

**P-165 Pre gestational and paediatric mobile chest imaging**[Jenna Knowles](#); [Kirsty Livesley](#)*Warrington and Halton Hospitals NHS Foundation Trust*

Throughout the UK, most of the neonatal chest X-rays are performed in non-specialist hospitals. Within our district general hospital we have performed on average around 227 portable neonatal chest X-rays each year on the Neonatal Unit (NNU). The quality of these X-rays has been an international issue for over 20 years. Most are performed AP Supine with a small percentage being performed decubitus or prone. There is very little guidance aimed at radiographers who undertake these examinations.

An audit was undertaken within our Trust that looked at pre-gestational chest imaging. This looked at the previous 12 months chest images performed and the quality of these X-rays. When assessing quality the positioning, use of lead protection, collimation, radiation dose and exposure will all be evaluated.

As a result, this poster aims to assist the radiographers when undertaking these examinations and ways to improve their technique which in turn will improve image quality.

**P-166 Imaging patterns of hypoxic ischemic encephalopathy (hie)**[Muhammad Umair Majeed](#); [Noman Qayyum](#); [Nadir Khan](#)*University Hospital of North Midlands*

Neonatal encephalopathy when caused by diffuse hypoxic-ischemic brain injury is called hypoxic-ischemic encephalopathy (HIE).

Severe HIE to the premature brain typically injure the thalamus, anterior part of the vermis, and dorsal brainstem. In mild to moderate ischemia the most common location for injury to premature brain is periventricular white matter. Thalamic, brainstem, and cerebellum in the immature brain have high metabolic activity, they are susceptible to injury in severe hypotension, seen as hyperechogenicity of the injured brain at US, hypoattenuation at CT, and restricted diffusion at MR.

The primary locations of ischemic injury in the term neonatal brain are the watershed territory. In severe ischemia metabolically active tissues in the brain are most susceptible to injury and include the lateral thalamic, posterior putamina, hippocampi, brainstem, corticospinal tracts, and the sensorimotor cortex. US findings may include hyperechogenicity of involved structures. Changes on CT scans include mild hypoattenuation of the thalamic and basal ganglia.

**Multisystem disorders****P-167 Venous thromboembolism and investigations for cancer**[Charles Hall](#); [Lilia Khafizova](#); [John McCaig](#)*St Helens and Knowsley Teaching Hospital NHS Trust*

**Aims:** The incidence of new cancers in patients with idiopathic venous thromboembolic disease (VTE) is approximately 4-10%. NICE have recently released new guidance regarding the investigation for occult cancer in patients with a first unprovoked VTE. It recommends that these patients who are not known to have cancer should be offered a physical examination, chest radiograph, blood tests and urinalysis. Those aged over 40 years, further investigation with abdominopelvic computed tomography (CT) should be considered. The aim was to audit compliance with NICE guidance and to determine the overall cancer detection rate.

**Methods:** Retrospective review of patients diagnosed with VTE attending anticoagulation clinic over a 3month period. Evaluation of the patient demographics, clinical details and subsequent investigations for cancer was performed. Discrepant cases were reviewed by two operators.

**Outcomes:** 110 patients over a 3 month period were identified. 15 patients did not meet the inclusion criteria. 95 were included into the analysis. 50/95 were aged over 40 years and presented with a first unprovoked VTE. 37/50 (74%) underwent chest radiography. 21/50 (42%) underwent abdominopelvic CT. Cancer was detected in 2/50 (4%).

**Discussion:** Our findings show that there is an inconsistent approach to the subsequent investigation of patients diagnosed with VTE. The overall prevalence of occult cancer is low, and given the known risks of exposure to ionising

radiation there is little evidence in the use of abdominopelvic CT in these circumstances. We plan to re-audit, evaluating greater patient numbers and check for improved compliance with chest radiography standards.

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### **P-168 Pictorial review of abdominal and pelvic TB mimicking other pathologies**

[Richard Hopkins](#); [Helen Oliver](#)

*Cheltenham General Hospital*

**Aims/objectives:** Our pictorial review will demonstrate the CT findings of abdominal and pelvic tuberculosis infection, mimicking diffuse peritoneal disease and small bowel inflammation. We hope to remind radiologists of the unusual presentations of TB, and to keep this aetiology in mind when reporting CT studies.

