# UKRC

10-12 June 2013 - ACC Liverpool

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# ESSENTIAL IMAGING

## ANNUAL MULTIDISCIPLINARY UK RADIOLOGICAL CONGRESS

BIR

IPEM

The British Institute of Radiology,
The College of Radiographers and
The Institute of Physics & Engineering in Medicine

## Poster presentations

## Clinical: Musculoskeletal

P-001 **A pictorial review of spinal infection**
*Chandani Thorning, East Surrey Hospital, Redhill*

P-002 **Identifying cervical spine fractures in trauma patients**
*Clare Armstrong, Sheffield Teaching Trust*

P-003 **Neoplastic spinal lesions**
*Chandani Thorning, East Surrey Hospital, Redhill*

P-004 **Accuracy of shoulder ultrasound versus shoulder arthroscopy in the detection of rotator cuff tears**
*Amit Gupta, Bradford Teaching Hospitals NHS Foundation Trust*

P-005 **Improving the lateral elbow technique**
*Helen Adamson, Mid Yorkshire Trust*

P-006 **An anatomical illustration of chronic wrist pain using magnetic resonance (MR) images**
*Chun Lap Pang, Peninsula Radiology Academy, Plymouth NHS Hospital Trust*

P-007 **A magnetic resonance (MR) pictorial review of meniscal tears: Thirteen common pitfalls**
*Prageeth Dissanayake, Peninsula Radiology Academy, Plymouth NHS Hospital Trust*

P-008 **A pictorial review of SLAP tears using MRI with surgical correlation**
*Prageeth Dissanayake, Peninsula Radiology Academy, Plymouth NHS Hospital Trust*

P-009 **Femoro-acetabular Impingement: Radiological and arthroscopic correlation**
*C Marsh, Alexandra Hospital, Cheadle*

P-010 **Understanding the plain film in femoroacetabular impingement and a review of the current literature and practices**
*Priya Suresh, Plymouth Hospital NHS Trust*

P-011 **Law of the Rings -The invisible pelvic fractures revealed**
*Tamir Ali, Royal Victoria Hospital, Newcastle*

P-012 **The effect of diagnostic ultrasound in patients referred with vague groin symptoms**
*Afaq Siddiqui, Harrogate District Hospital*

P-013 **The avoidance of radiation exposure by following RCR guidelines and Ottawa Rules in performing ankle radiographs**
*Dinnish Baskaran, Basildon and Thurrock University Hospital*

P-014 **Recognizing nail-patella syndrome- when genetic mutation meets the eye**
*Reem Bedair, Cairo University, Medical Sciences Division, Egypt*

P-015 **Utility of low field strength MRI in the evaluation of tuberculous spondylitis**
*Donald Nzeh, Department of Radiology, University of Ilorin, Nigeria*

P-016 **To evaluate the quality of request for musculoskeletal ultrasound from GPs**
*Afaq Siddiqui, Harrogate District Hospital*

## Clinical: Head and neck

P-017 **A pictorial review of sclerotic lesions of the skull base**
*Elizabeth Kneale, University Hospital Aintree, Liverpool*

P-018 **Imaging of salivary gland tumours**
*Senthil Kumar Muthu, Wrexham Maelor Hospital, Betsi Cadwaladr University Health Board*

P-019 **Tumoral calcinosis: what the general radiologist should know**
*Christopher Hilditch, Radiology department, Macclesfield District General Hospital*

## Clinical: Neuroradiology

P-020 **Management of sudden onset severe headache**
*Mirae Shin, John Radcliffe Hospital, Oxford*

P-021 **An a la carte menu of neuroradiology signs**
*Amit Parekh, North Bristol NHS Trust*

P-022 **Cerebral microhaemorrhages – are they all the same?**
*Helen Estall, University Hospitals of Leicester*

P-023 **Signs of early ischaemia on CT head scans**
*Amit Parekh, North Bristol NHS Trust*

P-024 **Stroke mimics**
*Rebecca Hunt, North Bristol NHS Trust*

P-025 **Spinal cystic disease: a pictorial review**
*Iain Macleod, Department of Plastic Surgery, Stoke Mandeville Hospital*

P-026 **Spinal cord diseases – a MR diagnostic approach**
*John Morlese, University Hospitals of Leicester*

P-027 **Lumbar puncture CSF sampling of suspected subarachnoid haemorrhage following a negative CT head**
*Haniya Kazi, South Tyneside District Hospital*

P-028 **Preoperative tumour volume and its effect on survival in adult patients with cerebral glioma**
*Tariq Aziz, University of Nottingham*

P-029 **Extra-axial collections: A practical CT/MRI guide for general radiologists to avoid life threatening misdiagnosis**
*Valter Stefano Fraccaro, University Hospitals of Leicester NHS Trust*

P-030 **A comparison of endovascular intervention to surgical clipping for subarachnoid haemorrhages - a retrospective audit**
*Rukhtam Saqib, University of Manchester*

P-031 **Seeing straight? A radiological perspective on visual pathway lesions**
*K Prescod, Manchester Radiology*

P-032 **Axial FLAIR MRI imaging for reassurance in the outpatient neurology setting**
*Peter Strouhal, Royal Wolverhampton Hospitals Trust*

P-033 **Congenital perisylvian syndrome**
*David Woodlock, Wrightington, Wigan and Leigh NHS Foundation Trust*

## Clinical: Breast

P-035 **Breast imaging in women under 40 with symptomatic breast disease**
*John Adu, Homerton University Hospital*

P-036 **Visual assessment of breast density: reproducibility**
*Lani Walshaw, Manchester Medical School*

P-037 **Visual assessment of breast density: are four images and two readers necessary?**
*Helen Millward, Manchester Medical School, Manchester*

P-038 **Is there a link between mammographic density and breast cancer characteristics?**

*Kathy Ren, The University of Manchester Medical School, Manchester*

P-039 **CT staging in breast cancer: can we select patients requiring staging with CT?**
*Peter Moule, Southampton University Hospital NHS Trust*

P-040 **Clinical usefulness of axilla ultrasound in patients without breast cancer**
*Brian Mucci, Southern General Hospital, Glasgow*

P-041 **The clinical role of FDG-PET/CT in follow up and restaging of breast cancer patients**
*Sally Emad El-Din, Cairo University Hospitals, Kaser Al-ainy, Cairo, Egypt*

P-042 **Can radiographers make accurate decisions about cancer when interpreting mammograms? A systematic review**
*Anne-Marie Dixon, University of Leeds*

P-043 **The impact of false positive screening mammography on subsequent breast screening participation**
*Katie Giles, South Deven Healthcare Foundation Trust, Torbay*

P-044 **Radiographer image interpretation and reporting in screening and symptomatic mammography: a survey of current UK practice**
*Anne-Marie Dixon, University of Leeds*

P-045 **Does increasing compression improve visual image quality in mammography? An initial investigation**
*Claire Mercer, University Hospital South Manchester*

P-046 **An analysis of the compressed breast area and image receptor/compression paddle pressure balance in different mammographic projections**
*Helen Smith, University Hospitals of Morecambe Bay NHS Foundation Trust*

P-047 **Axillary abnormalities on breast imaging**
*Megan Bydder, Nightingale Centre, University Hospital of South Manchester*

P-048 **Pictorial review of PIP implant ruptures**
*Soujanya Gadde, University Hospital South Manchester*

P-049 **Breast MRI: experiences from a district general hospital**
*Christopher Hilditch, Radiology Department, Macclesfield District General Hospital*

P-050 **Comparison of radiology scores with histopathology in a symptomatic breast setting**
*Afaq Siddiqui, University Hospital of Wales,Cardiff*

P-051 **A review of macrolane injections in clinical breast imaging**
*Joleen Kirsty Eden, South Lancashire Breast Unit, Wrightington, Wigan and Leigh Foundation NHS Trust*

P-052 **Local strategy for the accreditation and continuous professional development of assistant practitioners in breast imaging**
*Bernadette Booth, University Hospital of North Staffordshire*

## Clinical: Chest

P-053 **Air spaces, percentages and time for an update: an audit and discussion into image guided lung biopsies against BTS Guidelines**
*Zain Karim, Stepping Hill Hospital*

P-054 **Failure to diagnose lung cancer on the chest X-ray: an audit**
*Chris Loughran, East Cheshire NHS Trust*

P-055 **CT guided lung biopsies-can a DGH perform to expert standards?**
*Melvyn Ang, Clinical Radiology Department, Northern Health and Social Care Trust, N Ireland*

P-056 **Percutaneous CT guided lung biopsies**
*Anuradha Anand, James Cook University Hospital, Middlesborough*

P-057 **A pneumothorax, not a pneumothorax but a pneumothorax!**
*Haniya Kazi, South Tyneside District Hospital*

P-058 **Scalpel or wire? A case of yellow nail syndrome & literature review of percutaneous emoblisation in chylothorax**
*Chun Lap Pang, Peninsula Radiology Academy, Plymouth NHS Hospital Trust*

P-059 **A pictorial review of mediastinal masses and their radiological differences**
*Cindy Leung, Cardiff and Vale University Health Board*

P-060 **Pictorial review of cavitating lesions of the lung**
*Vijaya bhaskar Pakala, Heartlands Hospital*

P-061 **Do acute medical clinicians give CXR findings in the clinical history, when requesting CT investigation of the chest?**
*Shahid Hussain, Heart of England NHS Foundation Trust*

P-062 **Variation in ventricular ratio measurement in CT pulmonary angiogram**
*Brian Mucci, South Glasgow University Hospitals*

## Clinical: Cardiac

P-064 **Efficient management of echocardiography resource at a district general hospital**
*Dinnish Baskaran, Basildon and Thurrock University Hospital*

P-065 **Extra-cardiac findings on CT Coronary angiograms – a pictorial review**
*Fiona Caswell, NHS Grampian*

P-066 **High variability in signal intensity and contrast dynamics during CMRI first pass perfusion imaging when a standard dose of contrast agent is used - transit times of bolus & peak signal intensity in the blood pool**
*Shona Matthew, University of Dundee*

P-067 **Evaluation of vulnerable plaque in postmenopause females with acute coronary syndrome by using 64-MDCT**
*Zhaohui Yang, Department of Radiology, Renmin Hospital of Wuhan University, China*

P-068 **Simple guidelines may improve appropriateness of referrals for CT coronary angiography**
*Carl Roobottom, Derriford Hospital, Plymouth*

P-069 **RADAR assisted cardiac device implantation. Achieving very-low radiation dose during device deployment**
*Adam Westerink, Royal Brisbane & Women's Hospital, Australia*

## Clinical: Vascular

P-070 **Inferior vena cava anomalies and variants: implications for deployment of IVC filters**
*Chun Pang, Peninsula Radiology Academy Plymouth International Business Park*

P-071 **On-call provision of interventional radiology: the view from the hub**
*Drew Maclean, University of Liverpool*

P-072 **Inter- and intra-observer reproducibility in whole-body contrast enhanced MRA stenosis grading and systemic atheroma scoring**
*Lynne McCormick, University of Dundee*

P-073 **Radiological stenting for malignant superior vena cava obstruction (SVCO): A 5 year review of results and audit analysis**
*Thomas Micic, Aneurin Bevan Health Board Trust*

P-074 **Treatment of deep vein thrombosis using direct catheter thrombolysis with alteplase**
*Islah Din, Countess of Chester Hospital NHS Foundation Trust*

P-075 **Catheter guided thrombolysis for the treatment of acute limb ischaemia and deep vein thrombosis: How, when and does it work?**
*Aamer Iqbal, Department of Radiology, Royal Gwent Hospital*

P-076 **Adequecy of patient consent for interventional procedures**
*Ayesha Imran, Countess of Chester Hospital*

## Clinical: Uroradiology; gynaecology; obstetrics

P-077 **A retrospective analysis of 991 CT urograms to describe the prevalence of clinically significant extra-urinary findings**
*David Little, North Bristol NHS Trust*

P-078 **Krukenberg cases- a review of radio pathological correlation**
*K Presod, North East Lincolnshire*

P-079 **Retrospective audit of complication rate and diagnostic yield from ultrasound guided renal biopsy**
*Andrew Gemmell, Plymouth Hospitals NHS Trust*

P-080 **Imaging the acute scrotum**
*Jennifer Falce, Derriford Hospital, Plymouth*

P-081 **Ovarian cancer imaging? by guidelines**
*Sonali Limdi, Pennine Acute Hospitals NHS Trust*

P-082 **Transvaginal ultrasound: improving performance and attitudes of radiology trainees**
*Rosemarie Thomas, Derriford Hopital*

P-083 **Renal tumours - a wake up call**
*Samantha Anderson, Norfolk and Norwich University Health Care Trust*

P-084 **Further exploration of MRI techniques for liver T1rho quantification**
*Yi-Xiang Wang, The Chinese University of Hong Kong*

## Clinical: GI and hepatobiliary

P-085 **Epiploic appendagitis, a less common cause of abdominal pain**
*Anand Sastry, Derriford Hospital*

P-086 **The rare consequences of blunt abdominal trauma; from subtle mesenteric injury to the abdominal blow-out**
*Samantha Saikia, Royal Victoria infirmary, Newcastle*

P-087 **Large unusual intra abdominal mass lesions. Imaging review**
*Deepak Pai, Scunthorpe General Hospital*

P-089 **Radiation dose for radiologically inserted gastrostomy: How low can you go?**
*Hans-Ulrich Laasch, The Christie, Manchester*

P-090 **Does oral omnipaque 350 preparation for routine abdominopelvic CT work as well as gastrografin and is it better tolerated by patients?**
*Georgina Devenish, University Hospital Wales, Cardiff and Vale Trust*

P-091 **To bleed or not to bleed: A comprehensive review of imaging features in acute gastrointestinal haemorrhage**
*Joel Dunn, Imperial College Healthcare NHS Trust*

P-092 **Pictorial review of spectrum of findings of mucocoele of the appendix on CT**
*Deepak Pai, Scunthorpe General Hospital*

P-093 **Advanced practitioners in CT colonography, does having a different skill set within advanced practitioners improve diagnostic findings?**
*Denise Twist, St Helens & Knowsley Teaching Hospitals NHS Trust*

## Clinical: Multisystem disorders

P-094 **Pictorial review of unusual foreign bodies identified on various imaging modalities and their differentiation from an in situ medical device**
*Tahira Aslam, University Hospital Aintree, Liverpool*

P-095 **Lymphoma: The great mimic**
*Cindy Leung, Cardiff and Vale University Health Board*

P-096 **The incidence of contrast-induced nephropathy (CIN) following contrast-enhanced computed tomography (CECT): a contemporary review**
*Victoria Bonello, Epsom and St. Helier's University Hospital NHS Trust*

P-097 **Intra-osseous lines: All you need to know as a radiologist**
*Anand Sastry, Derriford Hospital*

P-098 **Top ten tips for duty radiologist**
*Zeid Al-Ani, University Hospital of South Manchester NHS Foundation Trust*

P-099 **Radiology in the undergraduate medical curriculum: Who, how, what, when, and where?**
*George Collins, St. Georges Hospital*

P-100 **Radiology teaching experience and knowledge: a survey of UK medical students**
*Bhupinder Hoonjan, Colchester Hospital University Foundation Trust*

P-101 **A pilot study: Can a multifaceted approach to teaching and the timely addition of prompt notes help to improve retention of information in final year medical students**
*G DeLay, Queens Medical Centre, Nottingham*

P-102 **Are radiology request forms adequately completed?**
*Mubeen Chaudhry, Mid-Cheshire Hospitals Trust*

## Clinical: Nuclear medicine

P-103 **11C-Methionine PET/CT – A pictorial review**
*Fiona Caswell, NHS Grampian*

P-104 **Audit of use of PIOPED classification in lung scintigraphy**
*Mei Chin, South Glasgow University Hospitals*

P-105 **Lung scintigraphy in pregnancy: audit of value of ventilation scan**
*Brian Mucci, South Glasgow University Hospitals*

P-106 **Nuclear medicine imaging in evaluation of patients with persistent hypercalcaemia following surgery for primary hyperparathyroidism**
*Hasan Nizami, Plymouth Hospitals NHS Trust*

P-107 **An audit of the accuracy of PET/CT in the preoperative assessment of non small cell lung cancer**
*Sophie Vaughan, University Hospital of Wales*

P-108 **Supplementary imaging of the spine following bone scintigraphy: A phantom based study comparing absorbed dose of the male and female reproductive organs from radiography and computed tomography imaging**
*Jennifer Kelly, St Helens & Knowsley Teaching Hospital NHS Trust*

## Clinical: Paediatrics

P-109 **Paediatric radiography: back to basics**
*Nadine Jeakings, University Hospital Southampton FT*

P-110 **Something sweet – does sucrose have a role in paediatric radiology?**
*Nadine Jeakings, University Hospitals Southampton FT*

P-111 **Paediatric major trauma CT - early experiences within a newly established major trauma centre**
*Franchesca Wotton, Peninsula Radiology Academy*

P-112 **Imaging characteristics of spontaneous duodenal haematoma in children**
*Rebecca Geach, Bristol Royal Hospital for Children*

P-113 **Paediatric craniocervical swellings - old wives tale- a radiologic perspective**
*K Prescod, North East Lincolnshire*

P-114 **Fetal intra-abdominal calcification: location, location, location**
*Yousef Alwan, Blackpool Teaching Hospitals, NHS Foundation Trust*

P-115 **Multisystem review of usual and unusual manifestations of infantile and childhood leukaemia**
*Kandise Jackson, Central Manchester Children's Hospital*

P-116 **Image review for post operative cochlear implants in paediatrics**
*Katie Haynes, University Hospital Southampton*

P-117 **Imaging of Taylor Spatial Frames for leg length discrepancies**
*Sian Lawler, Chelsea and Westminster Hospital NHS Foundation Trust*

## Innovation in service delivery

P-118 **CT thorax, abdomen and pelvis audit: an audit comparing non-trauma requests made by GPs and the accident and emergency department**
*Cheng Xie, Birmingham Heartlands and Solihull Hospitals, Heart of England Foundation NHS Trust*

P-119 **Innovative approach to 'Excellence in Quality' for ultrasound services**
*Ankia Meiring, InHealth Ltd*

P-120 **Magnetic resonance imaging of the claustrophobic patient in the mobile environment**
*Gillian Winter, InHealth Limited*

P-121 **Introducing a change: New MRI protocol for detection of liver lesions in non-cirrhotic patients using hepatobiliary specific contrast agent.**
*Sumita Chawla, University Hospital Aintree, Liverpool*

P-122 **Audits into extravasation of contrast during CT imaging and cannulation practice.**
*James Allred, Derriford Hospital Radiology Department, Plymouth*

P-123 **RadBENCH; Benchmarking image interpretation performance**
*Chris Wright, Sheffield Hallam University*

