 Acoustic times or "scan you believe it!" A quality publication. Ultrasound governance and communicating standards during a pandemic

Helen Brown

Shrewsbury and Telford Hospital NHS Trust

Background: Introducing new governance processes into a multi-site ultrasound department during a pandemic required re-thinking of current models of communication. Clear communication is vital when introducing governance processes such as peer review audit into a department, to ensure staff are not threatened by the processes and are able to use it as a learning opportunity to shape their practice and development, thereby improving patient safety.
Purpose: To explain the changes and processes, a monthly newsletter "Acoustic Times" was introduced, giving the opportunity to provide the evidence base and links to national guidance in an accessible format. Peer review audit and learning meetings were introduced and held virtually across sites to identify and share any individual or group learning points.

Summary of content: The presentation will give a plan of adopted processes and how documentation was introduced, with supporting rationale and evidence provided for staff through the newsletter including; evidence based protocols,

process of standard setting, peer review audit including supporting learning outcomes and CPD; actionable reporting; preceptorship; service user feedback and equipment QA. It covers, further supported learning on, critical reflection, specific focus on technical aspects of clinical examinations, sharing of external learning events, CPD and in-house ultrasound training. The benefits of the newsletter are shared including focus on improving consistency of practice and setting standards; faster reporting of audit findings and reaudits; and improved engagement with consultant colleagues. It also provides an accessible record of the development of governance processes which has been shared with sonographers in other organisations.

P168 CT CTA time intervals within a supraregional stroke thrombectomy network

Marco Mancuso-Marcello; Christos Nikola; Tom Jia; Oliver Spooner; Paul Bhogal

Barts Health NHS Trust

Background: Mechanical thrombectomy (MT) is the gold standard of care for patients suffering an acute ischaemic stroke (AIS) secondary to a large vessel occlusion (LVO). Decision making for MT requires a non-contrast CT (NCCT) head and CT Angiogram (CTA). As a comprehensive stroke centre (CSC) we sought to determine the NCCT and CTA time interval within our referral network of Acute Stroke Centres (ASC).
Methods: We performed a retrospective review of the first 100 patients transferred to tour CSC for a MT procedure in 2022. We recorded the time of the NCCT and CTA at the referring hospital. Patients were sub-divided into two cohorts: Group 1: NCCT and CTA performed at the same sitting, defined as the interval time being 10 minutes, Group 2: NCCT and CTA performed separately, defined as the interval time being 10minutes.
Results: Of the 100 patients sequential patients 60% were female and the median age was 74yrs (range 18-95). 10 patients had incomplete reports with NCCT and/or CTA times missing. Of the remaining 90 patients, there were 51 patients (57%) in Group 1 with an average interval time of 33 minutes. In Group 2, the 39 patients (43%), had an average interval time of 4836 minutes.
Conclusion: In over 40% of our sample there was a significant delay between the NCCT and CTA. Imaging pathways and process times in ASCs should be reviewed and optimised to conform to the National Optimised Stroke Imaging Pathway (NOSIP) guidelines.

1. NHS England (2021) National stroke service model.

P169 Mri protocol for imaging of pancreatic cystic lesions in oncology

Jennifer Newman[1]; Sadiq Usman[2]

[1]Royal Marsden Hospital; [2]The Royal Marsden Hospital

Background: Pancreatic cystic lesions (PCL) are a common pathology which have a rising detection rate(1). Due to MRI's excellent soft tissue resolution, it is imaging modality of choice for aiding diagnosis and characterisation of PCL(1,2). There are several published protocols for imaging pancreatic cystic lesions (PCL), however there is no consensus on one standard MRI protocol for diagnosis or surveillance of PCL. While there is no standard protocol the available literature agrees on the following sequences: T2-weighted ultrafast spin echo (T2-TSE), T1-weighted fat-saturation pre-contrast, diffusion-weighted imaging (DWI), contrast enhanced T1-weighted fat-saturation and MR Cholangiopancreatography(2,3). There is an increasing interest in developing an abbreviated MRI of the pancreas (A-MRI) protocol for surveillance of patients with PCL.

Purpose: This poster will explore current practice in MRI pancreas imaging and highlight the need for an abbreviated protocol as the demands for MRI services is ever-increasing.

Summary of content: Patient preparation for MRI of PCL and typical imaging features of common PCL in oncology will be outlined. The rationale behind a pancreatic protocol will be explored and the potential for implementing an abbreviated protocol (A-MRI protocol).

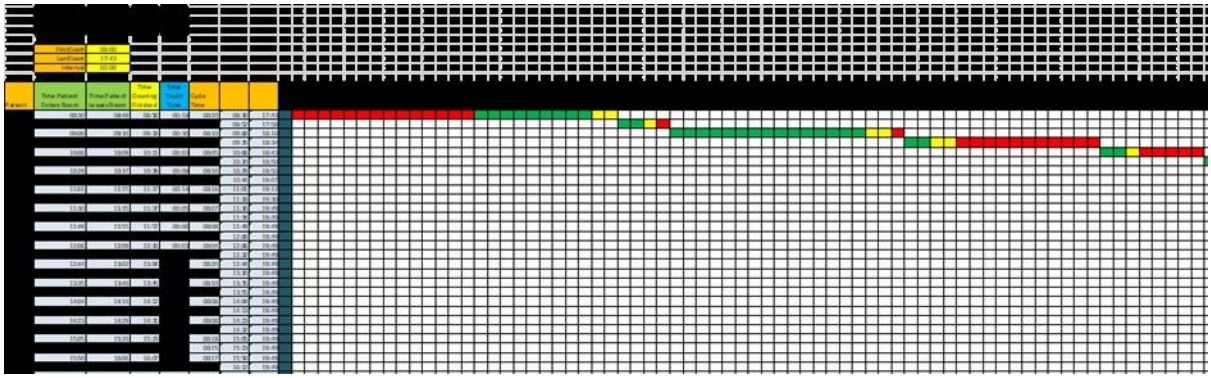
1. Al Ansari, N., Ramalho, M., Semelka, R. C., Buonocore, V., Gigli, S., & Maccioni, F. (2015). Role of magnetic resonance imaging in the detection and characterization of solid pancreatic nodules: An update. World Journal of Radiology, 7(11), 361. 2. European evidence-based guidelines on pancreatic cystic neoplasms. (2018). The European Study Group on Cystic Tumours of the Pancreas. Gut, 67, 789-804. 3. Hill, D. V., & Tirkes, T. (2020). Advanced MR imaging of the pancreas. Magnetic Resonance Imaging Clinics, 28(3), 353-367.