**Content:** The pictorial review of the unexpected cases of abdominal and pelvic tuberculosis infection will demonstrate the imaging findings from a number of patients. Cases demonstrate:

Infection mimicking primary or metastatic peritoneal disease with CT features of nodularity, omental and peritoneal stranding and ascites. The case was an unexpected finding as the patient had no particular recent risk factors for TB.

Infection mimicking small bowel Crohn's disease with CT features of segmental small bowel mucosal thickening, luminal narrowing and omental stranding. The patient had previously been treated abroad for TB as an adolescent several years ago. The symptoms were more typical of inflammatory bowel disease, and had no other features of active TB infection.

Ascites and peritoneal enhancement in a patient with no risk factors for TB.

**Relevance/impact/discussion:** Tuberculosis infection is becoming increasingly common in the UK, with an expected increase therefore in unusual and unexpected presentations. We hope to remind reporting radiologists of the features of abdominal and pelvic TB infection mimicking common pathology, so as to suggest this aetiology as a differential diagnosis in the appropriate setting.

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### **P-169 Vasculitis through the airways: Pictorial review of the respiratory involvement in granulomatosis with polyangiitis (GPA)**

[Roopa Tekkate](#); [David Collins](#); [Nicholas Ridley](#)

*Great Western Hospital, Swindon*

GPA is a systemic necrotising granulomatous vasculitis (formerly known as Wegener's granulomatosis) predominantly affecting the respiratory and renal systems. Laboratory investigations include raised inflammatory markers (CRP/ESR), positive anti neutrophil cytoplasmic antibodies (ANCA) and proteinase 3 (PR3) antibodies. Imaging modalities include plain X-ray, CT and MRI. Other investigations include bronchoscopy, nasal or sinus biopsy. Respiratory tract involvement is manifested as nasal crusting/ bleeding, sinus inflammation, subglottic stenosis, bronchial wall thickening, pulmonary infiltrate, pulmonary nodule, cavitating mass, ground glass opacity and consolidation.

Here we have reviewed our rheumatology and radiology case files and have constructed a pictorial review of this condition's effect on the respiratory tree. This includes sinus, tracheal, bronchial and lung parenchymal abnormalities. Imaging modalities include plain X-ray, CT and MRI scans.

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### **P-170 Incidentaloma- storm cloud or silver lining?**

[Nicholas Carter](#); [Dave Gay](#)

*Derriford Hospital*

**Aims:** Over 5 months 247 CT Traumograms were performed in a trauma centre. We noted malignancies detected incidentally due to the CT scan.

**Content:** Three incidental malignancies were identified. Two were potentially curable and one is receiving palliative treatment.

A motorcyclist involved in an RTC sustained a femoral and clavicular fracture, a small subarachnoid and subdural haemorrhage, and an incidental T4N3M0 bronchogenic carcinoma was identified. This subsequently was biopsied and discussed in MDT and surgery is being planned pending histology result.

A woman was trampled by cows and sustained a scapula and rib fractures. A breast mass was identified with bone and liver lesions. She subsequently underwent breast biopsy that confirmed metastatic breast cancer for which she is undergoing palliative treatment.

A woman fell down a flight of stairs and underwent a trauma scan which revealed no acute life threatening or treatment changing findings. It did identify a sigmoid mass which was later characterised as a 6cm tubulovillous adenoma on MRI. Histopathology results are still awaited but if cancerous this will be a curable T1N0M0 sigmoid tumour

**Outcome:** Pending histopathology results 2 cancers may be cured that if identified later could have been inoperable, and one metastatic breast cancer was identified, and life prolonging therapy commenced.

**Discussion:** As more imaging is being performed incidental findings are increasing, often burdening follow-up imaging. These cases demonstrate when performing CT for trauma it is prudent to identify and follow up relevant incidental findings.