P-124 **Are the multidisciplinary team meetings (MDTs) serving their education value for the radiology trainee?**
*Sumita Chawla, Department of Radiology, University Hospital Aintree, Liverpool*

P-125 **Variation, so what?**
*Jim Cannon, Managed Diagnostic Imaging Clinical Network (MDICN)*

P-126 **Minnie hands make light work!!!**
*Rachael Hilton, The Great Western NHS Foundation Trust*

P-127 **Service-user involvement in research: the benefits of letting them take control**
*Leslie Robinson, University of Salford*

P-128 **A foot in both camps- Surviving a split clinical/academic role**
*Alexandra Partner, University of Derby*

P-129 **Court on the web: Courtroom simulation for distance learning**
*Jacquie Vallis, Teesside University*

P-130 **Radiographer commenting: is there a reluctance to participate?**
*Carys Hunt, Bangor University*

P-131 **Audit of the quality of DATIX incident reporting for contrast extravasation**
*Sophia Sakellariou, Department of Radiology, Glasgow Royal Infirmary*

## Errors and discrepancies

P-132 **Disagreement in chest x-ray interpretation: comparative analysis between consultant radiologists and a reporting radiographer**
*Nicholas Woznitza, Homerton University Hospital*

P-133 **Are we getting the message across? An audit of radiology reports**
*Jawad Naqvi, University Hospital of South Manchester*

P-134 **Wrong site surgery - how well does radiology prevent this?**
*Shahid Hussain, Heart of England NHS Foundation Trust*

P-135 **"Is that your final answer?" an audit of provisional versus final reports of on-call CT imaging**
*Mubeen Chaudhry, Wirral University Hospitals Trust*

P-136 **Errors in final radiology reports generated using voice recognition software**
*Caroline Parkin, North Western Deanery School of Radiology*

P-137 **The Radiology Events Register (RaER): incident reporting in radiology**
*Catherine Mandel, Peter Maccallum Cancer Centre*

P-138 **When it all goes wrong – what should we tell the patient?**
*Ann Pinder, Plymouth Hospitals NHS Trust*

P-139 **MRI-induced soft tissue pain: Incidental finding of a 15 year old foreign body**
*Theofilos El Sayed Omar, Keele University Medical School*

P-140 **Cardio-respiratory radiology discrepancies**
*Praveen Varra, Birmingham Heartlands Hospital, Birmingham*

P-141 **Pictorial review CT head soft tissue normal variant pitfalls**
*Paul Lockwood, Canterbury Christ Church University*

## Patient dose measurement and management

P-142 **The incidence of contrast induced nephropathy in EVAR procedures**
*Gulraiz Ahmad, The Royal Oldham Hospital*

P-143 **Audit of radiation dose from CT KUB examinations at Nottingham University Hospitals**
*Christopher Clarke, Nottingham University Hospitals*

P-144 **An analysis of cardiothoracic patient radiation doses recorded in RIS**
*Oliver Morrish, East Anglian Regional Radiation Protection Service, Cambridge University Hospitals NHS Foundation Trust*

P-145 **Investigation on the influence of dose minimization management on the PET image quality**
*Hishar Hassan, Centre for Diagnostic Nuclear Imaging, Universiti Putra Malaysia*

P-146 **The effects of CT dose reduction software and patient body mass index on total CT dose**
*Simon Greenwood, Mid Cheshire Hospitals NHS Foundation Trust*

P-147 **Dose comparison between CT urography and traditional IV urography**
*David Little, NBT - North Bristol NHS Trust*

P-148 **Is adequate information being given for rejected CT requests?**
*Shahid Hussain, Heart of England NHS Foundation Trust*

P-149 **Low dose CTPA; the death of perfusion imaging?**
*Claire Brettle, Great Western Hospitals NHS Foundation Trust*

P-150 **Dose audit of gastro-endoscopic services**
*Paul Reid, Aintree University Hospitals NHS Foundation Trust*

## Computer assisted detection/diagnosis and image perception

P-151 **Triple phase pancreatic MDCT scanning- pros and pitfalls**
*K Prescod, North East Lincolnhsire*

P-152 **Low-dose versus high-dose CT acquisition on a PET/CT system for lesion detection: a free-response receiver operating characteristic study**
*John Thompson, Robert Gordon University*

P-153 **Adaptive iterative dose reduction versus filtered back projection for lesion detection: a free-response receiver operating characteristic study**
*John Thompson, Wrexham Maelor Hospital*

P-154 **The impact of pre-operative MRI in breast cancer in a Northern Irish Centre**
*MP Eastwood, Antrim Area Hospital*

## Radiation protection and quality assurance

P-155 **Exclusion of the lens of the eye in CT head examinations - closing the audit loop**
*John Adu, Homerton University Hospital*

P-156 **IQ works analysis tree for measurement of square wave contrast transfer factor in mammography**
*Jason Fazakerley, Integrated Radiological Services*

P-157 **Mammography AEC checks: correcting CNR measurements made with different sets of PMMA blocks**
*Thomas Couch, IRS Limited*

P-158 **The increased SID technique: what is preventing implementation in clinical practice?**
*Desiree O'Leary, University College Dublin*

P-159 **Increasing the source to image receptor distance: a simple optimisation strategy**
*Desiree O'Leary, University College Dublin*

P-160 **Emergency doctors knowledge of radiation dose and risk**
*Anna Paes, Prince of Wales Hospital, Sydney, Australia*

P-161 **Establishing a MRI quality assurance toolkit**
*Darren Hudson, Nuffield Health*

P-162 **Regadenoson (Rapiscan): Tips and tricks**
*Peter Strouhal, Royal Wolverhampton Hospital Trust*

P-163 **Electronic delivery of annual IRMER update and radiation safety awareness**
*Nicholas Taylor, Great Western Hospitals NHS Foundation Trust*

P-164 **A preliminary description of a new best practice approach for assurance of regulatory compliance in radiation protection**
*Rachael Ward, Plymouth Hospitals NHS Trust*

## General

P-165 **Establishing an MR lymphography service for patients with chronic lymphoedema**
*Patricia Martin, NHS Tayside*

P-167 **Role of nanotechnology in medical imaging**
*Muhammad Afzal, The Islamia University of Bahawalpur, Pakistan*

P-168 **'The waves of sound' - A short history of evolution of ultrasonography for medical imaging**
*Lalita Malghan, Hull Royal Infirmary, Hull*

P-169 **An amazing journey of evolution of Xrays: Revolution of medical diagnosis**
*L Malghan, Plymouth Hospitals NHS Trust*

## Student radiography

P-170 **Dose audit of adult chest radiographs**
*Wang Kei Ma, University of Salford*

P-171 **How effective are CTPA and MRA in the investigation of pulmonary emboli?**
*Nikul Chauhan, City University London*

P-172 **A self audit to compare DAP to DRL for PA chest examinations**
*Thomas Gately, University of Salford*

P-173 **Mammography - the relationship between compression force and paddle movement**
*Wang Kei Ma, University of Salford*

P-174 **Lateral hip radiography- which technique produces the lowest organ dose combined with best visual image quality**
*Sana Khalid, University of Salford*

P-175 **Light beam diaphragm collimator errors and their effects on radiation dose for AP pelvic radiography**
*Hannah Brookfield, University of Liverpool*

P-176 **Minor variations in lateral and AP lumbar spine centring, effects on radiation dose and image quality**
*Hannah Brookfield, University of Liverpool*

P-177 **Exploring the challenges of increasing levels of patient obesity for diagnostic imaging departments**
*Nadine Miller, City University London*

P-178 **Can radiographers visually categorise patient's into correct body mass index bands?**
*Group Presentation, University of Exeter*

P-179 **Fact or fiction: an analysis of the 10 kVp rule in computed radiography**
*Elizabeth Allen, University of Salford*

P-180 **A first: retrospective audit of Red Dotting occipitomental views**
*Claire Melia, University of Salford*

P-181 **Effect of fluoroscopy parameters on dose**
*Group Presentation, University of Exeter*

P-182 **Has the introduction of digital radiography possibly allowed for radiographic practice to decrease in quality?**
*Benjamin Vranjkovic, Hertfordshire University*

P-183 **Scottish Islands – a student diagnostic radiographer's experience**
*Fiona Oludipe, RGU, Scotland*

P-184 **Feed-Forward Sandwich; The students perspective**
*Sarah Naylor, Sheffield Hallam University*

P-185 **The research radiographer; who?**
*Jennifer Piper, Oxford University*

P-186 **The impact of training of image interpretation on radiographer's skills of reporting: A literature review**
*Farah Akram, Shaukat Khanum Memorial Cancer Hospital & Research Centre, Bradford*

P-187 **Training for theatre radiography is there room for improvement?**
*Nicholas Taylor, Great Western Hospitals NHS Foundation Trust*

P-188 **Reviewing a case-based learning program "SOLAR" in radiography education**
*Kristal Lee, Monash University*

P-189 **Enhancing radiography students understanding of depression: A workshop design involving service users**
*Karen Knapp, Medical Imaging, University of Exeter*

## Other

P-190 **The role of CT in acute respiratory failure in the recruitment of ECMO**
*Georgina Charlton, Guy's and St Thomas' Hospital*

P-191 **The use of Onyx in peripheral vascular interventions: a pictorial review**
*Asim Shah, Leeds Teaching University Hospitals Trust*

P-192 **IVC filter retrieval rates at a typical district general hospital-the reality?**
*Asim Shah, Mid Yorkshire NHS Trust*

P-193 **Data free at the point of need**
*Jim Beagle, The London Clinic*

P-194 **Does intravenous urography remain an accurate study in the imaging of acute renal colic in the presence of CT KUB?**
*Shayan Ahmed, Whipps Cross University Hospital, Barts Health NHS Trust*

P-195 **Extraosseous uptake within the abdomen and breast on whole body bone scan: a pictorial review of interesting cases**
*Nirav Patel, St Helens and Knowsley NHS trust*

P-196 **Ultrasound guided splenic biopsy; complication rates and diagnostic yield**
*Rebecca Johnson, Gloucester NHS Foundation Trust*

P-197 **Assessment of technical quality of Computed Tomography Pulmonary Angiogram (CTPA)**
*Lakshmi Kanagarajah, Basildon and Thurrock University Hospitals NHS Foundation Trust*

P-198 **Retrospective review of 1000 CT Urograms performed in a single centre**
*David Little, North Bristol NHS Trust*

## Clinical: Musculoskeletal

### P-001 A pictorial review of spinal infection

Zoe Little; Chandani Thorning; Stephen Gwyther; Hugh Maurice; Ajay Pankhania; Philippa Tyler

*East Surrey Hospital, Redhill; Royal National Orthopaedic Hospital, Stanmore*

**Purpose:** We will describe the anatomical and aetiological classification of spinal infections and review a number of cases presenting to our departments. Our aim is to illustrate the importance of MR imaging in the diagnosis of spinal infection and to depict the typical radiological features that may be seen.

**Content:**

Classifications
- Anatomical:
- Vertebral column - with or without intervertebral disc involvement
- Facet joint
- Spinal canal
- Adjacent soft tissue
- Causation:
- Haematogenous spread
- Post surgery
- Direct spinal trauma
- Invasion from a surrounding infection

Review of cases and images, including a review of MR features
- Vertebral osteomyelitis
- Discitis
- Tuberculous disease of the spine
- Facet joint septic arthritis
- Cervical epidural abscess
- Lumbar paravertebral abscess
- Multilevel discitis, intradural abscess, paravertebral abscesses in an immunosuppressed patient

**Conclusion:**

Certain patterns of clinical features may lead to a suspicion of spinal infection, but MR has a crucial role in confirming the precise diagnosis. An understanding of MR appearances and review of interesting cases is of great importance in determining appropriate clinical management.

### P-002 Identifying cervical spine fractures in trauma patients

Clare Armstrong; Sarah Holt

*Sheffield Teaching Trust*

Cervical spine injury often has major implications for patients and has been reported in 2.4% of blunt trauma victims. Quickly and accurately assessing radiographs to identity any fractures or pathologies is vitally important in the acute trauma setting.

Cervical spine x-ray interpretation can seem a daunting task and key points may easily be forgotten. The poster aims to guide viewers through a step-by-step approach, covering the standard views performed and aiming to prevent missed fractures or pathologies.

This poster aims to act as concise visual resource on the interpretation of cervical spine pathology in trauma patients, utilising a relevant case report and current literature on the topic.

### P-003 Neoplastic spinal lesions

Emma Rudsdale; Philippa Tyler; Chandani Thorning; Ajay Pankhania; Stephen Gwyther

*East Surrey Hospital, Redhill; The Royal National Orthopaedic Hospital, Stanmore*

The general radiologist will frequently encounter vertebral lesions and must be able to identify aggressive lesions that require urgent biopsy and surgical management, while not over-investigating incidental and inconsequential benign lesions. Aggressive lesions are largely infective or malignant, and malignant lesions may be primary or secondary. The appearance of the lesion and its cortex and its evolution or progression is used to differentiate benign from aggressive.

Lesions are categorised according to their imaging characteristics on multiple modalities, and location within the spine.

Lesions can also be categorised according to cell of origin:

- osseous: osteoma, osteoid osteoma, osteoblastoma, osteosarcoma
- cartilaginous: osteochondroma, chondroblastoma, chondrosarcoma
- haematopoietic: plasmacytoma, multiple myeloma, lymphoma
- round cell: Ewing sarcoma
- vascular: haemangioma, Gorham's disease
- notochord: giant vertebral notochordal rest, vertebral chordoma
- miscellaneous: simple bone cyst, aneurysmal bone cyst, giant cell tumour, fibrous dysplasia, metastases

The diagnosis of vertebral lesions is dependent on both clinical and radiological findings. MRI is widely used to identify and diagnose vertebral lesions, and examples of MRI findings of common vertebral lesions are shown. Understanding the radiological findings will assist diagnosis of vertebral lesions and aid further management, including the need for biopsy.

### P-004 Accuracy of shoulder ultrasound versus shoulder arthroscopy in the detection of rotator cuff tears

Clare Groves; Amit Gupta; Danish Saeed; Muthusamy Chandramohan; Phil Wright

*Bradford Teaching Hospitals NHS Foundation Trust*

**Background** - Shoulder ultrasound is a cost-effective and non-invasive tool for the investigation of rotator cuff pathologies. Shoulder arthroscopy enables direct visualisation of the cuff and is regarded as the gold standard. A pilot study conducted by the senior authors showed a 69% correlation between ultrasound findings and those found on shoulder arthroscopy in 42 cases. Reporting practices were changed as a result of the initial audit in an attempt to prevent overcalling of cuff tears and reduce false positive results.

**Aims** - To close the audit cycle and reexamine the accuracy of shoulder ultrasound against shoulder arthroscopy in the detection of rotator cuff tears.

**Methods** - Patients whom had a shoulder ultrasound confirming a tear in the rotator cuff and followed by arthroscopic repair between November 2010 and October 2012 were identified from a database. Patients with rotator cuff tears were only included. A single surgeon performed all operations. The findings on the ultrasound scan were compared to those as found on arthroscopy. Patient demographics, side of injury, mechanism of injury and ultrasound operator were recorded. The following data points were noted for every ultrasound and shoulder arthroscopy: position (mid-substance, free edge or foot print) and location of cuff tear (supraspinatus / infraspinatus or subscapularis), whether the transverse humeral ligament was intact, presence of long head of biceps tendonosis and whether the ACJ was degenerative. The results were statistically analysed and reviews against the literature.

**Results** - 34 patients (35 shoulders) were identified. The results are currently being analysed.

### P-005 Improving the lateral elbow technique

Helen Adamson

*Mid Yorkshire Trust*

**Purpose**: To review the techniques for positioning lateral elbows in a single NHS trust

**Method**: An audit was carried out to compare the repetition rate of lateral elbow projections to other lateral projections in order to assess if it was one of the more commonly repeated projections in the Emergency Department. The current practices and problems with diagnostic quality were explored by interviewing

radiographers and reporting radiographers. The PA projection was analysed to evaluate its usefulness when imaging the elbow.

**Results**: The findings suggest that radiographers sometimes struggle to encourage patients to adopt the correct position and that the true centring point for a lateral elbow is not always used. It was found that the PA lateral elbow is believed easier to obtain for radiographers however reporting radiographers expressed that suboptimal PA projections can obscure the visualisation of fat pads, a reliable indicator of an occult fracture. The poster will present some case study examples of the effect of positioning on anatomy.

**Conclusion**: The lateral elbow projection has a high repetition rate and the alternative PA projection has the potential to obscure pathology if not positioned correctly. Visualisation of anatomy can be improved with the use of the correct centring point.

**Discussion**: Radiography is an integral aspect in the trauma setting and due to the elbow anatomy, fat pad visualisation is essential to ensuring correct diagnosis and patient management. Consequently high standards of image quality in the lateral elbow projection must be maintained.

### P-006 An anatomical illustration of chronic wrist pain using magnetic resonance (MR) images

Jalpesh Jethwa; Chun Lap Pang; Prageeth Dissanayake; Abdul Gafoor; Pyria Suresh

*Peninsula Radiology Academy, Plymouth NHS Hospital Trust, Department of Musculoskeletal Radiology, Derriford Hospital*

**Aims/objective**: Chronic wrist pain is a complex subject. A pictorial review of the complex ligamentous anatomy of the wrist and its interdependent relationship with the carpal bones, distal radius and ulnar would aid understanding.

**Content**: We aim to demonstrate the MR appearances of pathologies such as scapholunate ligament tears, lunotriquetral ligament and early avascular necrosis with normal corresponding plain films. These subtle pathologies may be missed if MR is not utilised. A further discussion would be held regarding how MR images can be used as a tool for pre-operative planning.

**Relevance/Impact**: Chronic wrist pain reduces productivity in the Western societies, especially when it occurs in the dominant hand or when it occurs bilaterally. Plain radiographs are traditionally used to assess the presence of positive ulnar variance and irregularity in the proximal lunate surface whereas fluoroscopy may be utilised to assess the dynamic wrist function. Exquisite bony and soft tissue images obtained via MR images and MR arthography are increasingly advocated as the second-line investigation.

**Discussion**: A comprehensive knowledge of ligamentous wrist anatomy and its correlated pathologies would allow readers to appreciate the different causes of chronic wrist pain such as occult bony injury, triangular fibrocartilage tear, ligamentous injury, tendon pathologies, ganglion cysts and nerve entrapments.

### P-007 A magnetic resonance (MR) pictorial review of meniscal tears: Thirteen common pitfalls

Jalpesh Jethwa; Prageeth Dissanayake; Chun Lap Pang; Abdul Gafoor; Priya Suresh

*Peninsula Radiology Academy, Plymouth NHS Hospital Trust, Department of Musculoskeletal Radiology, Derriford Hospital*

**Aims/Objective**: Specific magnetic resonance (MR) signs alert radiologists to the possibility of a meniscal tear. Misinterpretation of anatomical structures or artefacts can lead to an unreliable diagnosis of meniscal injury. We aim to highlight the awareness of common mimics and pitfalls in MR knee images.