P170 Measuring utilisation of CT scanners within an acute trust

Richard Flood[1]; Lesley Wright[2]

[1]Maidstone and Tunbridge Wells NHS Trust; [2]Kent and Medway Imaging Network

The Getting It Right First Time (GIRFT) in Radiology report recommended that Radiology departments look at opportunities to increase capacity from within existing resources and examine ways that Trusts may be able to manage demand more effectively, to improve its service to patients. The utilisation of the available CT scanner time was between 38% and 91% because:
Appointment slots were longer than the measured cycle-times.
Patients were booked at 2 weeks or 6 weeks even if there was an appointment available sooner.
The first patients were booked to arrive well after the scanner was open.
There were delays waiting for porters to bring patients from the wards.



Scanner M8	08/06/2021	09/06/2021	10/06/2021	11/06/2021	12/06/2021
Load	07:10	07:17	08:38	08:53	08:34
Operational Hours	12:00	12:00	12:00	12:00	12:00
Number of Patients	36	35	38	34	42
% Utilisation	60%	61%	72%	74%	71%
Operating Hours / Activity	one every 20 mins	one every 20 mins	one every 19 mins	one every 21 mins	one every 17 mins

This was a large piece of work to address the important question is there sufficient CT time-capacity to match the CT demand the trust is requested to do. The findings have shown:
There is already more than enough CT time-capacity. Eradicating the need to outsource CT service and cancelled the private mobile CT scanner contract driving a £700K cost saving.
The relatively low CT utilisation looks to be the effect of policies that fall within the circle of influence of the Trust. The trust has a dedicated portering service to ensure acute patient flow, therefore inpatients are accessing the service quicker.
The efficiencies seen have reduced waiting times, improved target yields December 2022 the trust DMO1 position was 3 patients over 6 ww with a WL performance metric of 0.2% compared with a regional performance of 18.3%.

1. Halliday K, et al. Radiology GIRFT Programme National Specialty Report November 2020 https://www.gettingitrightfirsttime.co.uk/wp-content/uploads/2020/11/GIRFT-radiology-report.pdf 2. Richards M. Diagnostics: recovery and renewal. NHS England. November 2020

P171 I can't get no, satisfaction: What satisfies our patients in magnetic resonance imaging?

Darren Hudson[1]; Ruth Evans MBE[2]

[1]InHealth; [2]The Patient Experience Network

Background: Patient experience is an essential component of high-quality care, often measured through the satisfaction of patients. This service evaluation draws on a model from customer service to help better understand patient expectations and what matters to them most when attending for MRI. This will help identify how different areas influence satisfaction, which in turn could help services improve their patient experience.

Methods: Previous service users who had agreed to be contacted further, were emailed an online survey. The survey was based on Kano's model of customer satisfaction and aimed at identifying which, of 28 attributes as part of undergoing an MRI scan, might be considered of most importance to patient satisfaction, and thereby their experience.

Results: 615 patients responded to the survey, with the majority aged 55-74years and having had an MRI before. Based on responses, each attribute was classified according to Kano's model. Classification of the attributes show how those deemed 'functional' in nature have more potential to dissatisfy if not present, whereas those considered 'relational' are thought to have more of an influence over enhancing satisfaction.

Conclusion: The importance of relational aspects focused on communication and ensuring patients are fully informed were highlighted as drivers for improving satisfaction within MRI. Therefore, whilst it is essential that the fundamental components of a service are in place, services should then turn their attention to addressing any gaps to help provide what matters most to many patients, thereby helping to improve their experience.

P172 Are you being served? - how service animals could help improve the patient experience

Darren Hudson[1]; Ruth Evans MBE[2]

[1]InHealth; [2]The Patient Experience Network

Background: Patient experience is an integral part of high-quality care, equal to clinical effectiveness and safety, with clear evidence that it directly impacts on patient outcomes. In the context of MRI, this could relate to whether a patient manages to complete a scan, or whether quality is compromised due to movement or shortened scan times due to anxiety related to the nature of examination. This in turn impacts on accuracy of diagnosis and onward treatment, as well as how they view any further imaging that may be required or even wider engagement with health services in general.

Purpose: An integral element of patient experience and delivery of person centred care is communication and interaction with members of the clinical imaging teams. Being able to establish rapid rapport is an important skill, through which this connection helps build trust that in turn reduces anxiety, supports patient compliance and leads to a more positive experience. One such communication tool that is being used to support staff training is Service Animals(TM). Based on the work of Carl Jung, this tool explains how individuals are most likely to interact with others, particularly in a service situation, such as engaging with patients. Service Animals(TM) looks at behaviours and habits that have developed over time to provide an assessment of these across six dimensions, resulting in a classification based on four defined styles. Thereby helping to identify strengths and weakness to support more effective communication.

Summary of content: The Service Animals(TM) model will be presented along with application in practice.