### **P-171 Diagnostic yield and utility of CT chest, abdomen and pelvis imaging in the investigation of weight loss?**

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<sup>1</sup>NHS Greater Glasgow & Clyde; <sup>2</sup>NHS Ayrshire and Arran

**Introduction:** Standard follow up and cancer staging involves CT of chest, abdomen and pelvis (CT CAP). Such imaging is often extended to investigate unexpected weight loss or systemic upset without clear evidence base<sup>1</sup>. Radiation exposure, equivalent to seven years background radiation, is administered. Cumulative risk can be estimated<sup>2</sup>, but appropriate patient selection is necessary.

**Aim:** Investigate indications, yield and outcome of CT CAP scans in medical specialities. Secondary aim considered the predictive value of clinical factors and CRP/ESR.

**Methods:** All CT CAP scans performed over a six month period in a district general hospital were reviewed. No known Oncology imaging requests were included. Radiologist reports and referrer history were reviewed. Patient demographics, indications, medical specialty, imaging diagnoses and CRP/ESR pre-scan were recorded.

**Results:** 175 Scans performed with median age 73 years. In 89% (n=155), the request was suspected malignancy with unexplained weight loss. 61% of total patients (n=107) scanned had no known prior malignancy; 17% (n=18) had new malignancy diagnosed and 25% (n=17) required further diagnostic imaging. Overall 55% (n=85) of all query malignancy scans were negative.

CRP and /or ESR was performed in >95% pre-scan with positive predictive value of 30% (n=46) in malignancy when ESR>15 and CRP>10.

**Discussion:** 42% demonstrated malignancy/suspected malignancy suggesting reasonable patient selection. Earlier diagnosis means early treatment and avoiding missed diagnoses. This series suggests CRP/ESR neither adequately predicts nor excludes malignancy but raises the suspicion of infection when elevated. Weight loss and older age remain significant, yet non-specific, clinical predictors of malignancy.

#### Errors and discrepancies

### **P-172 To 'Err is Human': A methodological framework limiting radiographic error?**

Christopher Hayre

University Campus Suffolk

This poster proposes a methodological framework enabling radiological practitioners to critically explore and reflect on radiological errors/near misses within the clinical environment. The methodology employed was used as part of a PhD study conducted in the United Kingdom in 2012. The PhD methodology highlighted errors and near misses within the general imaging environment leading to national and international publications. The methodology proposed can be employed in other clinical environments such as 'higher dose' modalities including computed tomography and interventional imaging. The poster discusses the methods employed and supporting philosophies. Importantly it proposes a step by step guide for prospective researchers and practitioners to critically reflect on

'what radiographers do and how they do it'. This is important to consider because it remains generally accepted that 'no safe radiation dose' exists and still remains the largest artificial source to individuals globally.

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### **P-173 Traffic light: An alternative approach to abnormality signalling**

[Sarah Higgins](#); [Chris Wright](#)

*Sheffield Hallam University*

'Red dot' is the most common form of abnormality detection system in clinical practice. The SCoR 2013 policy recommends replacement with preliminary clinical evaluation (PCE) however this requires a different skill set. This research presents the results of a 'traffic light' system which requires the radiographer to make a decision on all images and could help bridge the gap.

Radiographers (n=39) at a busy NHS hospital were required to make a decision on every patient examined 24/7 for three weeks. 'Red' = abnormal, 'Green' = Normal, 'Amber' = unsure; and provide a PCE. Responses were later correlated with the official report to assess image interpretation performance.

Of the 1411 examinations performed 34% (n=484) received a red or green response; Accuracy 93%, Sensitivity (Red TP) 84%, Specificity (Green TN) 97%; however a marked decline in performance was evident during the night shifts. 66% (n=927) received an amber response. Elbow (19%) Knee (14%) and Shoulder (14%) were the most common anatomical regions of uncertainty. 26% of the radiographers (n=10) selected amber for all examinations performed and provided no commentary.

Some radiographers prefer not to participate in any form of ADS. Using the traffic light system, those that do appear to make reliable decisions (red or green) when they can, but opt for amber when unsure. It is now obvious to the referring clinician that additional input may be required to confirm the diagnosis. The amber responses facilitate the targeting of professional development activities in order to scaffold learning.