**Content**: A comprehensive review of MR imaging of the meniscus provides the basis. A focused selection of cases and relevant MR slices would illustrate the easily avoidable errors during meniscal tear evaluation.

**Relevance/Impact**: Recognising the mimics and pitfalls related to meniscal tear diagnosis will improve the accuracy of MR image interpretation. This reduction in false positive diagnoses can reduce the number of patients undergoing avoidable diagnostic/therapeutic arthroscopic procedures.

**Discussion**: MR imaging is now an indispensable tool to guide orthopaedic surgeons in the treatment of meniscal injuries because it characterises both menisci and neighbouring structures and alerts the surgeons to areas of

abnormality not easily seen at arthroscopy. Some mimics can be easily differentiated from tears, including the meniscofemoral ligament, the popliteus tendon sheath, the lax meniscal sign (buckled meniscus), diffuse meniscal oedema, Pseudo bucket-handle tear and magic angle effect. A thorough understanding of the relevant MR anatomy would improve the diagnostic accuracy of meniscal tears.

### P-008 A pictorial review of SLAP tears using MRI with surgical correlation

Jalpesh Jethwa; Prageeth Dissanayake; Chun Lap Pang; Priya Suresh; Abdul Gafoor;

*Peninsula Radiology Academy, Plymouth NHS Hospital Trust, Department of Musculoskeletal Radiology, Derriford Hospital*

**Aims/Objectives**: We aim to illustrate the relevant imaging findings that contribute towards a radiological diagnosis of a superior labral anterior to posterior (SLAP) tear. The gold standard for diagnosis remains surgical; we aim to illustrate the correlation between intra-operative and radiological findings.

**Contents**: This poster will review the common mechanisms of injury that lead to SLAP tears, the presenting features and the relevant radiological findings of a SLAP tear. Normal variants and other conditions that may mimic or need to be considered will also be reviewed.

**Relevance/Impact**: Superior labral anterior to posterior tears affects the superior glenoid labrum and is associated with non-specific shoulder pain. SLAP tears are not routinely detected by ultrasound or standard MR and can therefore lead to a delay in diagnosis.

**Discussion**: The role of the radiologist is to provide the referring clinician with an appropriate investigation pathway to both arrive at the diagnosis as well as to provide pre-operative planning. A detailed understanding of SLAP tears and their mimics would reduce diagnostic delay thereby streamlining the patient's clinical pathway to definitive treatment and recovery.

### P-009 Femoro-acetabular Impingement: Radiological and arthroscopic correlation

C Marsh; D A Hoad-Reddick; R Magennis

*Alexandra Hospital, Cheadle*

**Background**: Femoro-acetabular impingement (FAI) is a recognised cause of hip pain, particularly in the young athletic population. Arthroscopic intervention aims to restore normal anatomy and facilitates labral and chondral assessment and repair.

**Objectives**: To correlate the MRI and intraoperative arthroscopic findings.

**Methods**: A single surgeon series of 100 consecutive hip arthroscopies: 52 male and 48 female patients (mean 36 years) performed for symptomatic FAI were studied. All cases had undergone radiological investigations including Plain film and non-arthrographic MRI, the majority in the same hospital with identical scan protocols and single reporting Radiologist.

**Results**: Macroscopic findings from surgical records were correlated with reported radiological findings. All arthroscopies were abnormal, showing findings consistent with FAI, including chondrolabral separation, carpet delamination, synovitis, ligamentum teres tears and both pincer and cam type osseous anatomy. Radiological findings on MRI correlated well with arthroscopic findings in cases of large chondral defects and labral tears and the presence of joint fluid helped delineation of key structures.

**Conclusions**: MRI findings in patients with positive clinical signs of FAI correlated well with intraoperative findings. We demonstrate common radiological findings and correlate these with intra operative images and discuss the role of non-arthrographic MRI in this rapidly developing field in orthopaedics sports medicine practice.

### P-010 Understanding the plain film in femoroacetabular impingement and a review of the current literature and practices

Jalpesh Jethwa; Tania King-Mohammad; Abdul Gafoor; Priya Suresh

*Plymouth Hospital NHS Trust*

**Aims/Objectives:** To increase the awareness and confidence of Radiologists and Radiology trainees in the interpretation of the plain film when considering a diagnosis of femoroacetabular impingement (FAI).

Content: The poster will illustrate different types of FAI and the key findings seen on plain films. It will cover acetabular and femoral head morphology, associated FAI signs and relevant measurements such as alpha angle and femoral head neck offset. A further discussion on the relevance of diagnosing FAI and current practices will be held.

**Relevance**: The diagnosis of FAI is often first suggested by plain films performed for either non-specific hip pain or suspected FAI. Confidence in the interpretation of these plain films can be improved by increasing awareness of the relevant diagnostic signs and measurements available from the humble plain film without necessitating a second opinion from a musculoskeletal Radiologist.

**Discussion:** FAI is a comparatively new entity particularly with regards to the evolving surgical techniques in its management and is a major cause of early osteoarthritis in young people. Limitations in awareness and confidence in diagnosing FAI can easily be rectified by understanding the relevant criteria on plain pelvic radiographs. This bares significant importance in the young patient with hip pain and/or reduced hip motion and provides the possibility of early surgical intervention prior to the development of degenerative change.

### P-011 Law of the Rings -The invisible pelvic fractures revealed

Tamir Ali; Samantha Saikia

*Royal Victoria Hospital, Newcastle*

**Aims/Objectives**: We aim to highlight the importance and the known diagnostic difficulties synonymous with the diagnosis of subtle ligamentous pelvic injuries.

**Content**: Cases from a major trauma centre illustrating key findings in unstable pelvic fractures and common diagnostic pitfalls. Complications secondary to unstable pelvic fractures are addressed.

**Relevance/Impact:** Unstable pelvic fractures are frequently seen in high impact traumas. They can have serious complications including life threatening haemorrhage, nerve damage and genitourinary injury. Their prompt diagnosis will aid timely interventions Pelvic binders have a crucial role in temporary stabilisation of suspected pelvic fractures preventing exaggeration of injury and aiding haemostasis. However they are also very affective in masking pelvic ring fracture. High force pelvic fractures are commonly associated with other injuries that may also act as distracters. Radiologist should be aware of these common pitfalls.

**Outcomes**: To raise awareness regarding the importance and the diagnostic difficulties related radiological identification of ligamentous pelvic injury, which is further hindered by the now widespread practice of routine pelvic binder use. By sharing examples from our local experience we aim to emphasize the importance the “law of the rings” that usually necessitates active exclusion of further fracture/ligamentous injury when ever a single pelvic ring fracture is identified.

**Discussion**: Unstable ring fractures account for 20% of pelvic fractures. Haemorrhage is the leading cause of death in unstable pelvic fractures. With the increase use of acute trauma CT, it is paramount that radiologist can reliably diagnose these injuries so that appropriate treatment is instigated.

### P-012 The effect of diagnostic ultrasound in patients referred with vague groin symptoms

Afaq Siddiqui; S A Rahman; Nidhi Jain; Sridhar Kamath

*Harrogate District Hospital; University of Hospital of Wales, Cardiff*

**Background**: Introduction of ultrasound into clinical practice acts as an important adjuvant in evaluating patients with occult groin pain. Prior to the advent of ultrasound, diagnosis of groin hernia was by patient history and clinical examination. In current clinical environment, clinicians rely on ultrasound as a primary imaging modality to confirm clinical findings and to eliminate unnecessary intervention and morbidity.

The aim of this study is to evaluate the effect of ultrasound in diagnosing groin hernia among these patients.

**Methods**: Retrospective data collection using electronic database over a period of four months with a mean follow-up of 18 months.

**Results**: Total ultrasound scans were 95. Median age: 51 years. Male to female ratio: 7:3. The referrals ratio for GPs to Hospital specialties was 5:4. Positive hernia finding on scan were 39, negative 50, inconclusive 6. Two patients with negative ultrasound underwent surgical exploration for possible hernia and established to have a hernia in one patient (1% false negative). 20 patients with positive scans had conservative treatment and 19 underwent surgical repair. All the operated femoral hernia and 95% of inguinal hernia were confirmed as per the ultrasound reports. 3 patients from the inconclusive group (50%) underwent hernia surgery.

**Conclusion**: The accuracy of ultrasound in diagnosing groin hernia is comparable to published standards with no false positive results. However, we recommend that ultrasound referral should be used judiciously to improve efficiency. Patients with inconclusive and negative ultrasound would benefit from clinical re-evaluation and should be treated accordingly.

### P-013 The avoidance of radiation exposure by following RCR guidelines and Ottawa Rules in performing ankle radiographs

Waheedullah Mustafa; Dinnish Baskaran; Qaiser Malik; Syed Rahman

*Basildon and Thurrock University Hospital*

**Background**: Ankle radiographs are commonly requested x-rays comprising 10% of all radiographs obtained on emergency patients. The Royal College of Radiologists (RCR) recommend traumatic ankle radiographs when clinical features fulfil the Ottawa rules. These are a set of criteria formulated to prevent inappropriate ankle x-ray requests and reduce preventable radiation exposure. They state that in the context of trauma, a bony ankle injury is likely if the patient has inability to weight-bear immediately and in the emergency room or if there is tenderness over the posterior edge or tip of either lateral or medial malleolus.

**Aims and Methods**: We aimed to audit the appropriateness of ankle x-ray request in light of recommendations by the RCR and the Ottawa Rules. We Reviewed 200 consecutive traumatic ankle radiograph requests with a view to achieving standards of 100%.

**Results**: 79% of requests emerged from the emergency department, 18% from the General Practice and 3% from other hospital clinicians. 43% of total ankle radiograph requests did not meet the criteria of the Ottawa rules with General Practioners and Emergency department clinicians having 47% and 43% of inappropriate requests respectively.

**Conclusion**: A large proportion of ankle x-rays are inappropriately requested with respect to provided clinical information. We aim to improve clinical practice by emphasising RCR guidelines to respected clinicians through oral presentations, educative posters, algorithms and introduction of a proforma to aid request decisions. Implemented interventions will be reviewed through a re-audit with a view to improving clinical practice and reducing unjustified patient radiation exposure.

### P-014 Recognizing nail-patella syndrome- when genetic mutation meets the eye

Reem Bedair; Tarek Al-Zayat

*Cairo University, Medical Sciences Division, Department of Radiology; Al-Azhar University*

**Objectives**: This pictorial review illustrates the plain film imaging features of nail-patella syndrome (NPS) - also known as HOOD's disease. Even with its low incidence rate estimated at 1/50,000, plain film imaging plays a pivotal role in detection of the condition.

**Content**: Presenting with only an insidious onset of low back and knee pain with no definitive history of recent trauma or operation, this case review shines a light on a missed NPS diagnosis. In our series, the syndrome was overlooked during early childhood whilst in fact having been recessive in a whole family line.

**Relevance**: An outline of the typical appearance and X-ray imaging patterns enable the systematic and logical approach to differentiating the diagnoses. Reporting on the imaging features collectively enhances the understanding and knowledge on NPS. Advanced imaging techniques (e.g. MRI of the joints) and genetic typing was needed for confirmation as well as the genetic screening of the rest of the family.

**Discussion**: Although patient symptoms were quite subtle with clinical signs varying from the literature, Nail-Patella Syndrome diagnosis on radiological basis became quite conclusive when whole body joint plain film imaging was performed. This poster reviews the findings on the first line imaging modality for a case of NPS with recommendations on the line of management and differential diagnosis.

### P-015 Utility of low field strength MRI in the evaluation of tuberculous spondylitis

Donald Nzeh; Olalekan Oyinloye

*Department of Radiology, University of Ilorin, Ilorin, Nigeria*

**Background**: Tuberculosis (TB) of the spine has a high prevalence in developing countries. About 90% of magnetic resonace imaging (MRI) scanners available in Nigeria are low field MRI scanners due to unreliable public power supply.

**Materials and Methods**: Thirteen patients with clinical and MRI features of tuberculous spondylitis were studied.

Images were acquired with, 0.2 Tesla Siemens Magnetom Concerto MRI scanner.

T1W and T2W spin echo sequences with T1W post-gadolinium sequence were routinely done. STIR sequences were sometimes included. Images were acquired with T1-weighted spin echo, 400 to 500/12 to 20

(TR/effective TE), matrix size 512x512, 300mm field of view, 11 slices of 4.5mm thickness and T2-weighted spin echo 2,900 to 3,450/100 to 141 (TR/effective TE), matrix 512x512, 270mm field of view, 11 slices of 4.5mm thickness.

**Results**: Ten patients (76.9%) were males while 3 patients (23.1%) were females. Mean age of patients was 44.8 ±16.8 years (range: 25- 75years). Eleven cases (84.6%)cases had wedge collapse of either one or two vertebrae. Vertebra plana was present in one case (7.7%). Spinal cord edema was present in 12 cases(92.3%). Pre or paravertebral abscess was seen in 11 cases (84.6%). Nine patients (69.2%) had spinal cord compression. Two cases (15.4%) had nerve root compression.

**Conclusion:** Low field strength MRI scanner is capable of producing images of diagnostic quality in the management of tuberculous spondylitis.

### P-016 To evaluate the quality of request for musculoskeletal ultrasound from GPs

Afaq Siddiqui; David Sapherson; Jon Sharpe

*Harrogate District Hospital*

**Background**: In recent decades Ultrasound has emerged as a useful imaging technique for evaluating soft tissue and joint related abnormalities. Introduction of open access service to GPs for requesting musculoskeletal ultrasound has resulted in increase waiting times for musculoskeleletal ultrasound and also contributed to increase workload. There are limited guidelines for referral and making best use of clinical radiology services (MBUR) published by RCR is to ensure patients receive timely accurate diagnoses and also to ensure the efficient and even use of available diagnostic resources.

**Aim**: To asses whether GP referrals are compatible with RCR and locally agreed guidelines and to determine if the request was appropriate and sufficiently detailed. It is expected that request achieve 100% compliance.

**Methods**: Retrospective audit of 110 patient using Rad centre and IMPAX software.

**Results**: Ultrasound request examined 110, Male; female ratio 1;1.3, Median age: 52, time for scan (Median: 21 days). Request for ultrasound shoulder forms the bulk of imaging about 47% followed by foot 30%. Clinical history was adequate in 81% request form and 11% examination request did not mention clinical queries. Positive finding on scan was 70%. 33 % of patient had no X-ray prior to scan.

**Conclusions**: Details on request form for musculoskeletal ultrasound were not 100% compliant as laid by RCR. Adequacy of the referral forms helps in reducing workload and waiting time for musculoskeletal **Conclusion** ultrasound. Its aids in decision making and in answer clinical queries accurately during scanning. It can be use for auditing, research and in medico legal issues.

## Clinical: Head and neck

### P-017 A pictorial review of sclerotic lesions of the skull base

Elizabeth Kneale; Benjamin Pinkey; Huw Lewis-Jones; Rebecca Hanlon

*University Hospital Aintree, Liverpool*

**Aims/Objectives:** To provide a pictorial review of common and uncommon sclerotic bone lesions found in the skull base.

**Content:** This pictorial review aims to demonstrate our local experience of sclerotic bone lesions referred to our tertiary centre skull base MDT. There is a wide variety of pathology that causes sclerosis in the skull base. This review will cover both common and uncommon pathologies.

**Relevance/Impact:** The skull base is an important review area in head imaging. Sclerotic lesions are commonly found and referred to our skull base MDT. During a patients work up they undergo numerous radiological investigations which are reviewed by specialist radiologists. Firstly it is important to establish that the sclerosis is pathological and not related to anatomical variance. Secondly the radiologist needs to discriminate between benign and malignant causes of sclerosis.

**Outcomes:** The cases were acquired over a five year period. The skull base MDT occurs on a fortnightly basis. Cases were selected to encompass the wide spectrum of benign and malignant sclerotic bones lesions. We present more than 10 cases of pathology, which include ivory osteoma, fibrous dysplasia, chondrosarcoma and metastases. These pathologies will be presented in a variety of imaging modalities including plain film, isotope bone scans and CT.

**Discussion:** This pictorial review aims to be an aid memoir to all radiologists and clinicians dealing with sclerotic skull base lesions. It demonstrates the huge variability in pathology and emphasises that the skull base can be an uncommon site for common sclerotic bone lesions.

### P-018 Imaging of salivary gland tumours

Senthil Kumar Muthu; Praveen Govind

*Wrexham Maelor Hospital, Betsi Cadwaladr University Health Board*

**Aim:** We aim to review the normal anatomy of salivary glands with illustrations of US, CT and MR images. Discuss the role of imaging and imaging findings of salivary gland tumours.

**Background:** Salivary gland tumors consist of a group of heterogeneous lesions with complex clinico-pathological characteristics. We aim to illustrate the spectrum of the ultrasound (US), computed tomography (CT) and magnetic resonance (MR) in evaluating the major and minor salivary glands. Ultrasound is often the first step in imaging salivary gland pathologies and has proved to be the imaging of choice for obtaining diagnosis by fine needle aspiration and biopsy. CT continues being a useful for staging malignant disease and also as a complementary tool to MR. MRI imaging in most of the cases is superior in assessing a better lesion's characterization, local involvement and demonstrating perineural spread and infiltration of the skull base.

**Conclusion:** Imaging of salivary gland tumors is a challenge for radiologists due to the great variety of differential diagnoses. Tissue diagnosis is essential along with some clinical aspects and imaging features to decide the management and for surgical planning of the lesions.

### P-019 Tumoral calcinosis: what the general radiologist should know

Christopher Hilditch; Mike Crotch-Harvey

*Radiology department, Macclesfield District General Hospital*

Tumoral calcinosis is a rare hereditary condition characterised by painless calcific peri-articular masses. The prevalence of the condition is unknown, but is extremely uncommonly encountered by clinicians and radiologists alike.

The radiologist is usually the first person to elude to the diagnosis and a basic understanding of the imaging characteristics and the definitions is invaluable to the general radiologist who may incidentally find a case in their reporting pile. Recognition would save unnecessary referrals and unneeded imaging.

Here we present a literature review and case study of idiopathic of tumoral calcinosis. We describe the imaging findings, the clinical diagnostic criteria and the aetiological definitions. We make special reference to the more uncommon manifestation of tumoral calcinosis of the head and neck.

We will also present a case of our own who presented to both the oral and maxillofacial surgeons and the neurosurgeons. The patient presented with multifocal and painful masses over her hips, sacrum, cervical spine and mandible. The masses displayed rapid growth. The patient provoked such diagnostic dilemma that she was passed through a head and neck and a neuro-radiology MDT at regional tertiary centres before the correct diagnosis was reached by a general radiologist at a district general hospital.