P173 Managing claustrophobia in magnetic resonance imaging

Olanrewaju Lawal[1]; Philp Regelous[1]; David Omiyi[2]

[1]University of Hertfordshire; [2]Univeristy of Bradford

Introduction: A common challenge with using magnetic resonance imaging (MRI) is the claustrophobia some patients experience during the examination. Several interventions have been developed and used to help support patients with claustrophobia. Evidence shows that MRI radiographers believe that supportive instruction is the most effective method of supporting these patients 1,2. The supportive instruction is an elaborate explanation of the MRI

examination, and what the patient needs to do during the examination. One of the studies reports that the radiographers' level of education and years of experience affects their ability to use supportive instructions to support patients 1. This research aims to develop a consistent structured approach for applying supportive instructions to help claustrophobic patients during MRI examinations.

Methods: The MRI radiographers and the individuals who have previously complained of claustrophobia during the MRI examination constitute the research participants. These individuals are recruited through print Newspaper advertisements and social media platforms (the authors' LinkedIn and various professional WhatsApp groups). Ethical approval was obtained from the University of Hertfordshire Research Ethics Committee. Two focus group discussions are used to explore the views of the MRI radiographers and the patients with a history of claustrophobia separately. The thematic analysis approach is used to develop relevant categories, themes and subthemes from the data.

The implication to practice: This study will further help radiographers understand the experience of patients with claustrophobia during MRI examination. Structured guidance would be provided to ensure supportive instruction is consistently and effectively used in clinical practice.

1. Al-Shemmari AF, Herbland A, Akudjedu TN, Lawal O. Radiographer's confidence in managing patients with claustrophobia during magnetic resonance imaging. Radiography. 2022 Feb 1;28(1):148-53. 2. Hudson DM, Heales C, Vine SJ. Radiographer Perspectives on current occurrence and management of claustrophobia in MRI. Radiography. 2022 Feb 1;28(1):154-61.

P174 Patients previously contraindicated for MRI now scanned following introduction of radiographer led service for performing setting checks on programmable shunts

Sandra Towers; Antony Birtwistle

The Christie NHS Foundation Trust

Background: Programmable shunts provide better neurological outcomes for brain tumour patients with a build up of cerebrospinal fluid, compared to shunts with a fixed pressure setting (1). However their settings can be affected in the MRI environment and need to be checked before and after scanning by a neurosurgeon. For sites that do not have neurosurgical support, the presence of a programmable shunt is a contraindication for patients that need to undergo MRI. As a specialist oncology centre with no direct access to neurosurgeons, radiographers undertook training to perform the required checks enabling patients to be scanned.

Purpose: This service development has provided a more streamlined pathway, eliminating unnecessary delays to treatment, alleviating stress to patients (2) and providing much better continuity of care (3). The process involved collaboration between radiographers, physicists, neurosurgeons and manufacturers to allow standardised procedures and guidelines to be developed. This approach could be replicated and successfully adopted at other sites.

Summary of content: Poster outlines in detail the process from the initial problem through to the successful implementation of the service development and its full impact on patients, clinicians and radiographers. Headings include: background, method, evaluation and impact.

1. Li, M, Wang, H, Ouyang, Yim, M, Yin, X. (2017) Efficacy and safety of programmable shunt valves for hydrocephalus: A meta-analysis International Journal of Surgery PV (programmable valve)treatment is safe and may reduce the revision rate and over- or under-drainage complication rate, especially in patients aged less than 18 years with hydrocephalus. 2. Thompson CA, Charlson ME, Schenkein E, et al. (2010) Surveillance CT scans are a source of anxiety and fear of recurrence in long-term lymphoma survivors. Ann Oncol. 21(11):2262–2266 3. Stefania, R et al (2021) Do oncologists prefer sub-speciality radiology reports? A quality care study. Insights into imaging http://insightsimaging.springeropen.com/articles

P175 Building Medical Engagement in Imaging Networks

Ruth Williamson; Charles Peebles; Mary So; Jane Hayward

University Hospitals Dorset

Background: Imaging networks were formed in 2022 1 to improve patient care through alignment of process, sharing of resources and better use of technology. Medical engagement is a key enabler particularly around the aspirations of shared reporting and optimising workforce with a hybrid home and on site model.

Purpose: This study describes our regional experience in building medical engagement. The methodologies which have been most effective and those which required a revision of approach. Within this we describe engagement around radiologist training, subspecialty working and building understanding of how the networks are currently

configured as well as sharing risks and opportunities. By taking a subspecialty based face to face approach a rich understanding of key problems and possible solutions has been generated. Key indicators of success are ensuring that all trusts in the network are represented and that colleagues are allowed sufficient time to explore and understand what the network means to the current position and how they might influence future developments.

Conclusion: Medical engagement is a significant enabler of network development. Working in carefully supported subspecialty groups with a focus on identifying and co creating possible solutions to emergent issues has been the most effective tool to date in involving the wider workforce.

P176 The implementation of mobile CT CDCs across an NHS trust partnership

Lauren Matthews

Humber and North Yorkshire NHS Mobile CDC Service

Background: CDCs are community diagnostic centres developed to improve the patient experience by bringing healthcare to the community, ensuring an accessible and efficient patient journey. As a recommendation of the Richard's report (2020)(1), these services aim to corroborate and improve current healthcare, remaining at the forefront of innovation within the NHS. A partnership was formed between three trusts across North Yorkshire and the Humber with a united vision to reduce patient waiting lists and improve population health outcomes by taking the concept and implementing it within a mobile imaging context.

Purpose: From the design process of the CT CDC unit to having a fully functional mobile CT CDC operating across three NHS trusts, the application of CT CDCs has presented both inordinate benefits and challenges, with several learning points throughout. The amalgamation of mobile CT scanning into the NHS as a core provider has enabled radiographers to develop new skills, increasing job satisfaction and promoting autonomy within the radiography profession. Patient feedback indicates a preference of scanning on the mobile CT CDC units resultant of reduced appointment waiting times and accessibility. The mobile nature of the service has enabled targeted diagnostic services in the most necessary locations within each trust at the time of service rotation.