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### **P-174 Are diagnostic radiographers 'image acquisition' experts?**

[Christopher Hayre](#)

*University Campus Suffolk*

This paper challenges whether diagnostic radiographers remain 'image acquisition' experts in an imaging modality that constitutes approximately 90% of all radiological examinations. The use and practice of general radiographic examinations were explored as part of a PhD study in the United Kingdom. The radiographers in the PhD work acknowledged their limited knowledge and understanding of advancing digital technology. Historically radiographers knew if an X-ray film had been over or underexposed because radiographs appeared 'too white' or 'too black'. This paper argues that if radiographers fail to understand advancing technologies in a general imaging modality how can radiographers begin to optimise an imaging modality that remains a large part of radiographic work undertaken? This is central to the role of the radiographer in keeping with the 'as low as reasonably practicable' principle thus arguably important to consider in our profession.

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### **P-175 Exposure errors? Assessing X-ray exposures using digital radiography**

[Christopher Hayre](#)

*University Campus Suffolk*

This poster explores the use of X-ray exposures following the introduction of digital radiography. Radiographers are central to delivering optimum levels of ionising radiation whilst maintaining sound image quality for radiological interpretation. Yet do radiographers utilise X-ray exposures appropriately? A central theme uncovered as part of a Doctorate of Philosophy (PhD) study was the lack of autonomy concerning X-ray exposures within the general imaging environment. The findings highlight 'how radiographers behave'. For example, some radiographers do not alter 'pre-set' X-ray exposures, arguably failing to produce images of optimum diagnostic quality. Secondly, radiographers acknowledge 'whacking up', 'cranking up' and 'bumping up' X-ray exposures ensuring image production. In conclusion this poster provides an original insight into the attitudes and behaviours of radiographers regarding X-ray exposures in contemporary practices using digital radiography. Dose and image optimisation are central tenets of radiographic practice that may be hindered in contemporary practices.

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### **P-176 Inflammatory liver lesions mimicking metastatic disease**

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*Sheffield Teaching Hospitals NHS Foundation Trust*

**Aims/objectives:** The purpose of this exhibit is:

To review the appearances of inflammatory disease of the liver

To highlight imaging appearances of inflammatory liver disease which can mimic malignancy

**Content:** Review of the variable imaging appearances of this unusual group of conditions on US, CT and MRI illustrated through four biopsy proven cases.

**Relevance/impact:** An incorrect diagnosis of metastatic disease and the expected prognosis that may be incorrectly given has psychological, social and possible financially damaging implications for the patient.

**Outcomes:** We will present a pictorial review of 4 cases of benign inflammatory liver disease initially diagnosed as metastatic cancer on imaging.

**Discussion:** It is useful to remember this group of entities when considering a diagnosis of metastatic disease without a known primary or in cases where repeat tissue biopsy fails to demonstrate malignant cells.

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### **P-177 Preliminary clinical evaluation: The What/Where/How (WWH) approach to scoring**

[Tatsuhito Akimoto](#); [Chris Wright](#); [Pauline Reeves](#); [James Harcus](#)

*Sheffield Hallam University*

The SCoR is driving for preliminary clinical evaluation (PCE) however; currently there is no method of quantification to assess quality. FRCR has an approach to quantify comments in the rapid reporting examination (CR2B). The aim of this project was to develop a robust scoring system that enables comprehensive image evaluation regardless of profession.

An image test bank was administered using RadBench with equal prevalence of normal /abnormal. A random sample of attempts was selected to pilot the scoring model. Sensitivity, specificity and accuracy were calculated. A scoring system (WWH) was developed based on the WHAT (fracture type), WHERE (location), HOW (displacement/angulation) concept (Harcus & Wright 2014) to evaluate the PCE. The results were compared to those obtained using the FRCR model.

Calculated actual mean accuracy, sensitivity and specificity scores were 87%, 80% and 93% respectively. FRCR scores were 88%, 80% and 97%. WWH scores were 65%, 37%, and 93%. The FRCR score appears to mirror the actual decision scores however it does not reflect the fact that the PCE for abnormal cases is often incomplete; 'What' 67%, 'Where' 87%, 'How' 7%.