## Clinical: Neuroradiology

### P-020 Management of sudden onset severe headache

Mirae Shin; Faisal Rahman; Julie Chandra; Gerardine Quaghebeur; Bheeshma Rajagopalan

*John Radcliffe Hospital, Oxford*

The traditional teaching on diagnosis of subarachnoid haemorrhage(SAH) is based on previous reports that computed tomography(CT) would be expected to miss approximately 1 in 20 SAH. In patients with high clinical suspicion and negative CT, lumbar puncture(LP) is performed. More recent data, however, suggests that the sensitivity of CT can be up to 100% when performed within six hours of symptom onset.

We carried out a retrospective observational case-note study of 227 patients who had a CT for suspected diagnosis of SAH over a one year period. 129 female and 98 male patients were identified with mean age of 47.6 years. Collected data included the timing of onset of symptoms, delay to presentation, symptoms and examination findings, vital observations, timing of subsequent investigations, and eventual diagnosis. Of the 227 patients identified, 30 had diagnosis of SAH on CT. Mortality rate among these patients were high(46.7%). 4 patients(1.8%) had another type of intracranial haemorrhage. Another abnormality was identified in 23(10.1%). 170(74.9%) had a normal CT. Of these 170 patients with a normal CT, 96 patients(56.5%) had a LP. 2 of these patients had positive xanthochromia, but neither had final diagnosis of SAH. Follow up of the remaining 74 patients to date revealed no mortalities – making diagnosis of SAH unlikely.

In combination with the reported data, this throws into question the added value of LPs in ruling out SAH. Can we use the timing of presentation and initial findings to avoid LPs in a select group?

### P-021 An a la carte menu of neuroradiology signs

Amit Parekh; Shelley Renowden

*North Bristol NHS Trust*

**Introduction**: Certain pathological conditions have classic radiological appearances that are associated with food. These food signs are often quite specific and sometimes pathognomonic of these conditions. They can also be easily recognisable and memorable, helping a radiologist to make confident diagnoses, sometimes based on radiological findings alone. We therefore decided to host a neuroradiology banquet, presenting some of these signs in a delightful three course menu.

**Content**: We present a mouth watering á la carte menu which will include appetisers (cottage loaf, sandwiches and onion skin), mains (hamburgers, scallops and linguini) and desert (ice cream cone and berries). Each delicious dish will be accompanied with radiological examples giving a flavour of each sign and the condition it represents.

**Discussion**: This poster will provide a taste of some of the signs related to neuroradiological conditions. A review of these signs will remind radiologists about the appearances of conditions encountered in neuroradiology.

### P-022 Cerebral microhaemorrhages – are they all the same?

John Morlese; Helen Estall; Valter Fracarro; Sreema Harieaswar; Arshad Khan; Sumit Gupta

*University Hospitals of Leicester*

**Aims**: To describe the pathophysiology behind cerebral microhaemorrhage

To describe the different MR techniques used to identify cerebral microhaemorrhages.

To describe the differential diagnosis of cerebral microhaemorrhages.

**Contents**: A pictorial review of the causes of cerebral microhaemorrhages(CM) will be presented. We will highlight the different patterns of CM that enable a potential diagnostic cause to be elucidated.

First, we will describe the MR imaging techniques used to demonstrate CM. Then we will describe the imaging pitfalls such as calcifications and vascular flow voids.

We will then discuss the MR differentiation of the causes of CM including, hypertensive cerebral angiopathy, cerebral amyloid angiopathy, postradiotherapy angiopathy, neurovasculitis, diffuse axonal injury, cavernoma, septic emboli, haemorrhagic metastases and cerebral autosomal dominant arteriopathy with subcortical infarcts and leucoencephalopathy (CADASIL).

**Relevance/discussion:** Cerebral micorhameorrhages are increasingly detected on MR brain examinations. A detailed understanding of the pathophysiology and imaging diagnostic clues will help the radiologist to arrive at the correct diagnosis.

### P-023 Signs of early ischaemia on CT head scans

Amit Parekh

*North Bristol NHS Trust*

**Introduction**: Stroke is a common diagnosis encountered by radiology trainees with ischaemic stroke accounting for 80% of cases. CT is the primary modality for imaging stroke patients. It is used to detect stroke mimics and identify areas of reversible and irreversible damage due to ischaemia. Recognition of the early signs of ischaemia on CT is crucially important in order that therapies like endovascular clot retrieval and thrombolysis , which have been shown to improve prognosis, can be administered. Therefore, it is important that radiology registrars are aware of the subtle, early signs of ischaemic stroke which can often be overlooked on CT.

**Aims**: This poster aims to inform radiologists and registrars about the early signs of ischaemia and the key review areas related to stroke on CT.

**Content**: The poster will describe the four main ancillary signs of early, acute stroke on CT. These are the insular ribbon sign, the hyper-dense vessel sign, loss of grey white matter differentiation and the cortical ribbon sign. Each sign will be displayed with diagrams and examples. CT images will be correlated with corresponding MR images to illustrate ischaemic damage. There will also be a discussion about what each sign represents, its clinical significance, and the best method of identification on CT.

**Discussion/conclusion**: Detecting stroke early can improve prognostic outcomes. This poster serves to remind radiologists about the early signs of stroke which can be easily missed on CT.

### P-024 Stroke mimics

Rebecca Hunt; Rebecca Geach; Shelley Renowden

*North Bristol NHS Trust*

**Aim**: To illustrate the CT and MRI appearances of clinical conditions which mimic acute ischaemic infarction.

**Relevance**: Acute stroke is a leading cause of morbidity and mortality worldwide and accounts for approximately 11% of deaths in the UK. Prompt identification of symptoms coupled with early assessment and treatment with thrombolysis/anticoagulation in appropriate cases have significantly improved patient outcomes. There are a number of conditions which present with a similar clinical picture as ischaemic stroke and identifying these alternative pathologies is crucial. Common mimics such as hypoglycaemia and seizure must be identified clinically, but many diagnoses can be identified radiologically. Detection of stroke mimics prevents the inappropriate use of thrombolysis and helps guide prompt, appropriate management.

**Content**: We illustrate the radiological appearances of common mimics of acute ischaemic stroke on plain and contrast enhanced CT and MRI including diffusion weighted imaging. These comprise other vascular causes such as

haemorrhage and venous infarction and non vascular causes including neoplasms, infection, inflammatory processes and toxic and metabolic conditions.

**Conclusion**: The radiologist is vital in identifying conditions which mimic acute ischaemic stroke. This helps to prevent the inappropriate administration of thrombolysis and direct clinical management. This pictorial review illustrates common and important radiological mimics.

### P-025 Spinal cystic disease: a pictorial review

Iain Macleod; Tom Meagher; Luis Lopez De Heredria; Richard Hughes

*Department of Plastic Surgery, Stoke Mandeville Hospital; Department of Radiology, Stoke Mandeville Hospital*

**Aims**: Spinal cysts have an incidence of approximately 1%. They are commonly found incidentally on imaging but may be symptomatic and can be associated with vague and variable symptoms. This poster will summarise the various types of cyst found in the spine, and highlight their imaging features and classification where appropriate.

**Method**: Pictorial review

**Discussion:** Spinal cysts can be classified as congenital or acquired. Congenital cysts can form because of structural abnormalities (such as an Arnold-Chiari malformation) that obstruct CSF flow, or due to structural defects in the meninges. Acquired cysts are usually secondary to local inflammation, caused by trauma, infection, or tumour. Diagnosis can be delayed due to the late development of the cyst, and symptom crossover with the original lesion.

The main imaging tool in the diagnosis and assessment of these lesions is MRI. The location of the cyst in relation to the spinal medulla and meninges is important in diagnosis, but not specific. Cyst appearances will be determined by internal content; usually CSF-like (hypointense on T1, hyperintense on T2). However varying protein and fat levels, or the presence of dermal appendages, can change this. MRI is also useful in detecting the presence of associated malformations. CT has a role in assessing secondary changes in the bony spine, and CT myelography is important in characterising meningeal cysts.

**Conclusion:** Accurate imaging interpretation of spinal cystic disease is key to establishing likely diagnosis and guiding appropriate management.

### P-026 Spinal cord diseases – a MR diagnostic approach

John Morlese; Arshad Khan; Nadeem Qazi; Atique Imam

*University Hospitals of Leicester; Imperial College Healthcare NHS Trust; Great Western Hospitals NHS Foundation Trust*

**Aims:** To describe the pathophysiology of the differential diagnosis of spinal cord diseases.

To describe the differentiating MR features of the important spinal cord diseases.

**Contents:** Spinal cord diseases are not uncommon in radiological practise. The spinal cord can be affected by a myriad of different pathological processes. Most of these result in T2 hyperintense lesions. Therefore, the morphology and topographic location of these lesions becomes central to differentiating between the different pathological processes.

We will present a pictorial review of the major diseases affecting the spinal cord. We will focus on demyelination, inflammatory, tumours, posttraumatic and vascular causes.

We will highlight the important differential diagnostic MR patterns of spinal cord disease. Also, we will highlight the important clinical history and examination features that help narrow the differential diagnosis.

The differential diagnosis of cord abnormalities include; cord infarction, syrinx, multiple sclerosis, acute disseminated encephalomyelitis, neuromyelitis optica, transverse myelitis, cord tumours (including, astrocytoma, ependymoma, haemangioblastoma and metastases), infectious and post traumatic myelopathy and subacute combined degeneration of the cord.

**Relevance/ discussion:** The MR imaging of spinal cord diseases can be challenging. We will provide an approach to the interpretation of spinal MRI to help the radiologist to accurately diagnose the clinical condition.

### P-027 Lumbar puncture CSF sampling of suspected subarachnoid haemorrhage following a negative CT head

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**Background**: Subarachnoid haemorrhage is a medical emergency with a recognized high mortality. A negative CT head does not fully exclude subarachnoid haemorrhage. Therefore obtaining a lumbar puncture following a negative CT head is a practice that is widely considered a must.

**Aims**: To assess our local compliance with local guidelines necessitating a lumbar puncture in all patients admitted suspected of suffering a subarachnoid haemorrhage where a CT head is found to be negative.

**Methods**: All patients undergoing an emergency CT head with a history stating or indicating a working diagnosis of acute subarachnoid haemorrhage over a period of 6 month were included. The hospital's electronic laboratory records were reviewed to establish if an LP was performed in accordance with the local guidelines.

**Results**: 49 patients with negative CT for SAH were identified (mean age = 45.71, range 19-96 years). 81.63% (n=40) were females. In 46.93% (n=23) an LP was performed (LP group mean age = 43.17, range 24-61 years). Of these, 86.96% were females. This indicated that younger females were more likely to undergo an LP.

**Discussion**: LP is 100% sensitive in the diagnosis of SAH and is hence recommended in all patients suspected of SAH following a negative CT head.

Our audit identified significant room for improvement in our practice. We aim to raise awareness with these short falls with a re-audit planned after an interval period where we will also assess the notes to review if the decision not to do an LP had a documented justification.

### P-028 Preoperative tumour volume and its effect on survival in adult patients with cerebral glioma

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*University of Nottingham*

**Background and Purpose**: The prognostic value of preoperative tumour volume in adult patients with cerebral glioma remains questionable. Tumour volume can be measured using different approaches, each with their individual set of advantages and disadvantages. What's more is the increasing use of high resolution MRI, especially in the avenue of medical research. This study explored the predictive value of preoperative tumour volume in adult patients with low-grade and high-grade cerebral glioma. Two different methods of volume measurement were investigated, together with the use of both low-resolution and high-resolution MRI.

**Methods**: 64 MRI scans from 43 adult patients with cerebral glioma were analysed retrospectively. Preoperative tumour volume was measured using two approaches: the geometric (ellipsoid) method, and the semi-automated segmentation (volumetric) technique. Measurements were performed on both high-resolution and low-resolution post-contrast T1-weighted MR images. Volume measurements were compared between the two methods utilised and the two MRI datasets. Survival analysis was performed using the Cox proportional hazards model, with overall survival (OS) and time to progression (TTP) used as clinical endpoints.

**Results**: Measurements performed using the ellipsoid method were significantly overestimated. Volumetric measurements were comparable between the low-resolution and high-resolution datasets. Survival analysis did not identify preoperative tumour volume as a prognostic factor for OS or TTP.

**Conclusions**: This small study suggests the ellipsoid method overestimates volume. Volumetric measurements on low-resolution MR images are comparable and therefore a practical alternative to volumetric measurements on high-resolution MR images. Although preoperative tumour volume failed to predict survival, further cohort studies are undoubtedly required.

### P-029 Extra-axial collections: A practical CT/MRI guide for general radiologists to avoid life threatening misdiagnosis

Valter Stefano Fraccaro; Arshad Khan; Sreemathi Harieaswar; John Morlese

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In the last two decades the workload of radiologists reporting emergency scans has become increasinglydemanding due to the large increase in the numbers of acute CT brain scans.

Extra axial collections are very common conditions inthe A&Eclinical setting and could be broadly categorized into the extradural, subdural and subarachnoid spaces.

Whilst extradural and subarachnoid located lesions are quite easy to recognize, subdural collections could be often misinterpreted as innocuous medical conditions when they are actually acute and potentially life threatening in nature. We will also emphasize the differentiating features between true extra-axial collections from mimics such as pseudo-extra-axial collections that occur with brain atrophy and intracranial hypotension syndrome.

The imaging and pathophysiology characteristics of extra-axial collections will be discussed. We will describe the anatomical explanation of the differential diagnoses. We will emphasize the following conditions: Epidural haematoma,Subdural haematoma (acute, chronic, acute on chronic), Subdural hygroma (acute and chronic),Intracranial hypotension syndrome and Cerebral atrophy as a cause of confusion in diagnosis of extra-axial collections.

The potential misdiagnosis between chronic subdural and acute hygroma, bilateral chronic subdural and intracranial hypotension, chronic hygroma or chronic subdural and uni- or bilateral brain atrophy will be addressed giving to the general radiologist a practical work guide.

### P-030 A comparison of endovascular intervention to surgical clipping for subarachnoid haemorrhages - a retrospective audit

Rukhtam Saqib; Toby Williams

*University of Manchester; Salford Royal Hospital*

**Background**: Subarachnoid haemorrhages (SAH) has upto a 60% mortality within the 1st 30 days. The two established management strategies are endovascular intervention and surgical clipping. Our aim was to compare the outcomes of endovascular intervention to surgical clipping and to establish the preferred treatment.

**Methods**: For the 1st audit, 212 consecutive patients were identified using the SAH referral database between a year's period. For the re-audit, 73 consecutive patients were identified in a 6 month period in the following year. Electronic patient records were used to obtain patient demographics, clinical findings, radiology reports and follow up.

**Results**: Success rate of endovascular intervention was 94%/91% for the initial audit/re-audit respectively. Success rate for surgical clipping was 86%/76%. 94%/81% of SAH were aneurysmal, 4%/15.1% non-aneurysmal and 2%/1.4% dural AV fistula and AVM. The majority of the aneurysms were located in the anterior communicating and middle cerebral arteries for both audit cycles. Overall mortality was 11%/22% with 81% grade 4-5 WFNS in the re-audit.

**Conclusion**: The success rates were in line with national standards for both treatments in both audit cycles. Surgical clipping was favoured for more complex cases and this may account for its decreased success rate and increased mortality. Elective treatment of aneurysms were mostly managed with endovascular intervention which would also account for the variation in success and mortality between coiling and clipping. Endovascular intervention remains the preferred method of treatment for uncomplicated aneurysmal SAH at our hospital. Weekly neurovascular MDT meetings allow improve patient selection for both treatments.

### P-031 Seeing straight? A radiological perspective on visual pathway lesions

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**Aims/objectives:** Anatomic -radiologic description of visual pathway lesions presenting with visual symptoms

**Content**: Classically, in the clinical evaluation of visual symptoms, certain clinical features would lead a medical practitioner to a relatively accurate diagnosis. With further advances in neuroradiology, we look at a variety of common lesion that can present vision alteration with a look at the typical and atypical MRI and CT imaging findings correlated to anatomy and differentials to be considered. An emphasis on the radiologic- clinical correlation and anatomy is made. From tumours as simple as petrous bone meningiomas and metastatic malignancy to segmental

infarction are described pictorially with the clinical presentation. Emphasis is also made on the use of contrast to highlight otherwise subtle lesions .

**Relevance**. The features of common visual problem presentations such hemianopia, nystagmus or neglect are essential in the anatomic search and radiologic evaluation and diagnosis . However, any given particular presentation can be due to a number of lesions along the visual pathway and this poster gives illustrative examples.

### P-032 Axial FLAIR MRI imaging for reassurance in the outpatient neurology setting

Peter Strouhal; Mark Blakeman

*Royal Wolverhampton Hospitals Trust*

**Background**: Brain scans are often performed to reassure patients that headaches that no serious underlying pathological exists, despite no such recommendations from recent NICE or RCR guidelines. Many such patients are relatively young, so ALARA dose minimisation prompted local protocol review: Single sequence axial FLAIR MRI was proposed in lieu of CT for increased sensitivity yet still not having heavy resource implications.

**Method**: 500 'young' patients prospectively selected with "scan for reassurance" as primary indication; images correlated with clinical records.

Results: Median patient age was 37y (range 15y to 48y); commonest presenting symptoms were headache (95%) and nausea (11%). No significant lesions were detected. 1.8% had incidental findings (images will be shown on poster). Additionally, 20% overall had sinus disease which may be pertinent.

**Conclusion**: Single sequence FLAIR imaging can exclude serious pathologies without ionising radiation, without excessive consumption of MR resources and without raising significant diagnostic dilemmas with incidental findings. The programme continues recruiting to clarify the advantages and explore the limitations of the method.

### P-033 Congenital perisylvian syndrome

David Woodlock; Ahmed Ismail

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Perisylvian syndrome, also known as Opercular syndrome, can present with epilepsy, pseudobulbar features (difficulty chewing and swallowing), facial muscle paralysis, intellectual disability and delayed speech and language development. It is a neurological disorder which can be acquired due to a lesion of the anterior operculum, e.g. secondary to an infarct or, rarely, congenital. Anatomical structural abnormalities include polymicogyria of the cerebral cortex and increased cortical thickness at the Sylvian fissure. The condition is usually diagnosed in early childhood. Brain MRI is necessary for an accurate diagnosis of congenital perisylvian syndrome, which can be either unilateral or bilateral. We present 3 cases of paediatric Perisylvian syndrome, one of which is unilateral and the other two bilateral, and discuss the MRI features peculiar to that syndrome with a hint at the genetic background.

## Clinical: Breast

### P-035 Breast imaging in women under 40 with symptomatic breast disease

John Adu; Maaret Ojalehto; Markus Ornstein

*Homerton University Hospital*

**Introduction:** Current UK guidelines recommend mammography as the first line imaging technique in symptomatic women aged over 35 years and ultrasonography in women under 35 years. However, the use of imaging in patients aged 35 to 40 varies across different centres.