Summary of content: The success of the service is down to the hard work and determination of individuals involved throughout the implementation process. The expansion of the service is imminent and we look forward to further success implementing future CDCs across the partnership.

1. Richards, M. (2020). Diagnostics: recovery and renewal. NHS England, PAR242, pp.8–47.

P177 Imaging networks -- Turning the dial on the maturity matrix

Ruth Williamson; Charles Peebles; Mary So; Jane Hayward

University Hospitals Dorset

Background: Imaging networks were formed in 20221 to bring together transformation of imaging to improve patient care through alignment of process, sharing of resources and better use of technology. The delivery of the networks is informed by a complex maturity matrix with key waypoints identified as markers of project success.

Purpose: This presentation describes our network's progress along the maturity matrix highlighting areas where progress has been achieved and where significant barriers remain. Differential progress has been achieved in the 7 key domains of operational governance, IT and digital, Shared Reporting, Workforce, capital Planning & Equipment, Outsourcing and Capacity and Demand Modelling. A specific clinical workstream centred around subspecialty groups has supported engagement and the development of pilot use cases to explore benefits of working differently. The challenges to engagement have been mitigated by combining some programmes eg workforce and capital planning The areas where greatest progress has been made include leadership and governance, modest progress in digital maturity reflects a relatively developed state for part of our network and areas where the current organisational form finds it most challenging to progress are around procurement and shared finances.

P178 The introduction of initial image commenting

Sabah Awan; Danielle Hogg

Warrington and Halton Teaching Hospitals

Background: Historically, the "red dot" scheme has been utilised by the radiology department as an established practice to highlight abnormalities to Accident and Emergency clinicians. The red dot scheme fails to specify what potential abnormality the radiographer is flagging, posing a considerable degree of ambiguity. On the 01/08/2021, the department evolved from "red dot" to "initial image commenting", via the application of a sticky note to the image describing the identified abnormality. The commenting process applies primarily to AED images. Any of the following abnormalities may be commented upon; fractures/bony abnormalities which are suspicious of a fracture, dislocations, soft tissue signs indicative of trauma, foreign bodies and previously undiagnosed pneumothorax. This new scheme of work was audited a year later, with the aim of assessing the level of compliance.

Method: 100 AED examinations, undertaken between June-September 2022, where an abnormality had been highlighted by the radiographer. Data was obtained from Radiology Information System (RIS).

Results: 51% of images where an abnormality had been identified by the radiographer had no initial image comment attached to them via a sticky note.

Conclusion: The audit results revealed a low compliance with the new scheme, identifying the need for further education and staff support. To improve image interpretation skills radiographers where asked to complete an image interpretation workbook along with any additional CPD activities. A further audit is to be completed in 2023 assessing the level of improvement.

Neep MJ, Steffens T, Owen R, McPhail SM. Radiographer commenting of trauma radiographs: a survey of the benefits, barriers and enablers to participation in an Australian healthcare setting. J Med Imaging Radiat Oncol. 2014 Aug;58(4):431-8. doi: 10.1111/1754-9485.12181. Epub 2014 Apr 29. PMID: 24774619. Williams I, Baird M, Pearce B, Schneider M. Improvement of radiographer commenting accuracy of the appendicular skeleton following a short course in plain radiography image interpretation: A pilot study. J Med Radiat Sci. 2019 Mar;66(1):14-19. doi: 10.1002/jmrs.306. Epub 2018 Oct 9. PMID: 30302949; PMCID: PMC6399192.

P179 Image anonymisation -- improving the process

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Background: The radiology research team are beginning to see an increase in large data requests for anonymised images for research purposes. With a large proportion of research now based in AI technology and deep learning algorithms we are seeing an increase in requests for large data transfers (>500 examinations per Trial. For this reason R&D Imaging Support unit wanted to innovate the way anonymisation of DICOM is completed to ensure the ability to provide bulk anonymisation and uploading is efficient and streamlined. The current process of anonymising radiology images is time consuming and labour intensive with several steps which include identifying the correct images, retrieving from PACs, anonymising and quality assurance, prior to transfer. This process has several limitations such as speed as only one study can be processed at a time, and using an external system where support is limited. We sought to develop a simple programme which makes this process more efficient through automated searching, downloading and anonymising of required images from the PACs system.

Method: The currently anonymization system was reviewed and a project plan developed regarding how to streamline the process. An anonymization software was developed by our informatics team which automates the retrieving, anonymising and storing of images, ready for quality assurance and transfer. The system was tested robustly to ensure compliance with information governance requirements.

Results: The programme allows staff to set up anonymization of several studies (Minimum 20 studies), which can run in the background whilst staff then move onto other tasks.

P180 Radiographer abnormality flagging systems in the UK -- a preliminary updated assessment of practice

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Background: Radiographer abnormality flagging systems have been in use in the UK for over 30 years, with the guidance of the SCoR(2,3) indicating that the preliminary clinical evaluation (PCE), or comment, be the preferred system of choice. This study aimed to provide an updated assessment of current practice from a previous 2008 study(1).

Method: A cross-sectional online survey was disseminated via Twitter and aimed at departmental and reporting leads. It requested information on the types of flagging and reporting systems operated, scope of the systems employed, required education of participants, and the role of audit.

Results: Responses were received from 31 Trusts within the UK. Red dot systems were employed in 90% (n=28) of sites, with 26% (n=8) undertaking PCE. Skeletal radiographs were most commonly reviewed (90%; n=28) followed by chest (58%; n=18) and abdomen (32%; n=10). Only 13% (n=4) sites indicated if the image was normal but 71% (n=22) allowed the radiographer to indicate if they were unsure. There was marked variation in the educational requirements and use of audit.

Conclusion: Significant conclusions cannot be drawn due to limited sample size, however, compared to 2008(1) there appears to be minimal change in practices in the UK. There was some increase in the use of flagging systems generally and a higher proportion of PCE systems in comparison to red dot but the use of education and audit does not necessarily show much development. This study may support further research and consideration of potentially standardising abnormality detection systems.