The PCE score should ideally correlate with the actual score in order to provide useful information to the referring clinician. Whilst most comments state the location, less states the type, and very few refer to angulation or displacement. Analysis of the PCE is a useful indicator for targeting professional development. The same model could be applied to radiology reports, regardless of profession, to provide an auditable assessment of quality.

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### **P-178 Magnification assessment aids: Evaluation of practice**

[Kimberley Carlile](#); [Chris Wright](#)

*Sheffield Hallam University*

This research evaluated the role of magnification assessment aids as part of the imaging process of knees and hips, in the workup for orthopaedic surgery.

The quantitative method used the orthopaedic template scaling ball in routine use. Positioning was recorded from direct observation of radiographers (n=14) examining patients (n=56), focus receptor distance, as well as the completed images. A model was also developed and tested to demonstrate the variation in magnification when using different FRD's.

20% (n=11) of cases failed to demonstrate the whole scaling ball. For supine pelvis examinations the ball was positioned either between the legs at the symphysis pubis (62%), lateral skin surface level with the greater trochanter (25%) or directly on the table top (13%). For AP knee examinations; 60% in the middle of the coronal

plane, 28% on the table top, and 12% in the middle of the sagittal plane. 100cm FRD was used by half the radiographers; others ranged from 90-130cm.

Inaccurate positioning of the template scaling ball can ultimately lead to measurement errors which may impact surgical outcomes. A defined protocol for practice is recommended to ensure consistent FRD, placement of the scaling ball, and inclusion on the resultant image.

### **P-179 Implementation of NICE recommendations on abdomino-pelvic CT, following unprovoked venous thromboembolism, in a UK teaching hospital: No additional detection of occult malignancy and high numbers of incidental findings**

[David Garwood](#); [Bryan Renton](#); [Elizabeth Joekes](#)

*Royal Liverpool University Hospital*

**Introduction:** NICE Clinical Guideline 144 recommends patients with an unprovoked-VTE, who don't have signs/symptoms of cancer on initial investigation, be considered for further investigation with an abdomino-pelvic CT to exclude occult malignancy. We aimed to evaluate numbers of scans performed/outcomes in a UK teaching hospital following this recommendation. **Methods:** Retrospective review of CT scans performed before and after publication of the NICE guidance in 2012. CT reports and case notes were analysed. Type/stage of malignancy, treatment and other relevant findings were documented. For the 2014 data set, incidental radiological findings and follow-up recommendations were reviewed.

**Results:** The number of CT-scans requested for "unprovoked-VTE", rose by 142% following publication of Clinical Guideline 144. In the 2011-2012 data set, 21 patients were included, one of which was found to have a malignancy, which was clinically overt at diagnosis (not occult). Five patients (23.8%) had incidental findings requiring further investigation. In the 2014-2015 data set, 51 patients included, five (9.8%) were found to have malignancy. In retrospect, all showed signs/symptoms of potential malignancy on initial investigation and were inappropriately requested under NICE criteria. No occult malignancies were detected in correctly referred patients. Incidental findings warranting further investigation were reported in ten cases (19.6%). Follow-up advice was deemed incorrect in four of these.

**Conclusion:** Addition of abdomino-pelvic CT scan in patients with first unprovoked VTE and no signs/symptoms of cancer on initial investigation, significantly increased the number of scans and incidental findings, but didn't pick-up any additional occult malignancies.

### **P-180 It's only words. A comparison of transcription error rates in radiology reports produced via voice recognition software and traditional dictation**

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*Hull & East Yorkshire NHS Trust*

**Background:** Voice Recognition (VR) software has replaced Traditional dictation (TD) in most radiology departments for transcribing reports. Although VR has been a factor in reducing the turnaround time of reports and increased productivity, questions still remain over the accuracy of reports compared to TD. Studies have shown that between 4-42% of reports dictated with VR software contain transcription errors. These errors can potentially have a significant impact on patient management.