**Aims:** To determine whether performing mammograms in patients under 40 years made a difference to their subsequent management compared to clinical assessment and ultrasound alone.

**Materials and Methods:** We performed a retrospective review of written and electronic records of patients under 40 who underwent both mammography and ultrasonography at Homerton University Hospital between January 2011 and July 2012.

**Results:** 207 patients were identified. 85 patients (41%) had normal breasts, 99 patients (47%) had radiologically benign disease. Of the 13 mammographically indeterminate lesions (6%), 1 phyllodes tumour was detected, which was indeterminate on subsequent biopsy. The remaining 12 lesions were benign. One mammographically suspicious lesion was benign on both ultrasound and biopsy. 9 cancers (4%) were diagnosed, all of which appeared either suspicious or malignant on both ultrasound and mammogram.

**Discussion:** We have shown that mammography did not beneficially influence clinical management compared to physical examination and ultrasonography alone. Patients with mammographically indeterminate lesions that are benign or normal on ultrasound are subjected to multiple unnecessary and possibly anxiety provoking biopsies.

**Conclusion:** We propose that ultrasonography is used as first line imaging in symptomatic women under 40 unless there is a strong clinical suspicion of malignancy.

### P-036 Visual assessment of breast density: reproducibility

Lani Walshaw

*Manchester Medical School*

**Background and Aims:** Increased breast density is a modifiable breast cancer risk factor. Visual assessment of breast density estimates the proportion of the breast area occupied by fibro-glandular tissue on a mammogram. Although practical in terms of population-based screening, this approach is subjective. We investigate the intra-observer repeatability of breast density visual assessment.

**Method:** Seven mammographic film readers each re-assessed the breast density of 100 normal Full Field Digital Mammogram cases that they estimated the density for at least one year previously. Density readings performed by eaach reader between May 2010 and May 2011 were divided into deciles and 10 readings were randomly sampled from each decile to give cases spanning a range of densities. On both occasions cases were reviewed in similar reading conditions and density was recorded on the same percentage Visual Analogue Scale (VAS).

**Results:** For 6 out of the 7 readers, the difference in mean density between the 2 sets of readings was less than 6%, but the largest difference was 14.7%. Bland-Altman plots produced for each reader to assess agreement between old and new VAS readings showed considerable variability. At best, the limits of agreement were -12.46% to +17.02% and at worst they were -14.50% to +40.98%. The maximum discrepancies between old and new readings ranged from -31% to +65%, with a majority positive trend.

**Conclusion**: We conclude that variability between old and new readings was clinically unacceptable, hence there is a need for evaluation of reader performance when using visual assessment.

### P-037 Visual assessment of breast density: are four images and two readers necessary?

Helen Millward; Mary Wilson; Jamie Sergeant; Caroline Boggis; Nicky Barr; Paula Stavrinos; Sue Astley

*Manchester Medical School; UHSM, Wythenshawe; School of Cancer and Enabling Sciences, University of Manchester*

**Objective**: Visual assessment of breast density provides a simple method of assessing this important component of breast cancer risk, but when used in routine screening the workload is significant. Here we investigate whether assessment of just one radiographic projection provides a representative estimate of breast density.

**Methods**: Digital mammograms from 6485 women were assessed independently by two readers as part of a large study aiming to predict cancer risk at the time of screening, and densities in all four views were marked on 10cm visual analogue scales. Differences in density recorded for different views by the different readers were analysed.

**Results**: The average discrepancy between left and right breast densities was 0.26%, (s.d. 2.53%; 95% confidence interval -4.81% to +5.32%). Between CC and MLO views, the average difference was 0.73% (s.d. 2.99%; 95% confidence interval -5.26% to +6.71%). The average difference in estimates by the two readers was -0.05% (s.d. 12.04%; 95% confidence interval -24.13% to +24.04%).

**Conclusion**: Clinically significant differences were not found between left and right or CC and MLO images, demonstrating that the number of views assessed could be decreased. However the large discrepancies between the readers indicate that this method of measuring percentage breast density is not reliable. This article presents independent research funded by the National Institute for Health Research (NIHR) under its Programme Grants for Applied Research

programme (Reference Number RP-PG-0707-10031). The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health

### P-038 Is there a link between mammographic density and breast cancer characteristics?

Kathy Ren; Yit Lim; Julie Morris; Sigrid Whiteside; Soujanya Gadde; Mary Wilson; Caroline Boggis; Susan Astley

*The University of Manchester Medical School; UK; The Department of Medical statistics, University Hospital of South Manchester; Nightingale Centre and Genesis Prevention Centre, University Hospital of South Manchester; The Institute of Population Health, University of Manchester*

**Aims**: The aim of this work was to examine the relationship between volumetric breast density and tumour characteristics, such as size and level of invasiveness, in breast cancer cases.

**Methods**: This study involved retrospective data collection on 106 women who were diagnosed with breast cancer during their routine screening mammogram. The volumetric density measurement for each breast with cancer was calculated by Quanta™ and Volpara™ software based on the raw FFDM (full field digital mammography) images. Histological information regarding tumour size and the level of invasiveness was extracted from the NBSS (national breast screening system) database. The associations between mammographic density and tumour characteristics were examined using the Mann-Whitney U test and Spearman's rank order correlation.

**Results**: Of the 111 lesions, invasive cancers had a significantly higher mean Volpara™ volumetric density than non invasive ones ($p = 0.046$). Similar results were replicated in the Quanta™ measurements, however the results were not statistically significant ($p = 0.189$). Further analysis showed no significant correlation between tumour size and volumetric density.

**Conclusion**: In women with previous negative screening mammograms, an association was found between a measure of volumetric breast density and the level of invasiveness at the time of cancer detection.

### P-039 CT staging in breast cancer: can we select patients requiring staging with CT?

Peter Moule

*Southampton University Hospital NHS Trust*

**Background**: One-in-nine women in the UK will develop breast cancer. Estimates suggest 5% of women presenting with breast cancer will have metastases at the time of diagnosis and 35% will develop metastases within 10-years of diagnosis. At present, no firm guidelines indicate which patients should undergo staging CT.

**Aims**: Which patients are most likely to have metastases and what characteristics determine whether to CT stage?

**Methods**: Data regarding patient and tumour characteristics was retrospectively collected from Equest and CRIS databases on patients who had a CT staging investigation at Southampton Breast Screening Unit during a 4-year period.

**Results**: 114 patients were eligible for analysis. 21 had distant visceral metastases confirmed by CT. Statistically significant ($p \leq 0.05$) relationships were found with axillary lymph node involvement on ultrasound and biopsy results of tumour size (pT) (OR 2.078,95% CI 1.166-3.704), mammographic size (OR 1.04,95% CI 1.011-1.069), pre-CT stage (OR 18.831,95% CI 2.391-148.287) with the existence of metastases on staging CT.

The most common reason for CT staging was axillary lymph node involvement on ultrasound with 56.5% with metastases being staged for this reason. Incidence of metastases increased from 3.64% in early stage disease to 13.33% in late stage disease.

**Conclusion**: CT is a highly effective staging investigation; however, involves exposure to ionising radiation and financial costs. These results indicate staging CT may not be required in all cases and could be restricted to those patients most at risk from metastases.

### P-040 Clinical usefulness of axilla ultrasound in patients without breast cancer

Brian Mucci; Deepak Vishwanath; Adil Mehmoud

*Southern General Hospital, Glasgow*

**Aim**: To assess the yield from axilla ultrasound in patients with normal breast imaging and in patients without a breast lesion

**Methods**: We retrospectively studied the records of all patients undergoing axilla ultrasound during January 2012 – March 2012. Patients with an ultrasound score of U1 – U3 were included in the study. Patients with breast cancer and those with an ultrasound score of U4 and U5 were excluded from the study.

**Results**: In our study population, none of the patients with an ultrasound score of U1 – U3 had a significant pathology.

**Conclusion**: Ultrasound imaging has a high specificity when evaluating axillary lymph nodes in patients with breast lesions. However, Our study shows that performing ultrasound of axilla in patients with normal breast imaging and in patients presenting with other benign pathology is not beneficial.

### P-041 The clinical role of FDG-PET/CT in follow up and restaging of breast cancer patients

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*Cairo University Hospitals, Kaser Al-ainy, Cairo, Egypt; Johan Wolfgang Goethe University Hospital, Frankfurt, Germany*

**Purpose**: The purpose of the current study was to evaluate the clinical role of FDG-PET/CT in the follow up and restaging breast cancer patients.

**Methods**: We retrospectively evaluated 34 female patients with history of breast cancer. Patients were referred for a FDG-PET/CT scan because of suspected recurrence (n=15), whole body staging in already confirmed cases of recurrence (n=5), follow up and reassurance in asymptomatic patients (n=7), follow up after local ablative therapy of hepatic metastases (n=5), follow up after treatment of bone metastases (n=2). PET-CT findings were compared with the findings obtained by other imaging modalities, histopathology whenever available, and clinical and imaging follow up for at least 6 months.

**Results**: The PET/CT was considered pathological in 21 out 34 patients. Incorrect interpretations of PET/CT images occurred in 3 patients (8.8%) (1 false positive and 2 false negative). Reasons for false positive was pulmonary nodule (n=1). Whereas false negative was due to an axillary lymph node metastasis (n=1) and supra renal metastases (n=1). PET/CT showed an overall diagnostic accuracy of 91.2% with a sensitivity of 90.9% and a specificity of 91.6%. The PPV and NPV were 95.2 % and 84.6% respectively.

**Conclusions**: FDG-PET/CT may play a substantial role in the restaging and follow up of patients with breast cancer with significant sensitivity and specificity.

### P-042 Can radiographers make accurate decisions about cancer when interpreting mammograms? A systematic review

Anne-Marie Dixon; Andrew Scally; Paul Marshall; Dawn Dowding

*University of Leeds; University of Bradford*

Radiographer involvement in mammography image interpretation is well established in the National Health Service breast screening programme. Some radiographers now undertake this role in symptomatic services. The purpose of this review was to evaluate the evidence underpinning radiographer involvement in mammography image interpretation.

**Aim:** To determine if radiographers make accurate diagnostic decisions when interpreting mammograms.

**Method:** A comprehensive search identified 8374 potentially relevant papers; 13 met the review inclusion criteria - evaluating cancer detection accuracy using mammograms from authentic screening or symptomatic populations. Sensitivity, specificity, positive and negative predicative values and overall accuracy were compared within and across studies.

**Findings:** Diagnostic accuracy varied between 66.5% and 99.7%. The studies were not suitable for meta-analysis in view of participant and methodological variability.

Ten studies used screening mammograms - radiographers made more accurate decisions if they had undergone some image interpretation training and when their performance was measured over a test bank of purposively selected cases.

Mammography radiographers with no image interpretation training showed greater accuracy when tested over a consecutive series of cases as might occur in real-life practice.

Only three studies measured performance using mammograms which included some symptomatic cases. Whilst overall accuracy (81.8 - 88.1%) was not as high as in some screening studies, ability to correctly identify cancer (sensitivity) was better (89.0 - 91.4%).

**Conclusion:** Image interpretation specific training improves the ability of radiographers to make accurate diagnostic decisions about screening mammograms. There is a need for further study of evolving practice using real-life populations of symptomatic cases.

### P-043 The impact of false positive screening mammography on subsequent breast screening participation

Katie Giles; Rebecca Green

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Background: When potential abnormality is found on screening mammograms, patients are invited to an assessment clinic  The outcome of the assessment clinic results in the diagnosis of false positives and true positives.  Publications have suggested that false positive mammography reduces the subsequent uptake of screening, whilst other authors have found it to have no effect. We assess the effects of false positive screening results at our centre.  Methods: Six months of assessment clinics were reviewed. Patients with a false positive diagnosis following assessment clinic appointments were tracked to determine if they accepted a subsequent breast screening invite 3 years later.

**Findings**: 208 patients attended assessment clinic. 45 patients (22%) had malignant disease.  2 (0.5%) were placed on early recall. 161 patients (77.5%) had non-malignant disease and categorised for a routine recall.

Of the false positive group, 18 patients were no longer suitable for routine screening.  143 patients were invited for screening, of these 122 or 84.7% accepted the invite.  19 patients or 13% of those eligible for screening did not partake in their subsequent screening round.

We compared the screening invite uptake for the false positive group with women screened in the same year having had a normal result (84.7% versus 87.7%). No significant difference is demonstrated between the two groups.

**Conclusion**:  A false positive result at screening had no effect on subsequent screening participation.  In addition, patients with a false positive screening result were statistically more likely to attend subsequent screening than the general screening population

### P-044 Radiographer image interpretation and reporting in screening and symptomatic mammography: a survey of current UK practice

Anne-Marie Dixon; Barry Strickland-Hodge; Paul Marshall; Dawn Dowding

*University of Leeds*

Radiographer performed mammography image interpretation and reporting (MIIR) was introduced to address medical workforce shortages and has improved the performance of the NHS breast screening programme. This survey explored the characteristics and practices of radiographers undertaking MIIR in breast imaging services in the United Kingdom.

**Aim:** To describe the professional attributes, training and practices of radiographers involved in MIIR in the UK.

**Method**

Information about the study was sent to all breast imaging screening and symptomatic services in the UK inviting MIIR radiographers to participate in an online survey during April and May 2012.

**Findings:** Sixty-six radiographers completed the survey. Respondents worked in combined NHS screening / symptomatic units (33), screening services (17), symptomatic units (15) and private practice (1).  Most respondents (71%) were over 46 years of age, qualified with the Diploma of the College of Radiographers (79%), undertook the

Society of Radiographers Certificate of Competence in mammography (68%) and have a university post-graduate award (61%) including MIIR modules.

MIIR is usually undertaken in specifically allocated sessions; average monthly workload is 9 sessions (600 examinations) for screen reading and 7.6 sessions (85 cases) for symptomatic work. Within the sample radiographers interpreted and reported the full range of mammography investigations. A variety of practices (single / double reading, hot / cold reporting, official / informal opinion) was evident.

**Conclusion:** Radiographers in the UK now undertake MIIR across a full range of examinations. Further research is required to explore why operational practices vary and what impact this has on service quality.

### P-045 Does increasing compression improve visual image quality in mammography? An initial investigation

Claire Mercer; Peter Hogg; Simon Cassidy; Erika Denton

*University Hospital South Manchester; University of Salford; Norfolk and Norwich University Hospital*

**Purpose:** Literature suggests that visual image quality (VIQ) and compression levels are directly related. This study investigates the relationship between VIQ and compression.

**Methods:** Over 3 consecutive NHSBSP screening rounds, 39 clients were identified from a sample of 500. The 39 clients had received markedly different amounts of compression on each consecutive screen with no measured breast density changes.

The 39 clients fell into one of three compression groups; low (mean CC=6daN, MLO=7.2daN), intermediate (mean CC=8.4daN, MLO= 9.6daN) and high (mean CC=11.9daN, MLO=13.6daN). Significant differences in compression values between each compression group were found [T-Tests (<0.01) and ANOVA (<0.01)]. An individual client experiencing a maximum compression variation of 12daN in the MLO views and 11daN in the CC views between 3 screens.

Left and Right medio-lateral oblique and Left and Right cranio-caudal views were scored for VIQ using 3 Image Quality Scales (IQS1, IQS2 and IQS3) for each of the 39 clients on each of their 3 screening rounds.

**Results:** For the same client no significant difference was found in visual image quality over the 3 screening rounds. This finding was found for each VIQ scale (Kappa >0.87, ANOVA p>0.5, ICC >0.91).

**Conclusion:** Our study suggests that an increase in compression is not necessarily associated with an increase in visual image quality. This is contrary to popular views. We suggest that further work be conducted to clarify the potential relationship between visual image quality and compression.

### P-046 An analysis of the compressed breast area and image receptor/compression paddle pressure balance in different mammographic projections

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*University Hospitals of Morecambe Bay NHS Foundation Trust; University of Salford; Bolton Hospitals NHS Foundation Trust; University Hospital South Manchester*

**Aim**: Determine whether: Medio -Lateral Oblique (MLO) 45$^{o}$ or (MLO) 55$^{o}$ gives increased image receptor (IR) foot print; IR at intra-mammary fold (IMF) or IR at +2cm relative to IMF gives increased IR foot print and better pressure balance for Cranio-Caudal (CC).

**Method:** A digital mammography set with flexible paddle was used on 16 female volunteers. The pressure exerted from the paddle and IR and the area of breast in contact with the IR were measured using an electronic pressure mat. Readings were taken from each breast using four different techniques. The CC was positioned with the IR at the IMF and 2cm above the IMF. The MLO was positioned with the IR at 45$^{o}$ and 55$^{o}$. Five frames of pressure / area data were recorded per compression and 2D and 3D pressure maps produced. The results were analysed mathematically and visually.

**Results**: Initial analysis indicates that in all cases, for CC, raising IR 2cm vertically relative to the IMF significantly increases the area of breast in contact with the IR. Analysis of the MLO projections demonstrated no significant

difference between 45° and 55°. The pressure maps demonstrate focal areas of high pressure within the breast in some women.

**Conclusion**: For the CC view, raising the IR 2cm vertically from IMF increases breast area on the IR. This makes 'object' closer to the IR, consequently this may enhance image quality. Further studies are planned to correlate pressure and compressed breast area with mammographic image quality, breast density and pain.

### P-047 Axillary abnormalities on breast imaging

Megan Bydder; Soujanya Gadde

*Nightingale Centre, University Hospital of South Manchester*

**Learning objectives:** To highlight the spectrum of axillary abnormalities detectable during breast imaging. To illustrate the imaging findings of axillary abnormalities on mammography, ultrasound, digital breast tomosynthesis and breast MRI.

**Background:** The axilla is visualised to varying degrees on standard mammographic views, digital breast tomosynthesis, ultrasound and breast MRI. Patients with axillary abnormalities may present symptomatically to the breast clinic, or be detected incidentally during breast screening.

**Imaging findings:** Axillary lesions detectable on conventional breast imaging modalities include abnormalities of the skin, subcutaneous tissues, lymph nodes, accessory and axillary tail breast tissue and shoulder joint, as well as artefactual lesions.

We present a range of axillary conditions seen in our breast unit, and illustrate their imaging findings on mammography, ultrasound, digital breast tomosynthesis and MRI.

**Conclusion:** Familiarity with the imaging findings of axillary abnormalities that may present to symptomatic breast clinics or incidentally during breast screening, is important to facilitate accurate differential diagnosis.

### P-048 Pictorial review of PIP implant ruptures

Soujanya Gadde; Megan Bydder

*University Hospital South Manchester*

**Aims**: To illustrate the imaging appearances of PIP(Polyimplant prosthesis) implant rupture on different imaging modalities including mammography, ultrasound and MRI and to highlight subtle findings which can easily be misinterpreted.