1. Snaith, B and Hardy, M (2008). Radiographer abnormality detection schemes in the trauma environment – an assessment of current practice. Radiography. 14(4):277-281. Doi: https://doi.org/10.1016/j.radi.2007.09.001 2. Society and College of Radiographers. (2013) Preliminary clinical evaluation and clinical reporting by radiographers: policy and practice guidance. London: The Society and College of Radiographers. 3. Society and College of Radiographers. (2006) Medical image interpretation and clinical reporting by non-radiologists: the role of the radiographer. London: The College of Radiographers

P181 Does proving a bank of anatomical side markers to an x-ray department increase the usage of anatomical side markers in a general imaging department

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"The gold standard for annotating radiographic images is to include an unambiguous anatomical side marker [ASM] in the primary beam." (1) Unfortunately in recent times there has been a downturn in the usage of anatomical side markers. This could be due to a number of factors, including infection control reasons (2) and the availability of digital ASMs (3). In order to ensure compliance with the gold standard of ASMs a district general hospital instituted marker champions. Their remit was to get the usage of anatomical side markers to 90% compliance. A bank of departmental ASMs (10 sets) was provided for the use of all staff in the department. This, along with verbal encouragement of the department were the only actions undertaken by the marker champions. A subsequent audit of the use of ASMs was performed, collating data from the departmental RIS system for all patients imaged for a random week before the introduction, and a random week after, ensuring only qualified radiographers images were used, and the same radiographers were on for both weeks. The results showed a total marker usage of 60% in the week prior to the introduction of the bank of departmental ASMs, and a use of 76% in the week following. Of all the images following the introduction of the bank of ASMs, 11% of the images were taken with departmental ASMs. It is clear, therefore, that a bank of departmental ASMs is an effective and cost effective way to increase the use of ASMs.

1) Barry K, Kumar S, Linke R, Dawes E. A clinical audit of anatomical side marker use in a paediatric medical imaging department. J Med Radiat Sci. 2016 Sep;63(3):148-54. doi: 10.1002/jmrs.176. Epub 2016 May 25. PMID: 27648278; PMCID: PMC5016612. 2) Jenna Tugwell, Adele Maddison, Radiographic markers - A reservoir for bacteria?,Radiography. 2011 17(2):115-120. doi: 10.1016/j.radi.2010.10.005. 3) Hayre CM, Blackman S, Eyden A, Carlton K. The Use of Digital Side Markers (DSMs) and Cropping in Digital Radiography. J Med Imaging Radiat Sci. 2019 Jun;50(2):234-242. doi: 10.1016/j.jmir.2018.11.001. Epub 2019 Jan 17. PMID: 31176431.

P182 Audit and promotion of local red dot policy with PACS "sticky notes"

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Background: Recent studies have proven that all plain imaging radiographers have the ability to provide red dot and commenting systems for ED radiographs regardless of experience (Stevens and White, 2018, Verrier et al., 2022). This is supported by the Society of Radiographers (2013). Our local red dot policy requires a brief written communication of perceived, or query, of pathology via a PACs sticky note after red dot application. Ensuring communication with ED staff and the reporter for either; correct pathways for patients, additional clinical information or learning objectives in image interpretation. It was documented via reporting radiographer meetings that the majority of images with red dots did not have sticky notes applied.

Purpose: To describe the promotion and education of local red dot policy and PACS sticky notes to improve compliance.

Summary: The poster will include the history of the red dot system which was presented to the radiographers via a monthly departmental poster. A link and evaluation of the policy video that was created and shared.

Results: of audit that showed 71% compliance of attaching a sticky note. Discuss limitations of the audit and possible reasons for non-compliance. Description of education of the policy to the newly qualified radiographers. Compliance of policy will be assessed by further audit with additional questions of accuracy of sticky notes to ascertain if any knowledge gaps in image interpretation arise. It is hoped this will confirm continual promotion of policy will improve compliance further.

Stevens, B. and White, N. (2018) 'Newly qualified radiographers' perceptions of their abnormality detection abilities and the associated training the received at undergraduate level', Radiography, 24 (3) pp219-223. Available at: doi: 10.1016/j.radi.2018.01.004 (Accessed: Feb 2023) The Society of Radiographers (2013) Preliminary Clinical Evaluation and Clinical Reporting by Radiographers: Policy and Practice Guidance. Available at: https://www.sor.org/getmedia/520af092-cd10-4ae4-8f2f-3625a91b47c3/Preliminary%20Clinical%20Evaluation%20and%20Clinical%20Reporting%20by%20Radiographers_%20Policy%20and%20Practice%20Guidanc_1 (Accessed at 10/2/2023) Verrier, W., Pittock, L., Bodoceanu, M. and Piper, K. (2022) 'Accuracy of radiographer preliminary clinical evaluation of skeletal trauma radiographs in clinical practice a DGH', Radiography, 28 (2) pp 312-318. Available at: https://doi.org/10.1016/j.radi.2021.12.010 (Accessed: Feb 2023).

P183 How small is too small? Suture needle visibility on radiographic imaging

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Background: A retained surgical instrument post-procedure is an NHS never-event1. Imaging is sometimes required in the operating theatre to locate a missing item following the surgical count. One of the smallest items in the surgical count are suture needles and previous studies have shown that smaller sized suture needles can be difficult to visualise with imaging2. This may cause patients to be exposed to ionising radiation with no benefit. The aim of this study was to establish which suture needles used at the Trust were visible on imaging to provide guidelines for the Surgical Count Standard Operating Procedure.