**Purpose:**

1. To evaluate the number and type of transcription errors within radiology reports produced via Voice Recognition (VR) software at our institution.
2. To compare the error rate of voice recognition (VR) with error rate of traditional dictation (TD) transcription.

**Method:** We retrospectively analysed 100 consecutive reports each for CT, MR, US and plain film in Jan 2014 produced via the VR software. We then compared this with 100 consecutive reports each for CT, MR, US and plain film in Jan 2009 produced via Traditional Dictation (TD). Errors in the reports were categorised into minor errors, major errors and nonsensical phrases.

**Results/conclusion:** Out of the 400 reports produce via VR, 98 reports (24%) contained errors. The majority of these (96/98) contained minor errors. One report contained a major error and one report contained a nonsensical phrase.

In contrast 30 reports (7%) produced via TD contained errors, all of which were minor errors. In summary VR transcribed reports have a significantly higher error rate than TD transcribed reports with more major errors which can impact patient management.

### **P-181 Managing PACS errors in radiology: Utilising a quality management system (QPulse)**

[Katie Pickles](#); [Beverly Snaith](#); [Gareth Cinnamon](#)

*Mid Yorkshire Hospitals NHS Trust*

**Aims:** To review non-conformance errors in a PACS system.

To share experience of using a quality management system for non-conformances.

To review errors from a single NHS Trust.

**Content:** In 2014 the non-conformance module of the Q-Pulse system was set up to manage PACS errors. This allowed the team to design an electronic form which once completed alerted staff that there was a pending request. PACS administrators now receive an email alert of errors requiring action. Data analysed over twelve months showed that 0.12% of images required PACS changes, these are auditable and can be analysed by reason as well as owner, modality, hospital site and days to closure. Once the error has been corrected the system also alerts the individual who identified the error and requests a check and approval of the change, thereby closing the loop.

**Relevance:** In the filmless radiology environment errors occur during patient or examination identification and result in a non-conformance. These errors require communication with the radiology IT systems team and manual intervention to correct, usually through a paper-based system. Previous studies of PACS errors have identified the prevalence to range from 0.2 to 0.5% of images acquired.

**Outcomes:** Quick and efficient management of such changes has enabled errors to be communicated and rectified with secure data transfer. The continuous audit process has also highlighted staff training issues and improved communication between systems and clinical teams. The innovation in radiology PACS processes has led to improved governance thereby increasing quality of care and reduced risk.

### **P-182 Evaluating the need for intra fraction motion monitoring scans for tomotherapy delivered SABR**

[Sarah Petty](#); [Christopher Thomas](#)

*Guy's and St Thomas' NHS Foundation Trust*

In August 2015 we began to deliver SABR under the Commissioning through Evaluation(CtE) programme. Prior to this the department delivered SABR to NSCLC with step and shoot or VMAT IMRT on conventional linacs. Pre-correction, post correction and post treatment CBCT's were acquired with the option of a mid CBCT for step and shoot IMRT. Average intra-fraction motion was 0.008mm(x) (+/-0.06), 0.004mm(y) (+/-0.1) and 0.028mm(z) (+/-0.09). It was concluded the post treatment scan could be safely omitted and that a mid treatment CBCT was not necessary thus reducing the amount of time the patient remained in the treatment position for.

A VMAT solution for all SABR CtE indications (spine, pelvic/spine re-irradiation and lymph nodes) was not possible, however acceptable Tomotherapy plans could be produced. In order to ascertain intrafraction motion, evaluate verification requirements vs increasing the risk of intrafraction motion, guide immobilisation design and investigate the option of reducing PTV margins, a pre-, mid- and post-treatment imaging schedule was implemented.

Verification data were analysed for each immobilisation technique used and were correlated with beam on time and scan time demonstrating:

Intra-fraction motion is within acceptable limits in the of context of the PTV margins applied.

Recommendations can be made to remove mid treatment and post treatment scans reducing the overall treatment time and possibility for motion to occur dependant on beam on time and immobilisation technique used.

## Health informatics

### **P-183 Accuracy of radiology requests and reports – are patients at risk?**

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