**Content**: PIP implants are different to other types of silicone implants not only for the industrial grade silicone used in them but more importantly for a thinner implant shell/capsule which is thought to be the reason for a higher rate of rupture. For a radiologist this poses a particular problem as this thin capsule is ofen difficult to identify on imaging thus leading to misinterpretation of intra vs extra capsular rupture or complete missed diagnosis of a rupture. An underdiagnosis or overdiagnosis would have an impact on the patient treatment. Given the various factors involved such as high level of patient anxiety and the costs around removing/replacing an incorrect diagnosis could potentially become litiginous. Since December 2011, 144 women were imaged at our institution with a clinical suspicion of implant rupture. This review will help not only in identifying the imaging features particularly relating to PIP implant rupture/complicatons but also the features useful to avoid a misdiagnosis.

**Conclusion**: For everyone involved in imaging breast implants, it is essential to be able to identify an abnormal PIP implant correctly and hopefully avoid any pitfalls.

### P-049 Breast MRI: experiences from a district general hospital

Christopher Hilditch; Chris Loughran

*Radiology Department, Macclesfield District General Hospital*

**Introduction:** MRI in breast disease is recommended in;

(i) investigation of lobular neoplasia,

(ii) assessment of implant rupture,

(iii) evaluation of tumour response to chemotherapy,

(iv) circumstances of diagnostic dilema where it can be used as a problem solver such as where there is a discrepancy between clinical and radiological findings,

(v) screening patients with a genetic predisposition to cancer.

Increased referrals for MRI had been noted. We conducted an audit to determine whether the technique was being used appropriately.

**Methods:** A retrospective review of radiological and histological reports from patients undergoing breast MRI from January 2012 to October 2012 was performed.

**Results:** 150 patients were scanned; 46 (31%) for lobular carcinoma (9 cases were shown to have multifocal disease and in 2 this was bilateral), 36 (24%) for possible implant rupture, 52 (35%) as a problem solver, 2 ( 1%) patients were scanned for a strong family history, and one was scanned to monitor neo adjuvant chemotherapy . In 13 (9%) guidelines were not adhered to – the most common reason being as a substitute for a tissue biopsy.

**Conclusions:** In 91 % of cases scanning followed the recommend guidelines but in 13 cases these were not followed. We suggest that breast MRI in certain circumstances is a sound alternative to biopsy in selected low risk patients. We provide imaging examples.

### P-050 Comparison of radiology scores with histopathology in a symptomatic breast setting

Divya Santosh; Afaq Siddiqui; Jyoti Bansal; Philippa Young

*University Hospital of Wales,Cardiff; University Hospital of Llandough,Cardiff*

**Aim:** The primary objective of our study was to compare radiological scores for breast imaging with histopathology in symptomatic breast setting. The secondary objective was to evaluate concordance between axillary ultrasound with sentinel lymph node biopsy (SLNB) results.

**Method:** This was a retrospective analysis of radiology and histopathology reports for 100 randomly selected patients, who attended our symptomatic breast clinics over a period of 6 months. All patients >35years had both ultrasound of the breast and mammography. Patients ≤35 years with indeterminate and suspicious lesions on ultrasound went on to have mammography. Comparison was made between histopathology and imaging scores. Axillary ultrasound findings were compared to SLNB results.

**Results:** 60 patients had malignant histopathology. 18(30%) malignant lesions were underscored on mammogram and 7(11.6%) on ultrasound. However, only 5(8.3%) malignant lesions were underscored on both modalities.

There was 95% concordance of radiological scores with histopathology for benign lesions.

Of the 58 patients who had axillary ultrasound, 34 were reported to be normal and underwent SLNB. 28/34 (82%) of these patients had normal SLNB results.

**Conclusion:** 93% of all lesions were appropriately scored on radiological imaging. 91.7% of the malignant lesions had corresponding BIRAD scores of 4 or 5. There was 82% concordance of axillary ultrasound with SLNB in excluding axillary node metastasis.

### P-051 A review of macrolane injections in clinical breast imaging

Joleen Kirsty Eden

*South Lancashire Breast Unit (Wrightington, Wigan and Leigh Foundation NHS Trust)*

Macrolane™ Injections for cosmetic breast enhancement were introduced in 2007; however have recently been withdrawn by the manufacturers due to the lack of consensus between radiologists. The appearance of Macrolane on various imaging modalities poses new challenges to practitioners and there are currently no guidelines for breast management when clients present with abnormalities post-treatment.

Although a temporary filler, studies suggest Macrolane may last longer in some patients, and the long-term effects are yet unknown.

Many complications are minor but symptomatic breast pain and lumps directly related to the substance often require investigation with imaging (mammography and ultrasound) leading to biopsy in order to diagnose, thus increasing patient anxiety.

Macrolane causes opacities, which may obscure glandular breast tissue, whilst concealing underlying pathologies on imaging. Migration of the substance into the pectoral muscle and glandular tissue can reduce the sensitivity of mammography.

Capsular contracture can lead to fibrosis and micro-calcifications may remain even after complete degradation of the substance, which may require stereo-tactic biopsy in order to differentiate from malignancies.

Ultrasound images of the breast indicate the similarities between cystic lesions, abscesses and Macrolane, whilst contrast-enhanced MRI is required for problem solving. These associated implications may directly affect patient pathway in the NHS breast screening programme, and delay diagnosis of breast cancer.

This review of clinical images obtained in mammography, ultrasound and MRI will provide knowledge and recommendations for practitioners who are beginning to encounter Macrolane for breast enhancement.

### P-052 Local strategy for the accreditation and continuous professional development of assistant practitioners in breast imaging

Bernadette Booth; Dianne Raby; Susan Williams; Lisa Hackney

*University Hospital of North Staffordshire*

From January 2013 assistant practitioners who are members of the Society of radiographers will be asked to apply for accreditation. Although this is a voluntary register, the clinical activity relating to imaging or treatment performed by assistant practitioners who do not become accredited will not be recognised by the Society of Radiographers and their membership status will be identified as “support worker” or “radiography department helper”.

It is proposed that accreditation is a means of reassuring patients and employers that assistant practitioners are appropriately educated and trained, working to their scope of practice and engage in continuous professional development.

This poster aims to share experiences, ideas and information related to assistant practitioner accreditation and although the content is with particular reference to breast imaging we hope to offer an appreciation of the accreditation pathway for other modalities.

The objectives are:

- To identify routes to accreditation as documented in the Scope of Practice for assistant practitioners, with particular reference to local assistant practitioners in breast imaging.
- To illustrate practical methods for ensuring all necessary documentation is in place for accreditation.
- To suggest ways in which evidence to sustain bi-annual re accreditation may be achieved, with particular reference to service improvement and staff development.
- It is hoped that delivery of this poster will raise questions and encourage other departments to explore how they can achieve accreditation and implement a strategy for continuous professional development of assistant practitioners.

## Clinical: Chest

### P-053 Air spaces, percentages and time for an update: an audit and discussion into image guided lung biopsies against BTS Guidelines

Zain Karim; James Whittaker

*Stepping Hill Hospital*

The BTS guidelines for Image Guided Lung Biopsies published in 2003, give a best standards guide to the pre-procedure protocol, sampling accuracy, post-procedure care and acceptable complication rates. This poster presents

an audit of the Lung Biopsy service of a DGH against these guidelines to engage in a discussion on their suitability ten years post publication.

A retrospective analysis of case notes and PACS identified 52 biopsies (41 CT, 11 US) in an August 2010 to August 2011 cohort. 100% documented compliance was the standard for pre-procedure checks consisting of FBC, clotting and spirometry (87%); chest and abdominal CTs (100%); consent (97%); and without contraindications (100%). Against guidelines, 92% were adequate samples (>90% standards; sensitivity for malignancy >2cm was 94% (>80%; and there were no false positives (<1%). Both pneumothorax rate (27%vs20.5%) and chest drain necessity (10.4%vs<3.2%) were higher than accepted. All chest drain cases involved long intra-thoracic needle traverses and gave no long term consequences.

Increasing frequency of CT-guided biopsies leads to easier diagnosis of small immediate pneumothoraces versus standard plain films. More recent literature demonstrates consistently higher complication rates than suggested, especially small, sub-pleural lesions. Alternative sampling by Trans-bronchial biopsies or VATS involve considerably more risk, and where evidence suggests that there is no association between emphysema, cavitation, needle size, specimen number and post-biopsy positioning with pneumothorax rate, an argument exists that higher complication rates are tolerable where diagnostic sampling is high and patient safety is uncompromised. The re-audit data will be available at the time of presentation.

### P-054 Failure to diagnose lung cancer on the chest X-ray: an audit

Rabea Haq; Chris Loughran

*East Cheshire NHS Trust*

**Aims**. Lung cancer mortality remains high. A reason may be a delay in making the initial diagnosis.

**Methods**. We performed a retrospective review of GP referrals from 2009 & 2011. We examined time from (i): GP referral to CXR (ii)CXR to report (iii) Report to CT (iv) CT performed to report and (v) total delay. (In this study CT demonstration of a lung mass was regarded as the point at which the diagnosis of malignancy was made)

**Results in 2009** – 33 patients were examined and in 2011 - 20 patients. 80% had a CXR performed within 5 days of referral, 90% had a CXR report within 5 days of CXR . The main delay was from CXR to CT performance, 42% took 6 - 10 days - longest interval 40 days. 92% of CT reports were verified within 1 day of scan.

**Discussion** . Areas for improvement focussed on a more critical CXR review by radiologists especially hilar areas, lung apices, behind the heart, and costophrenic angles. Where “pneumonia” is diagnosed – especially when over 50 - follow up needs to be undertaken., The policy of re x-ray in 10 days (with pneumonia) needs review and consideration given to CT scans directly more often. More lateral radiographs need to be encouraged – especially when over 50 with a smoking history and a significant history e.g. haemoptysis. A high ( 140 KV technique) should be performed whenever possible . GP requests need expeditious reporting.

### P-055 CT guided lung biopsies-can a DGH perform to expert standards?

Melvyn Ang; Eddie Gibson

*Clinical Radiology Department, Northern Health and Social Care Trust, N Ireland*

**Background:** CT guided lung biopsies are now performed more frequently to obtain diagnostic tissue sample to guide management. We conducted a study to determine our diagnostic accuracy and complication rates compared to the current literature.

**Methods:** Retrospective review of all patients who underwent a CT guided lung biopsy in 2011. The diagnostic accuracy and complication rates were analyzed.

**Results:** 64 patients underwent CT guided lung biopsy in 2011.

| | | |
|---|---|---|
| Our Diagnostic Accuracy | Royal College of Radiologists (RCR) Audit Template | British Thoracic Society(BTS) |

| | | |
|---|---|---|
| Overall 92% (95% for lesions greater than 2cm) | 80% | 85-90% for lesions greater than 2cm |

| | Simple Pneumothorax | Pneumothorax Requiring Chest Drain Insertion |
|---|---|---|
| Our Complication Rates | 24% | 6% |
| British Thoracic Society | 20.5% | 3.1% |
| More Recent Publications (2004-2010) | 23-42.3% | 5-8.8% |

**Conclusion:** Our overall diagnostic accuracy and accuracy for lesions greater than 2cm are above the suggested standards set by both the RCR and BTS at 92% and 95%. Although our complication rates are much higher then suggested by BTS, we feel that the figures are ambitious and the evidence used was published in journals dating from 1988 to 1999. Our figures were comparable to the more recent publications. We propose that standards for complication rates secondary to CT guided lung biopsy need updated in line with changing practice and as reflected in the current literature.

### P-056 Percutaneous CT guided lung biopsies

Sze Mun Mak; Anuradha Anand; Richard Hartley

*James Cook University Hospital, Middlesborough*

**Purpose**: Percutaneous CT guided lung biopsies are commonly performed to diagnose lung lesions. The indications include a new or enlarging solitary mass not amenable to diagnosis by bronchoscopy, multiple noules or persistent infiltrates of unknown origin, and hilar masses following negative bronchoscopy.

**Methods**: We audited the CT guided biopsies performed in our hospital between 01/01/2009 and 31/12/2010. We then compared our results with the British Thoracic Society guidelines (2003), particularly accuracy of sampling and complication rates. We looked at sensitivity and specificity, haemoptysis, post-procedural pneumothorax rates, and the proportion of these which required chest drains. The recent trend of icnreasing numbers of biopsies was also considered.

**Results**: A total of 254 biopsies were performed. 196 of these confirmed malignancies, 41 demonstrated benign pathology. There were 17 cases of missed maliganncy. 6 were lost to follow up, and considered benign. On analysis, this yielded a sensitivity of 92%, specificity of 100%. There were 59 pneumothoraces (23%), of which only 3 (1.2%) needed drainage. 10 patients (4%) had CT detected intrapulmonary haemorrhage. 16 (6.3%) had recorded haemoptysis, of which only 2 were large. Only 1 death (0.4%) occurred indirectly. The number of biopsies had increased consistently since 1999, from 25 to 127 cases per year. We also found that, in our trust, CT biopsies had picked up approximately 34% of confirmed malignancies.

**Conclusion**: Our institution's performance was foudn to be in line with the BTS 2003 guidelines.

### P-057 A pneumothorax, not a pneumothorax but a pneumothorax!

Haniya Kazi; Naeem Jagirdar

*South Tyneside District Hospital*

**Background**: Pneumothorax is a common clinical emergency presenting to A&E with chest pain, shortness of breath and tachypnoea. It has a reported incidence of 18 to 28 per 100,000 men per year and 1·2 to 6 per 100,000 women per year.

Secondary spontaneous pneumothorax occurs in older subjects with underlying lung disease. It usually follows from ruptured bullae in patients with COPD.

Iatrogenic pneumothorax may follow a number of procedures such as mechanical ventilation and interventional procedures such as central line placement, lung biopsy, percutaneous liver biopsy and pleural drains.

**Methods**: This case report emphasises the pitfalls of not considering the common differentials for this medical emergency.

Results: We present a pictorial review of a patient with COPD and bullae, which was misinterpreted as a pneumothorax in A&E and had an intercostal drain, following which he deteriorated and had complications including massive surgical emphysema, a pneumothorax and broncho-pleural fistula and finally succumbed.

**Key Messages:**

Not all lucencies on chest radiographs are pneumothoraces.

Other differentials need to be considered and a thorough history and clinical examination play a vital role in establishing the diagnosis.

Comparison with previous chest radiographs would be helpful where available.

A CTscan would differentiate between bullae and pneumothorax and urgent discussion with the radiologists is recommended if there is clinical doubt.

### P-058 Scalpel or wire? A case of yellow nail syndrome & literature review of percutaneous emoblisation in chylothorax

Chun Lap Pang; Delilah Khan; Ajay Sahu; Ivan Walton; Kate Devere-Smith

*Peninsula Radiology Academy, Plymouth NHS Hospital Trust; Clinical Perfusion Science Department, Plymouth NHS Hospital Trust*

**Aims/objective**: We aim to present the latest evidence of percutaneous embolisation in treatment-resistant chylothoraces.

**Content**: Due to the rarity of ongoing chyle leak, the evidence of treatment derives from case reports and a small number of retrospective studies. We aim to summarise and compare the available therapies, especially examining the effectiveness of embolisation. Given the complexity of care, we present a unique case of spontaneous chylothorax in yellow-nail-syndrome to aid understanding.

**Impact**: Chylothorax is a serious condition, there is currently no universal agreement on management. Low/ no fat diet, repeated intercostal drainage, pleurodesis and ligation of thoracic duct used to be the only options. Although embolisation itself can be technically challenging, successful cases are associated with low morbidity and mortality rates. The advance of interventional radiology provides a minimally invasive solution.

**Discussion**: While spontaneous chylothoraces are rare events, thoracic duct can be compromised by common surgical procedures, e.g. during oesophagectomy, leading to chylothorax post-operatively. A staged management that initiates from conservative management to radiological or surgical intervention would be regarded as a logical approach. Embolisation should be considered before more invasive procedure. The current evidence shows that percutaneous management of chyle leak is feasible and has low complication rate.

### P-059 A pictorial review of mediastinal masses and their radiological differences

Cindy Leung; Victoria Trainer; Angharad Eynon

*Cardiff and Vale University Health Board*

**Purpose/Aim**: Here we aim to review the mediastinal anatomy and demonstrate with radiological images a variety of anterior, middle and posterior mediastinal masses. In addition we will highlight any characteristic cross-sectional imaging features of these mediastinal masses.

**Content Organization**: Diagrammatic and cross-sectional compartmental demonstration of mediastinal anatomy.

Plain film, cross-sectional and endoscopic ultrasound imaging; including both typical and more unusual causes of mediastinal masses.

**Summary**: It is important for the radiologist to be clear with their diagnosis and differential of a mediastinal mass. Clinical management is often largely based on the radiological findings and mediastinoscopy or surgical intervention

in the mediastinum has associated risks, morbidity and mortality. It is therefore necessary and useful for the clinician to attempt to differentiate between benign and malignant disease.

### P-060 Pictorial review of cavitating lesions of the lung

Vijaya Bhaskar Pakala; Shahid Hussain

*Heartlands Hospital*

**Aims/objectives:** Plain radiograph and CT are the common modalities used for investigating chest pathology. A cavitating lung lesion is one of the common findings. The aetiology is wide. The aim/focus of this review is to provide clinicians and radiologists an overview of the common and uncommon causes and their associated findings which help in diagnosis.

**Content**: We present a pictorial review of all of the different cavitating lesions imaged on plain radiographs and CT including benign; malignant; infective; autoimmune, iatrogenic and vascular aetiologies.

**Relevance/impact:** The cavitating lung lesion is a common finding in chest imaging. The aetiology is wide from congenital or acquired; infectious or non infections; benign or malignant etc. Identification, assessment and appropriate further management is important in treating the condition. A delay in identification can be detrimental to the patient outcome.

**Discussion:** Knowledge of the differential diagnosis of the cavitating lung lesions; the associated radiological findings to come to a working diagnosis to arrange appropriate further investigation or start treatment will ensure good patient outcome. It is not always possible to make a single diagnosis just based on imaging. Though obtaining a histological diagnosis is a definite way to make an accurate diagnosis this is not always appropriate in infectious cases. Having a better understanding of the radiographic appearance of the cavities like location, number, size of the wall and contents is useful in narrowing down the differentials. This short pictorial review will be a quick guide and a useful tool in routine daily practice of both clinicians and radiologists.

### P-061 Do acute medical clinicians give CXR findings in the clinical history, when requesting CT investigation of the chest?

Shieh Ning Yao; Amdad Ahmed; Shahid Hussain

*Heart of England NHS Foundation Trust*

**Introduction/Background** - Assessing the appropriateness of investigating chest symptoms with a CT is dependent on adequate clinical information being provided on the request card. This is particularly the case with admissions via A&E/ Acute medicine.

**Aims** – The purpose of this audit was to determine whether the findings of an initial CXR performed in the emergency department are documented as part of the clinical information given on the request card.