Method: All suture needles used at the Trust were imaged using an image intensifier (II) (OEC 9900 Elite, General Electric) and a lumbar spine phantom. Suture needles were placed into the phantom and imaged with an II distance of 35cm from the phantom (Image 1)

The smaller sutures that could not be visualised were subsequently imaged using a portable x-ray machine (DRX-Revolution, Carestream, 67kVp, 1.6mAs, distance 110cm). All images were reviewed by a second radiographer.

Results: Larger suture needles (0 - 6/0) were easily visualised using an II. The five smallest suture needles (7/0-10/0) were difficult to visualise but were visible on the portable x-ray (Image 2)

Conclusion: Missing suture needles sized 0 - 6/0 can be identified using an II. Suture needles smaller than 7/0 are unlikely to be visualised with an II and a portable x-ray could be used. Consideration must be given to patient stability, overlying anatomy, sterility, and artefacts.

1. NHS Improvement (2018) Never Events List. NHS Improvement https://www.england.nhs.uk/wp-content/uploads/2020/11/2018-Never-Events-List-updated-February-2021.pdf

2. Weprin, S., Crocerossa, F., Meyer, D., Maddra, K., Valancy, D., Osardu, R., Kang, H.S., Moore, R.H., Carbonara, U., J Kim, F. and Autorino, R., (2021) Risk factors and preventive strategies for unintentionally retained surgical sharps: a systematic review. Patient Safety in Surgery, 15, pp.1-10.

P184 Management of scout/localiser images across radiology department in the UK

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Background: Scout/Localiser (S/L) images are crucial to identifying potentially life-threatening conditions as they may hold critical information for diagnosis and management of disease. However, it remains unclear how these images are managed as part of the diagnostic series. This study is aimed at exploring if there exist local protocols for the management of S/L and if cross-sectional imaging (CMI) radiographers are aware of the recently issued joint position statement on the topic by relevant professional bodies (i.e., RCR, IPEM and SCoR).

Method: An ethically approved cross-sectional survey of CMI radiographers in the UK was conducted online (23rd May - 3rd July 2022). The survey sought information regarding 1. Demographics 2. S/L image management protocols, and 3. Awareness of the joint position statement on S/L. Data collected was analysed using the Statistical Package for Social Sciences (v.28) and thematic analysis.

Results: A total of 130 responses were received. Of the respondents, (59/129; 45.7%) indicated that there exist no local policy/protocol in their department while only 23.3% (30/129) do have protocols in place. There exist a large variation in management policies for S/L in the UK and majority of CMI radiographers are not aware of the recent joint statement.

Conclusion: Standardised protocols for the management of S/L images are lacking. Local policies need to be developed and implemented to effectively manage S/L images to enhance patient care. Education and awareness creation in relation to the critical role of S/L images to patient care and about the joint statement needs to be prioritised.

1. Kaasalainen T, Palmu K, Reijonen V, Kortesniemi M. Effect of patient centering on patient dose and image noise in chest CT. AJR Am J Roentgenol 2014; 203: 123–30. doi: 10.2214/AJR.13.12028. 2. Laborde, G., Gilsbach, J., Harders, A., Klimek, L., Moesges, R. and Krybus, W., 1992. Computer assisted localizer for planning of surgery and intra-operative orientation. Acta Neurochirurgica, 119(1-4), pp.166-170. 3. Lambert, J., Kumar, S., Chen, J., Wang, Z., Gould, R. and Yeh, B., 2015. Investigating the CT localizer radiograph: acquisition parameters, patient centring and their combined influence on radiation dose. The British Journal of Radiology, 88(1048), p.20140730. 4. Lim, I., 2017. What is Localizer on CT Scan. [online] Radtechonduty.com. Available at: http://www.radtechonduty.com/2017/03/localizer-on-ct-scan.html [Accessed 17 February 2022]. 5. Schmidt, B., Saltybaeva, N., Kolditz, D. and Kalender, W., 2013. Assessment of patient dose from CT localizer radiographs. Medical Physics, 40(8), p.084301. 6. SoR. 2021. Role of scout or localiser images during CT or MRI in diagnostic radiology | SoR. [online] Available at: https://www.sor.org/news/imaging/role-of-scout-or-localiser-images-during-ct-or-mri [Accessed 19 February 2022].

P185 Estimating the carbon footprint and heat recovery potential of linear accelerator cooling systems

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Background: The NHS aims to reduce the carbon footprint of its directly controlled emissions to net zero by 2040 [1]. A 2022 study estimated the carbon footprint of a course of radiotherapy to range approximately from 75 to 240 kgCO2e per patient [2]. This did not include the contribution from linear accelerator (LINAC) cooling systems. Electric chillers used to cool LINACs operate continuously and are an area where improvements may be made without clinical consequence. We have estimated the carbon footprint of these cooling systems and assessed options for reducing this.

Method: The scope of estimating the carbon footprint of the LINAC cooling system was limited to the operational electrical energy consumption of the electric chillers and did not include carbon embodied in manufacture. We collected energy metering data for groups of electric chillers as well as current clamp data for individual chillers dedicated for cooling single LINACs over the course of a week. This was converted to CO2 equivalent values using standard BEIS conversion factors [3]. We measured circulating coolant temperatures upstream and downstream of the chillers to estimate their heat recovery potential. Through literature searches and consultations with engineers, we assessed the feasibility of various methods of reducing this carbon footprint including through heat recovery.
Results & Conclusion: We will report on the results of estimating the carbon footprint of LINAC cooling systems and on the potential for heat recovery solutions.

1. National Health Service (2022). Delivering a net zero NHS. Available at: https://www.england.nhs.uk/greenernhs/a-net-zero-nhs/ (Accessed: 08/02/2023). 2. Cummings J, Taylor C and Chuter R. 2022. Estimating the Carbon Footprint of the Radiotherapy Pathway. [Poster]. ESTRO, 2022, Copenhagen. 3. Department for Business, Energy & Industrial Strategy (2022) Greenhouse gas reporting: conversion factors 2022. Available at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2022 (Accessed: 08/02/2023).