**Methods** – Retrospective analysis of 100 cases at our trust across 3 hospital sites was performed. All patients who were admitted via the acute admissions units were eligible for inclusion except trauma patients who would not necessarily have had a CXR first. Population statistics were obtained. CXR findings and correlation between A&E interpretation and radiology report was made.

**Results** - 6 patients out of a sample size of 100 patients did not have a CXR prior to a CT examination. Out of the patients who had a CXR prior to CT scan, only 37% (35 out of 94) had the CXR findings documented on the CT request information. 78 of the CT studies were CTPA examinations, 61 of these were normal. The positivity rate was 22%.

**Discussion** – Emergency teams are poor at documenting CXR findings on request cards but when findings are documented there is usually good correlation between A&E and Radiology reports.

**Conclusion(s)** – More effort should be made by vetting radiologists to ensure that findings from relevant previous investigations should be included on CT requests

### P-062 Variation in ventricular ratio measurement in CT pulmonary angiogram

Paul Armstrong; Brian Mucci

*South Glasgow University Hospitals*

**Introduction**: Detection of Right Ventricular (RV) enlargement in patients with pulmonary embolus (PE) helps identify patients with PE at risk of adverse clinical events. Radiologists should comment on RV/LV ratio when reporting PE at computed tomography (CT). We have looked at variation in measuring this amongst a group of radiologists and between that group and a radiologist with a specialist interest in cardiac CT.

**Methods**: 25 cases of proven pulmonary embolus on CT angiography were reviewed. The RV/LV ratio was measured by a radiologist with special interest in cardiac CT and by 5 general radiologists. The variation in measurement within the group and between the general radiologists and the expert reader was assessed.

**Results**: Mean standard deviation for the measured ratios was 0.165 with a range between cases of 0.386 to 0.085. Mean variation from the expert was 0.282 with a range of 0.8 to 0.1. If the threshold of abnormal is above 1.0 then there was normal/abnormal disagreement within the readers in 10 (40%) and between expert and others in 9 (36%)of cases.

**Discussion**: RV/LV ratio is important in PE. We see a wide range in ratio measurement between a group of radiologists and wide variation from a measurement estimated by an expert radiologist with special interest. We discuss various strategies to improve measurement including use of 4 chamber views, specific training for such measurement. We emphasise the importance of specifying criteria of measurement and suggest the use of a standard test set for training and assessment.

## Clinical: Cardiac

### P-064 Efficient management of echocardiography resource at a district general hospital

Dinnish Baskaran; Oliver Cook; Rossella Barbagallo

*Basildon and Thurrock University Hospital*

**Background**: Echocardiography is a highly valued diagnostic non-invasive imaging modality frequently implemented in clinical practice to monitor cardiac physiological function, review cardiac anatomical abnormalities and exclude the presence of intracardiac thrombus. The British Society of Echocardiography (BSE) has defined and stratified echocardiography clinical indications with a view to provide incremental value to patient care and facilitate effective resource utilisation.

**Methods**: We reviewed 424 echocardiography in-patient request forms received during 2 months at a secondary care centre. We assessed the appropriateness of the requests in accordance with BSE guidelines, delays between the requests and the scans, and the completion of request forms with respect to provided requester contact information, consultant name and patient demographics.

**Results**: Based on BSE guidelines, 71% of requests were classified as appropriate and 29% were classified as inappropriate assessing from the provided clinical information. 80% of scans were performed within 24 hours and 90% were performed within 48 hours. Over 97% of requests forms were deemed legible, contained the requester contact information, consultant name and patient demographics.

**Conclusions**: Excess echocardiographs were performed at the Trust. We have formulated a set of local guidelines adapted from the BSE guidelines to aid decisions regarding echocardiography requests. We aim to reinforce this with oral presentations, educative posters and algorithms with a view to re-audit in 6 months. By implementing these interventional measures, we aim to decrease clinically inappropriate referrals and enhance clinically urgent echocardiographs.

### P-065 Extra-cardiac findings on CT Coronary angiograms – a pictorial review

Fiona Caswell; David Eason; John Miller

*NHS Grampian; NHS Highland*

CT Coronary Angiograms (CTCAs) are becoming an increasingly popular non-invasive method of evaluating the coronary arteries. Whilst conventional angiography is traditionally performed by Cardiologists, CTCAs are normally performed and reported by Radiologists.

Our centre is very experienced in performing coronary angiograms, with 312 successfully completed in the 12 month period of review. Of these, 53 (17%) identified incidental findings within their report, which ranged from potentially clinically significant pulmonary emboli, pleural and pericardial effusions to liver and renal cysts as well as a wide range of intrapulmonary findings.

We present our findings in the form of a pictorial review of incidental findings in order to highlight the importance of knowledge of clinically important extra-cardiac abnormalities.

### P-066 High variability in signal intensity and contrast dynamics during CMRI first pass perfusion imaging when a standard dose of contrast agent is used - transit times of bolus & peak signal intensity in the blood pool

Shona Matthew; Deirdre Cassidy; Stephen Gandy; Graeme Houston

*University of Dundee; NHS Tayside*

**Aim;** This study sought to provide a semi-quantitative analysis of the CMRI first-pass perfusion (FFP) images of thirty eight volunteers, focusing on the dose/kg, bolus transit time (BTT), peak signal intensity (PSI) in the blood pool (BP) of the left ventricle (LV), patient heart rate (HR), ejection fraction (EF) and in order to determine the variability in contrast dynamics and PSI in the BP.

**Materials and Methods:** Imaging was performed at 1.5T (Siemens, Erlangen, Germany) using a standard dose (20ml) of contrast agent (Gadoteric Acid, Guerbet) and TR/TE (2.4/1.01) ms, FA = 10°, slice thickness = 6mm. Image analysis was performed using ARGUS software (Siemens, version VB15).

**Results:** Individual contrast doses varied depending on body mass index (BMI) and this variation bore no correlation to BTT from the injection site to the LV BP or on the PSI in the LV BP. Similarly, EF and HR did not impact on BTT through the four chambers of the heart, the arrival time of the bolus in the LV or the PSI detected in the BP at first pass.

**Conclusion:** This study has highlighted that the variability of contrast agent PSI and TT during FPP cannot easily be accounted for by BMI, dose/Kg or cardiac function. This suggests that variability in PSI may also occur in the myocardium during first-pass (*poster II). These findings should be considered in the clinical interpretation of rest perfusion data.

### P-067 Evaluation of vulnerable plaque in postmenopause females with acute coronary syndrome by using 64-MDCT

Zhaohui Yang; Huangqing Ouyang; Jian Song; Huajun Song; Baojun Xie; Tingting Zhu; Xiaohua Zheng

*Department of Radiology, Renmin Hospital of Wuhan University, P.R.China; Department of Anatomy and Embryology, Wuhan University School of Medicine, P.R.China*

**Objective** To evaluate morphology, composition and size of vulnerable plaque using 64-detector spiral Computed Tomography Angiography (CTA) in postmenopause females with acute coronary syndrome (ACS) confirmed by coronary angiography.

**Methods** 44 patients diagnosed with coronary artery disease documented by CTA and coronary angiography were studied. The coronary plaques were evaluated for the degree of stenosis, the minimum CT density, and calcification morphology as well as plaque volumes.

**Results** CTA and coronary angiography showed no significant differences in the degree of stenosis between the groups. The minimum CT density was significantly lower in ACS groups than in Stable Angina Pectoris (SAP) group. The total volume of plaque was not significantly different between the groups. Spotty and large calcification was

significantly more frequent in the lesions associated with ACS than SAP. The minimum CT density less than 35 HU were significantly more frequent in the ACS lesions. Presence of both (spotty calcification and the minimum CT density <35 HU) showed high positive predictive value, while absence of both showed high negative predictive value for the vulnerable plaques associated with ACS.

**Conclusions** The CT characteristics of vulnerable plaques associated with ACS in postmenopause females include: low plaque density, spotty calcification, a larger proportion of soft plaque volume. The coronary atherosclerotic plaque with CT values below 35HU together with spotty calcification characteristics at the same time is easier to rupture.

### P-068 Simple guidelines may improve appropriateness of referrals for CT coronary angiography

Carl Roobottom; Benjamin Clayton; Gareth Morgan-Hughes; Grant Mitchell

*Derriford Hospital, Plymouth*

**Aims:** We re-evalutated our cardiac CT service to assess whether the issuing of guidelines had improved the rate of inappropriate referrals.

**Content**: In 2009 our service was receiving unacceptably high rates of inappropriate referrals. Having identified patient-related factors contributing to non-diagnosis, assessable at the point of referral, we introduced simple guidelines to highlight these to our referrers.

**Outcomes:** Since 2009 our rate of non-diagnostic scans in a like-for-like population has fallen significantly ($p = 0.0001$). In those patients where scans are not attempted, not diagnostic or of poor image quality, the same patient factors have been identified.

Rates of inappropriate referral have fallen most significantly in those who received our guidance ($p = 0.004$) but remain high, similar to our initial data, in new referrers to our service.

**Relevance:** As cardiac CT services are accessed by a wider range of referrers, ongoing education is required to ensure appropriate use. This is likely to be applicable to all diagnostic modalities.

**Discussion:** A number of factors may influence whether a scan is ultimately diagnostic. While increased confidence of reporters and improvements in technology are likely to be important, our evaluation suggests that the quality of referral is still key. Where CT has been unsuccessful, patient factors such as heart rate or rhythm, and inability to breath-hold, remain common. Referring clinicians require an understanding of any investigative technique and awareness of its limitations in order to utilise it most appropriately.

### P-069 RADAR assisted cardiac device implantation. Achieving very-low radiation dose during device deployment

Adam Westerink

*Royal Brisbane & Women's Hospital, Australia*

**Background:** Cardiac device implantations are associated with a small but not insignificant radiation dose to both patient and operator. State of the art fluoroscopic systems enable integrated dose reduction strategies. These strategies were implemented under our Radiation Dose Assessment and Reduction (RADAR) program. We evaluated the effect of this integrated strategy on procedural device implantation.

**Methods:** Dose area product (DAP) values were gathered from 69 device implant (pacemakers & ICDs, excluding BiV) procedures after RADAR implementation between November 2011 and March 2012. RADAR strategies included very low pulse rates, gridless imaging and a reduction in dose per pulse on our equipment. This was compared to 74 consecutive previous procedures between March and August 2010. Clinical complications were monitored and analysed.

**Results:** Median DAP was significantly reduced from 5.11 to 0.452 Gycm2 ($p<0.0001$) with no significant change in median fluoroscopic time (322 vs 366 secs: p=NS). There was no significant change in clinical complications.

**Conclusion:** Implementation of the RADAR program reduced the radiation dose required for cardiac device implantation to very-low levels. Median DAP values compare favourably to published data and approximate a standard chest x-ray series dose.

## Clinical: Vascular

### P-070 Inferior vena cava anomalies and variants: implications for deployment of IVC filters

Delilah Khan; Chun Pang; Robin Alcock; Philip Coates

*Peninsula Radiology Academy, Plymouth; Plymouth Hospitals NHS Trust, Plymouth, Devon*

**Aims/Objectives:**The purpose of this poster is to illustrate a range of Inferior Vena Caval anatomic variants and to explain the technical challenges in deployment of IVC filters in this patient group.

**Content :** Inferior vena cava anatomic variants are a diverse group of entities, encountered from time-to-time during radiological procedures. These congenital abnormalities range from duplication of the IVC to left sided IVC. These anatomic variants are a challenge to Interventional Radiologists, as they first must be identified prior to IVC implantable filter deployment This review presents an illustrated overview of the wide variety of inferior vena cava abnormalities, and show examples of IVC Filter deployment in variant anatomy.

**Outcome**:To illustrate inferior vena cava abnormalities and how filter deployment technique must be modified.

**Relevence** :Interventional Radiologists need an awareness of the IVC variations in anatomy to anticipate potential deployment and retrieval difficulties. In some cases, a knowledge of abnormal anatomy may influence the decision to deploy the device, depending on the clinical setting.

**Conclusion**: IVC variant anatomy is encountered occasionally by Interventional Radiologists, and strategies must be in place to identify these variants and alter the approach to device deployment accordingly.

### P-071 On-call provision of interventional radiology: the view from the hub

Drew Maclean; Nabil Kibriya; Usman Shaikh; Steven Powell

*Royal Liverpool and Broadgreen University Hospitals*

**Aim:** To review the practice of an on-call interventional radiology (IR) department providing ad-hoc regional cover and to assess the burden of out-of-trust work on its system.

**Content:** A retrospective review of the on-call practice over 3 years (2009-11) using the RIS database was made.

**Relevance:** The demand for an effective 24-hour IR service has increased significantly over recent years and seemingly this demand can only grow further with government guidelines that all patients should have robust access to on call IR.

**Outcomes:** 289 on-call procedures were carried over 3 years, 39.4% of which (115 patients) came from a different hospital trust on admission. Fifty-one out-of-trust patients (44.4%) went on to have further interventional procedures during their admission. The majority of out-of-trust patients underwent vascular intervention (45 patients). The largest out-of-trust proportion was hepatobiliary, with 48.0% of all hepatobiliary interventions being performed on an out-of-trust patient.

**Discussion:** This institution has offered a long established 24-hr IR service, and currently takes on a significant proportion of patients from the surrounding catchment area, with no formal service level agreement in place. A validated hub and spoke arrangement would allow for on call service provision to smaller hospitals while concomitantly increasing recruitment at the hub.

### P-072 Inter- and intra-observer reproducibility in whole-body contrast enhanced MRA stenosis grading and systemic atheroma scoring

Lynne McCormick; Jonathan Weir-Mccall; Richard White; Jill Belch; Stephen Gandy; Allan Struthers; Frank Sullivan; Roberta Littleford; John Houston

*University of Dundee; Ninewells Hospital and Medical School*

**Aim**: To determine the reproducibility of two radiologists in whole-body contrast-enhanced MRA cardiovascular analysis.

**Methods**: 20 patients (11 male, 9 female, age range 52-77 years), with 5 patients in each subgroup of healthy, mild, moderate and severe atheroma burden, were imaged on a 3.0 Tesla MRI scanner (Megnetom Trio, Siemens,

Erlangan, Germany). Coronal FLASH sequences were used to obtain contrast-enhanced MR angiograms of each patient. Two cardiovascular radiologists performed manual stenosis analysis on 159 arterial sites in each of these patients. A categorical stenosis grading scale was applied to each of these sites. Whole-body atheroma scores were calculated as a summation of all assigned grades, normalised for interpretable sites.

**Results**: The reproducibility of each observer's analysis was substantial in the analysis of the moderate and severe symptomatic patients groups (Observer 1 Kappa (k)=0.603 ± 0.029 moderate, k= 0.582 ± 0.024 severe; Observer 2 k= 0.559 ± 0.031 moderate , k= 0.626 ± 0.023 severe; P<0.001), but only fair in the grading of the healthy and mild atherosclerosis patients' groups (Observer 1 k= 0.404 ± 0.057 healthy, k= 0.501 ± 0.029 mild, Observer 2 k= 0.391 ± 0.061 healthy, k= 0.432 ± 0.034 mild, P<0.001). Correlation between radiologist whole-body atheroma scoring was high (Spearman correlation = 0.911, P<0.01).

**Conclusions**: Observer reproducibility and agreement was moderate to substantial in the grading of clinically significant stenosis. Observer disagreement associated with the grading of minor pathologies does not reduce high consensus in whole-body atheroma scoring.

### P-073 Radiological stenting for malignant superior vena cava obstruction (SVCO): A 5 year review of results and audit analysis

Thomas Micic; Christopher Chick; Nimit Goyal; Aamer Iqbal

*Aneurin Bevan Health Board Trust*

**Background**: SVC stenting is currently the main intervention indicated in malignant SVCO. Patients may present with upper limb oedema, distended chest and neck veins, shortness of breath and headache; or present asymptomatically with impending SVCO discovered on CT. This presentation reviews the measurable outcomes of SVC stenting for malignant obstruction and assesses whether current practises are in line with CIRSE guidelines published in 2006.

**Methods**: Patients were recruited retrospectively over a 5 year period (October 2007 to October 2012). Data regarding procedural success, clinical success, recurrence rates, procedure complications and mortality was sourced from electronic medical notes.

Results: 32 patients underwent SVC stenting for malignant SVCO (13 females (40.6%) and 19 males (59.4%) with a mean age of 64.5 years (43-84 years)). Technical success was reported in 31 (97%) of procedures; clinical success (i.e. full or partial resolution of symptoms in 24 hours) was reported in 24 patients (78%). 1 procedure (3%) required restenting within the 5 year period due to re-obstruction. No immediate complications were reported. There was one reported death within 24 hours of stenting; however this was not attributed to the procedure itself. The median survival was 45 days (1-1,010 days).

**Conclusions**: SVC stenting is a palliative procedure which aims to alleviate symptoms of SVCO caused by malignancy. Our results are comparable to those published by CIRSE (2006) and demonstrate that good clinical practise is maintained in the care of such patients.

### P-074 Treatment of deep vein thrombosis using direct catheter thrombolysis with alteplase

Simon Greenwood; Islah Din; Gian Abbott; Mohamed Barkat

*Countess of Chester Hospital NHS Foundation Trust*

**Purpose:** To evaluate the outcomes and complications following direct catheter thrombolysis of deep vein thrombosis (DVT) using alteplase.

**Methods**: 10 patients underwent direct catheter thrombolysis for DVT by split level infusion with alteplase between January 2009 and February 2012 and were retrospectively assessed (4 female, 6 male; average age 43; 4 upper limb DVTs, 6 lower limb; mean duration of thrombolysis 24–48 hours; median hospital admission 7 days). Precipitating factors included 2 patients with anomalous venous anatomy and 2 patients with thoracic outlet syndrome. Complications occurring within the same hospital admission were deemed to be acute and those occurring on subsequent follow-up as chronic. Follow-up was assessed for a minimum of 6 months. Outcomes were assessed symptomatically on outpatient clinic review and radiographically by the degree of thrombus resolution on immediate post-thrombolysis venography (nil, partial or complete).

**Results:** 5 patients (50%) had complete resolution of their DVT, with the remaining 5 patients (50%) having partial resolution.

9 patients (90%) had complete resolution of their symptoms with the remaining patient (10%) having ongoing leg swelling and erhythema.

No acute or chronic complications from the procedure were recorded in any of the patients, with only the 1 patient having ongoing symptoms and a possible post-thrombotic syndrome.

**Conclusions:** Direct catheter thrombolysis with alteplase is a safe and effective treatment for deep vein thrombosis and compares favourably to mechanical thrombectomy, with preservation of valves. It should be considered as a treatment option in patients presenting with upper or lower limb deep vein thrombosis.

### P-075 Catheter guided thrombolysis for the treatment of acute limb ischaemia and deep vein thrombosis: How, when and does it work?