P186 Reducing carbon footprint in radiotherapy: Portable workflow management tools and waste reduction

Alexandra Pyett; Catriona Buchan

Leeds Teaching Hospitals NHS Trust

Background: Working towards the ambition to be one of the greenest Trusts in the country by embedding sustainable practices, we explored solutions within radiotherapy that would enable an entirely paperless environment and reduce waste by improving workflow efficiency. Workflow inefficiencies can introduce delays in the patient pathway, impact the effectiveness of a system and contribute to carbon emissions. Close collaboration with the provider of an oncology informatics system enabled us to influence developments to ensure the product fit with clinical goals and had real-world applicability. Quality improvement methodologies directed our approach to analysis, development and implementation which facilitated identification of key areas for improvement. Subsequently, a carefully managed, phased roll-out of technology-based solutions was initiated and was systematically reviewed adopting the Plan-Do-Study-Act approach.

Purpose: The aim of this poster is to share our experience of working with the technology provider to create novel solutions to complex pathways and will highlight the challenges and successes of its implementation. It will also outline the ambitions for a truly portable solution with imaginative use of existing resources and devices.

Summary of content: Content will include an outline of existing pathways and illustrate the development to the new, and improved, ones. There will be examples of electronic forms, and dashboards that allow pathways to be monitored. To quantify this, there will be an impact analysis on efficiency along the patient pathway as a result of integrating software solutions.

P187 Towards a greener clinical radiology and radiotherapy practice: A systematic literature review

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Background: Environmental sustainability (ES) in healthcare has dominated discussions surrounding climate change. Practice modifications across clinical radiography is required to reduce the contributions to global climate change. This study sought to explore and integrate current evidence relating to considerations for ES in radiography practice to provide a comprehensive guide for greener clinical practice, education, and research.

Method: A systematic literature search and review of studies of diverse evidence across various key databases was completed. The Preferred Reporting Items for Systematic Review and Meta-Analysis guidelines and the Quality Assessment Tool for Studies with Diverse Designs assured the inclusion, quality, and credibility of the review. A result-based convergent data synthesis approach was employed to integrate the findings.

Results: A total of 151 journal articles were identified, after the application of exclusion criteria, 9 articles were eligible for inclusion in the review. Three key themes emerged, 1: energy consumption and data storage practices, 2: Usage of clinical consumables and waste management practices and 3: Travel activities related to radiology and radiotherapy practice.

Conclusion: The carbon footprint of clinical radiography practice is substantial and highlights considerable contributions to climate change. Despite these contributions, considerations for greener practice in radiography appear to be poorly prioritised due to lack of discipline-specific ES policies, legislations, and limited research. Widening the scope of research and awareness is imperative in providing a more holistic and better appreciation of the environmental burden from radiography practice.

P188 Zen

Lorraine Whyte

Beatson West of Scotland Cancer Centre

A learning needs analysis was carried out. Staff reported that the introduction of a staff wellbeing initiative was high on their list of priorities, with stress being singled out as the most detrimental factor to their work/life balance. To actively reduce stress mindfulness sessions were introduced throughout the work day with the intent of motivating

and re-balancing staff. Results showed that stress levels were reduced and staff became more relaxed and more positive. The project was so successful that it has now been incorporated as part of our weekly CPD agenda.

1. Bergen-Cico, D. et al. (2013). Examining the efficacy of a brief mindfulness-based stress reduction program (brief MBSR) on psychological health. Journal of American College Health, 61, 348–360 2. Trowbridge,K, et al. (2017) Preliminary Investigation of Workplace-Provided Compressed Mindfulness-Based Stress Reduction with Paediatric Medical Social Workers. Health & Social Work, Volume 42, Issue 4.

P189 Chest radiographs conducted despite a recent prior examination: an audit

Panagiotis Papageorgiou; Kalliopi Bisba

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Descriptor: An audit on the adherence of clinicians to IRMER guidelines when it comes to repeating chest radiographs.
Background: Chest radiograph (CXR) is the by far the commonest imaging module ranging from primary to tertiary health care sector. Nevertheless it remains a source of ionising radiation whose indications are thoroughly described in IRMER and the topic highlighted in the annual CQC report of IRMER regulatory activity (1, 2). Sometimes failing to check previous history leads to overexposure of patients to unnecessary X-rays which conflicts with the aforementioned guidelines.

Method: 53 consecutive individuals from the Internal medicine ward were scanned in November 2022 - January 2023 in Papanicolaou General Hospital of Thessaloniki, Greece (PGH) and their electronic notes were reviewed for their compliance. This practice was compared against the standard Local policy and NHS guidelines in concordance with the IRMER radiation protection regulations (1) and the RCR guidelines (2). This is the first adherence audit of its kind so no prior results were subject to comparison.

Results: The sample percentage that had a CXR repeated was 92% , from that 100% was repeated within less than 6 weeks given as a standard (1,2). In 39% of the cases consolidation has already been described in the first report and more specifically CAP was diagnosed in 35% of the sample. Finally, the cases who described a CAP worsening in the 2nd CXR were 14% (N=53). Suggestions for change: - Awareness of referring clinical staff performing IR(ME)R practitioner justification

1. Ionising Radiation (Medical Exposure) Regulations 2000 http://www.legislation.gov.uk/uksi/2000/1059/pdfs/uksi_20001059_en.pdf 2. iRefer: making the best use of clinical radiology. London. RCR 2012. http://guidelines.irefer.org.uk/about/#Abt10

P190 Diagnostic radiography students' attitudes towards gender inclusive pregnancy status checks

Katie Morrow; Stuart MacKay

University of Liverpool

Background: Under IR(ME)R17, radiographers are responsible for protecting foetuses against ionising radiation. Previously, only females were screened for pregnancy prior to a pelvic X-ray, however new guidance from the SoR and CQC relating to IR(ME)R17 phrasing recommends all individuals of childbearing potential must be screened, including male, female, transgender and intersex patients. There is a lack of literature exploring student radiographers' views about gender inclusive pregnancy status checks.

Method: A qualitative study was conducted with nineteen third-year students on the BSc Diagnostic Radiography degree programme at a University in the North West. Focus groups were conducted using open-ended questions to gain insight into how IPS checks are conducted at each of the seven NHS Trust clinical placement sites. Students were also asked about their attitudes towards conducting IPS checks.

Results: A thematic analysis yielded four main themes: education, standardisation, fear of reaction, and placement involvement. Barriers to conducting the IPS check include a lack of staff encouragement due to the guidance being enforced at the discretion of the employer, as well as a general lack of awareness around gender inclusivity. All students showed a willingness to conduct the IPS checks despite this.

Conclusion: For service users and providers to welcome IPS checks, more training and awareness should be enforced surrounding LGBT+ issues in healthcare. Age and experience range of participants were limiting factors. Students generally feel well-prepared to conduct IPS checks due to experience on placement, however IPS checks should be standardised across placement sites to ensure equal learning opportunities.

P191 Initial experience with whole brain radiotherapy with hippocampal avoidance using Varian HyperArc at Complejo Hospitalario Universitario de Cartagena (CHUC)

Miguel Martinez-Albaladejo; Vicente Puchades Puchades; David Ramos Amores; Jonathan Suárez Arteaga; Alfredo Serna Berná

Complejo Hospitalario Universitario de Cartagena

Background: The aim of this study is to preliminary evaluate the use of Varian HyperArc (HA) as a planning and treatment strategy for whole brain radiotherapy with hippocampal avoidance (WBRTHA) in the radiotherapy department at CHUC.

Method: 14 patients treated in Clinacs for WBRTHA by the VMAT technique (TP), 4 coplanar 6X-arcs, were retrospectively planned for a TrueBeam HD-MLC linac (TPTB), and using the newly commissioned HA technique (non-coplanar FFF-arcs, max-1400MU/min). The main efficiency and dosimetric parameters of PTV&OAR were analysed/compared in Eclipse TPS by statistical significance (Wilcoxon-signed-rank test).

Results: The HA plans demonstrated significant improvements in the PTV dosimetric quality including a reduction in the parameters V105%, D2%, Dmax and an increased Dmin, V95% compared with TP. A significant decrease in OAR doses was also found for the HA plans (Figures 1-2). HA plans resulted in significantly shorter planning and beam-on times with regards to TP (TPTB) on average by 52.4 minutes (26.8) and 1.8 minutes (2.0), respectively. The MUs and modulation index were significantly lower for HA compared with TP and TPTB.

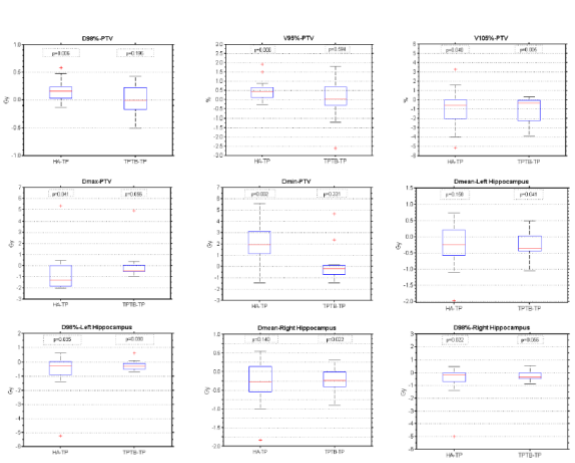

Figure 1. Dosimetric differences in the PTV and hippocampi parameters between the techniques HA,TP and TPTB. p-values shown are result from the statistical tests between HA and coplanar VMAT metrics. Note the vertical scale is different on each plot.

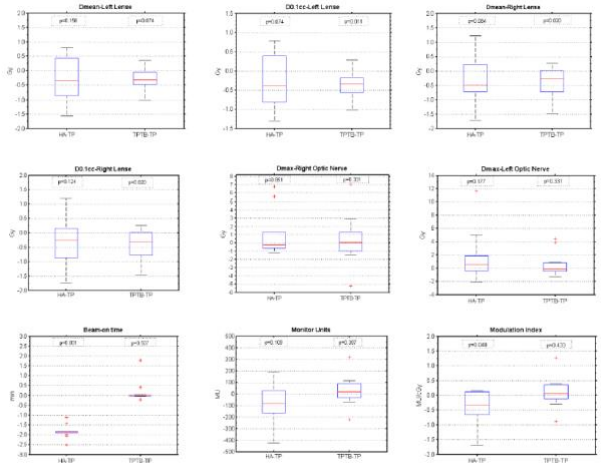

Figure 2. Dosimetric differences in the lenses, optic nerves and efficiency parameters between the techniques. p-values shown are result from the statistical tests between HA and coplanar VMAT metrics. Note the vertical scale is different on each individual plot.

Conclusion: HA is an efficient strategy for WBRTHA treatments in a TrueBeam HD-MLC. The main advantages found for this modality compared to coplanar VMAT are the gains in the dosimetric OAR sparing, the reduction of the high doses to PTV and the increase of minimum doses to PTV, being less time-consuming and independent on the user experience. We believe that the efficiency and confidence increase due to process automation improves patient care. Therefore, HA has become our new standard technique for WBRTHA.

1. Sprowls, C. J. et al. (2021). *Whole brain radiotherapy with hippocampal sparing using Varian HyperArc*, Medical Dosimetry.doi: 10.1016/j.meddos.2021.02.007.

2. Rusu, I. et al. (2022). *Fully automated planning and delivery of hippocampal-sparing whole brain irradiation*, Medical Dosimetry, 47(1). doi: 10.1016/j.meddos.2021.06.004.

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