Nimit Goyal; Aamer Iqbal; Cristopher Chick

*Department of Radiology, Royal Gwent Hospital*

**Introduction**: Managing acute limb ischaemia and venous thrombosis is challenging. Treatment options include thrombolysis and surgery. Thrombolysis may be mechanical or chemical. Chemical thrombolysis is administered systemically, intravenously or via catheter. The debate about which is the best approach continues. We present a retrospective study assessing the success of catheter guided thrombolysis in patients with acute limb ischaemia and venous thrombosis. We aim to assess the factors which affect the outcome such as time from onset of symptoms, extent of clot etc.

**Methods**: A retrospective study of 45 patients with a diagnosis of acute limb ischaemia or Deep Vein Thrombosis; who underwent diagnostic angiography/venography and subsequent thrombolysis from 2000-2012. Imaging and thrombolysis was performed and reported by a consultant radiologist. All patients underwent initial imaging to assess if thrombolysis was suitable.

**Results**: The age of patients undergoing thrombolysis ranged from 11-87yrs with 60yrs being the average. 38(84%) patients underwent thrombolysis for acute limb ischaemia and 7(16%) for deep vein thrombosis. Thrombolysis duration ranged from a single bolus dose to 51 hours with 22 hours as an average. 34(75 %) patients had successful thrombolysis with 4(9 %) suffering complications. 2 patients suffered a groin haematoma, 1 from puncture site bleeding, and 1developed compartment syndrome requiring a fasciotomy and subsequent above knee amputation.

**Conclusions**: Catheter guided thrombolysis is an effective treatment option for patients with limb ischaemia or venous thrombosis. Although there are risks associated with the procedure, most notably bleeding, this technique may be suitable as a first line treatment option.

### P-076 Adequecy of patient consent for interventional procedures

Ayesha Imran; Islah Ud-Din; Simon Greenwood; Gian Abbott

*Countess of Chester Hospital*

**Purpose**: All patients undergoing interventional procedures for diagnostic or therapeutic purposes should be given sufficient information in a way they can understand in order to enable them to exercise their right to make informed decision about their care. This audit was organized to reduce the number of erratic or deficient processes for obtaining consent for interventional radiology procedures.

**Method**: The audit was performed prospectively. All patients undergoing major interventional procedures were included for four consecutive weeks. 49 patients were asked to complete a proforma and their positive and negative responses were recorded.

**Results**: The most positive responses were on the questions regarding adequate opportunity to ask questions and signing of consent forms, which was 96%. Questions regarding explanation of the procedure and complications related to the procedure received positive responses in 86%. Types of anaesthesia were not explained in an effective way and scored 45%. Most negative responses were on questions of alternative methods of examination or

treatment which were discussed in only 39% of cases. Overall, the results did not meet the standard RCR criteria of 95%.

**Conclusion**: The results indicate that the consent process requires significant improvement in various aspects in order to achieve the standard. Discussion about the issues leading to inadequate consent and knowledge about local and national consent policies are essential. Compulsory consent training will become part of the core induction for staff who obtain consent. Senior help, intranet and internet resources and patient information leaflets will be used to ensure informed consent is achieved routinely.

## Clinical: Uroradiology; gynaecology; obstetrics

### P-077 A retrospective analysis of 991 CT urograms to describe the prevalence of clinically significant extra-urinary findings

Helen Burt; David Little; Edward Simpson; McCoubrie Paul; Mark Thornton

*North Bristol NHS Trust*

**Aim**: The purpose of this study is to describe the prevalence of clinically significant extra-urinary findings on CT urograms.

**Content**: The poster will present a retrospective analysis of 991 consecutive CT Urograms conducted between February 2010 and May 2012 within a busy teaching hospital. Findings are categorised according to clinical significance using a previously described system to facilitate comparison with similar studies. Case examples will be presented and described to illustrate common clinically important findings.

**Relevance**: CT urography is a specialised investigation primarily performed to detect upper renal tract urothelial malignancies in patients presenting with haematuria. Significant incidental extra-urinary findings are common and awareness of their prevalence and categorisation aids reporting and on-going management of these patients.

**Outcomes**: Clinically significant extra-urinary findings requiring further investigation or management were reported in 94 of 991 CT urograms; a prevalence of 9.5%.

**Discussion:** Findings were categorised as being highly significant if they involved new appearances suggestive of malignancy or metastatic disease or acute conditions requiring immediate intervention such as infective or inflammatory processes. The most commonly reported conditions were abdominal or pelvic lymph nodes greater than 1cm and abdominal aortic aneurysm greater than 3cm. In many of the other cases, common incidental findings were gallstones, diverticulosis, herniae and pleural plaques suggesting previous asbestos exposure. These pathologies potentially have clinical relevance for the future management of these patients and are important to document within the patient record.

### P-078 Krukenberg cases- a review of radio pathological correlation

K Presod; Zeid Al Ani; Claire Horton; M Arrayeh; Ed Kweka; A Elsayed; N Sumwanyamber

*North East Lincolnshire; Manchester Radiology*

**Aims/Objectives**. Awareness that evaluation of Bilateral ovarian tumours will require consideration of the Gastrointestinal and mammary system for a primary lesion.

**Content**. Classically Krukenberg tumours have been described as metastatic bilateral ovarian adenocarcinoma. However, with advances in imaging leading to early malignancy detection in gynaecologic as well as other organ systems, it is important to remember that patients presenting with bilateral ovarian tumors could be metastatic and imaging can help in establishing the source. In a review of a number of cases, we look at a variety of radiological presentations and the pathological diagnoses: ranging from classic presentations and additional subtypes including Gastroinestinal Stromal Tumors.

**Relevance**: As a clinical guide to radiologists and clinicians, ,an awareness that bilateral ovarian tumors should have metastasis considered as a differential. Other clues in the clinical history and diagnostic findings should raise the alert for further cross sectional investigation.

**Conclusion**:With increases in different types of Gastrointestinal and mammary tumors, the classical definition of Krukenbuerg tumor is now embracing wider pathologic variants giving the known radiological picture

### P-079 Retrospective audit of complication rate and diagnostic yield from ultrasound guided renal biopsy

Andrew Gemmell; Mark Bramham; Petra Williams

*Peninsula Radiology Academy*

Renal biopsy is performed to achieve a histopathological diagnosis in renal disease and solid renal masses. Ultrasound enhances biopsy technique by permitting real time visualisation of needle placement.

This retrospective audit was performed to determine the complication rate and diagnostic yield of ultrasound guided renal biopsies in one centre.

154 patients over a consecutive ten month period were analysed. 91 biopsies were performed on native kidneys and 63 on renal allografts. Gold standards were identified from four peer reviewed published research studies.

All biopsies were performed using an automatic biopsy device. Complications were identified from patient notes. Biopsies were classified as adequate if the pathology report stated a clear diagnosis or the biopsy revealed ten or more glomeruli.

The overall complication rate was 5.8%. Major complications (haemorrhage) occurred in two patients (1.3%). 7 patients (4.5%) exhibited minor complications. Adequacy of biopsy tissue was achieved in 94.8% of cases.

This audit demonstrated an overall complication rate comparable with published data (range 3.36% - 12.2%). The rates of major haemorrhage and minor complications were also within range of published standards (0.36%-2.7% and 1.04% to 9.5% respectively). Adequacy of biopsy samples was slightly less than the standard rates (95.3%-98.8%).

Renal biopsy performed in this unit exhibits a risk comparable with published data. The information gathered is informative in setting local standards and advising patients regarding risk. The data and accompanying literature review provide a valuable summary of good practice which will be informative for trainee and senior radiologists alike, ultimately enhancing patient care.

### P-080 Imaging the acute scrotum

Natasha Hougham; Simon Freeman; Gemma Miles; Jennifer Falce

*Derriford Hospital, Plymouth*

Ultrasound evaluation is the imaging investigation of choice for acute scrotal pathology and is an increasingly common request for the on-call radiologist. The superficial location of the scrotal contents permits the use of high-frequency linear array transducers resulting in high resolution images and enabling assessment of scrotal blood flow using colour and spectral Doppler techniques.

Ultrasound is frequently requested in cases of suspected torsion of the spermatic cord as the consequences of incorrect diagnosis, particularly in young men are significant; however, imaging must never delay surgical exploration where clinical findings are typical. In more equivocal cases, although grey scale features may be normal or indistinguishable from epididymitis, Doppler ultrasound can be helpful provided the clinician and radiologist are aware of the limitations of this examination and the difficulty in diagnosing incomplete or intermittent torsion. Ultrasound can also be useful in identifying complications such as testicular abscess formation or ischaemia.

Ultrasound findings may prompt urgent surgical intervention and improve outcome such as in identifying testicular rupture after blunt trauma. Similarly, characteristic ultrasound appearances of Fournier's gangrene may precede clinical findings of crepitus allowing timely debridement. Unnecessary surgery may be prevented in cases where acute idiopathic scrotal oedema is identified.

The practitioner should be mindful that sometimes testicular tumours present with acute scrotal symptoms therefore differentiation between inflammation and malignancy is essential.

This poster aims to familiarise the on-call radiologist with normal testicular anatomy, scan techniques, and sonographic appearances of different acute pathologies presenting with scrotal pain and swelling.

### P-081 Ovarian cancer imaging? by guidelines

Zawar Hussain; Sonali Limdi

*Pennine Acute Hospitals NHS Trust*

Extensive guidelines exist regarding imaging in patients suspected with ovarian cancer. NICE recommends ultrasound scan as initial investigation followed by CT scan for staging. MRI-scans are not routinely indicated for assessment. The Royal College of Obstetrics and Gynaecology recommend transvaginal ultrasound due to their increased sensitivity. Regional Cancer Network guidelines recommend CT reports be in line with the FIGO staging system and also mentioning hydronephrosis.

The aim of our retrospective audit was to determine whether the above guidelines were being followed at our Trust in patients suspected with ovarian cancer.

Data was obtained from Regional Cancer Registry and information collected from the hospital letters system, and PACS/CRIS.

There were 29 new cases of ovarian cancer in 2011 with 13 patients suspected of ovarian cancer at presentation. 12 patients had ultrasound scan initially; 2 were transvaginal and 1 patient had CT as first investigation. 8 patients had MRI-scan as second investigation to characterise ovarian masses detected on ultrasound scan. 4 (31%) patients had investigations as per recommendation (US-CT+/-MRI-scan) and 6 patients had ultrasound initially, then MRI (for mass characterisation) followed by CT scan, which would also be as per guidelines. Guidance was followed in 77% of patients. 26 CT-scans were performed for 29 patients, 17 reports (65%) met the reporting criteria.

Though the imaging guidance was followed in a good proportion of patients, there is scope for improvement. We plan to present this data (along with other clinical parameters studied) in a Gynaecology Forum to facilitate further compliance with guidelines.

### P-082 Transvaginal ultrasound: improving performance and attitudes of radiology trainees

Rosemarie Thomas; Gemma Miles; Petra Williams; Diane de Friend

*Derriford Hopital; Plymouth*

The ‘ability to perform and report abdominal and pelvic ultrasound of common presentations’ forms part of the Core Uro-gynaecological Training of the Royal College of Radiologists; as specified in the ‘Specialty Training Curriculum for Clinical Radiology’, updated May 2012.

The purpose of this study is to determine the current level of training, as well as the attitudes and perception of the Registrar group at our hospital regarding performing Transvaginal Ultrasound (TVUS); both within the working day as well as at weekends and on-call.

3960 TVUS scans were performed in the Ultrasound Department of our hospital in 2011, all of which were performed during normal working hours.

There are currently 43 Radiology Registrars from year 2 to 5 in our training sheme. Our study population all take part in an on-call rota, but have varied levels of capability and experience using TVUS; as well as wide-ranging subspecialty interests. These attributes may affect the willingness and ability of trainees to undertake what would potentially be the most appropriate investigation.

Using a questionnaire at the start of the study and by repeating the same questionnaire following 3 months of directed training in TVUS on a computerised phantom model, we intend to investigate attitudes towards performing this essential, but potentially challenging examination, and hope to identify any changes following specific training.

### P-083 Renal tumours - a wake up call

Samantha Anderson; Glynis Wivell

*Norfolk and Norwich University Health Care Trust*

**Aims/ Objectives**: Feedback at MDT's showed that we were missing renal tumours at primary imaging. We undertook a retrospective audit of our practice.

**Content**: Using data from the cancer registry we reviewed all renal cancers that presented to the trust form January to July 2012. We looked at how these patients were imaged. Of the 73 cases, 40 had ultrasound as their primary intervention. 11 of the 40 tumours (27.5%) were missed on ultrasound. These cases were evaluated

- 5 were renal cell carcinoma
- 6 were transitional cell carcinoma
- The patients had been scanned by consultants, specialty trainees and sonographers
- 15 patients were from one-stop clinics but 25 were not
- The stored images were reviewed to evaluate technique used.
- We looked for difficulty of imaging noted at time of scan.

**Relevance/Impact**

- We were unable to find any other data series for comparison
- The Guidelines on Renal Cell Carcinoma from the European Association of Urology (2010) states that

'More than 50% of adult renal tumours are detected when using ultrasound'

**Outcomes**

- We will use our findings as an educational tool for all groups of staff
- We will re-audit in 12 months

**Discussion**: We were surprised at the findings and the fact that we were unable to find any other data series for comparison. These figures will be used as a baseline, further audit following education is necessary.

### P-084 Further exploration of MRI techniques for liver T1rho quantification

Yi-Xiang Wang; Feng Zhao; Min Deng; Jing Yuan

*Department of Imaging and Interventional Radiology, The Chinese University of Hong Kong, Hong Kong*

**Introduction**: T1rho MRI can detect liver fibrosis, and it is feasible to obtain consistent liver T1rho for humans. Dixon et al. (Magn Reson Med 1996; 36:90-4) proposed a method to reduce sensitivity to B0 field inhomogeneity in T1rho imaging. In this study, we compared the images scanned by rotary-echo spin-lock pulse method (sequence 1) and the pulse modified according to Dixon method (sequence 2).

**Material and Methods**: 29 healthy volunteers were included. MRI was performed on 3T. Spin-lock frequency was 500 Hz and the spin-lock times of 1, 20, and 50 ms were used. When NSA=2, the breath-holding duration for one slice acquisition was 8sec. If NSA=1, the duration was 2sec. With ROI measurement, T1rho was quantified by setting ROIs on liver parenchyma region. With histogram analysis the T1rho value for the highest peak was recorded. Results: Liver T1rho values obtained by sequence 1 (NSA=2) and sequence 2 (NSA=2) showed similar values, i.e. 43.1±2.1 ms vs 43.5±2.5 ms (p=0.7445) respectively. For the 6 volunteers scanned with both sequences in one session, intraclass correlation coefficient (ICC) was 0.939. Sequence 2 did not increase the scanning success rate. For the 9 subjects scanned by sequence 2 with both NSA=2 and NSA=1 during one session, the ICC was 0.274. ROI method and histogram method for T1rho measurement had an ICC of 0.901.

**Conclusion**: With Dixon method the rate of artifacts occurring did not decrease. NSA=1 did not offer satisfactory SNA. The histogram measurement and manual ROI measurement provided similar liver T1rho value.

## Clinical: GI and hepatobiliary

### P-085 Epiploic appendagitis, a less common cause of abdominal pain

Behnam Shaygi; Anand Sastry; Sumaira Ilyas; M P Williams

*Derriford Hospital*

**Aims**:Imaging of acute abdominal pain in an acute emergency situation can pose a significant challenge to trainee registrars. In the last few years, it is often the radiology trainee who makes the initial decision on appropriate imaging investigation and interprets the same. This exhibit describes several cases of epiploic appendagitis as a less common cause of abdominal pain and discusses the appearances of this entity. Comparison is made between computed tomography and magnetic resonance imaging features. The literature related to this condition is reviewed.

**Content**: The spectrum of computed tomography and comparison to magnetic resonance imaging features of epiploic appendagitis.

**Relevance**: To demonstrate different imaging features of epiploic appendagitis and explore the related literature.

**Discussion**: Pictorial assay of imaging of acute abdominal pain due to epiploic appendagitis.

### P-086 The rare consequences of blunt abdominal trauma; from subtle mesenteric injury to the abdominal blow-out

Samantha Saikia; Tamir Ali

*Royal Victoria infirmary, Newcastle*

**Aims/Objectives**: We aim to highlight a number of important but less encountered/diagnosed and often subtle findings in the setting of blunt trauma.

**Content**: Cases from a major trauma centre which demonstrate classic and interesting findings of significant blunt intra abdominal injury of non-solid organs.

**Relevance/Impact:** In a chaotic trauma setting the presence of other injuries, be it solid organ or musculoskeletal, may distract the Radiologist from other findings. Subtle clues indicative of bowel injury can be easily overlooked. Presence of such injuries influences the management and a delay in diagnosis can increase morbidity and mortality in trauma patients. Injuries to the abdominal musculature can be subtle and may result in hernia formation with the added complications and surgical repair requirements.

**Outcomes**: We hope to raise awareness of a few uncommon but significant intra-abdominal injuries.

**Discussion**: CT has become increasingly important in the first line management of trauma patients. Accurate diagnosis of findings in this acute setting is crucial in expediting treatment of such patients. In this presentation we aim to highlight some useful signs which signify important pathology related to the bowel, mesenteric and abdominal wall injuries.

### P-087 Large unusual intra abdominal mass lesions. Imaging review

Deepak Pai; Ajay Dabra; Chaitanya Gupta; Claire Horton; Rasika Singh

*Scunthorpe General Hospital*

**Objectives**-To present five large unusual intra abdominal mass lesions with different pathology

**Description**- Abdominal pain and distension is one of the common causes of presentation in surgical, medical outpatients as well as emergency department. Many causes have been described but bowel obstruction and ascites being the commonest. Large solid/cystic masses are well known to occur especially in female patients related to gynaecological mass lesions.

We came across five very unusual cases both in men and women unrelated to gynaecological causes. All of these cases posed diagnostic challenges on imaging, prior to surgical exploration, biopsy and histological confirmation.

Final diagnosis on these cases were GIST(Gastrointestinal Stromal Tumor), testicular malignancy with extensive intra abdominal metastases, gossypiboma, psammoma carcinoma of the ovary with widespread peritoneal psammoma

bodies mimicking calification and pseudomyxoma peritonei. All of them had unusual features on imaging and hence we would like to share them with the conference delegates.

**Conclusion**- Large solid or mixed solid/cystic masses can pose challenge on imaging. Good history and searching for subtle imaging features may help in pre-biopsy diagnosis

### P-089 Radiation dose for radiologically inserted gastrostomy: How low can you go?

Hans-Ulrich Laasch; Damian Mullan; Andy Pitt; Katherine Macdermid

*The Christie, Manchester*

**Purpose**: To review the radiation dose for radiologically inserted gastrostomy in a specialist cancer centre in light of a national survey, indicating a national average of the Dose Area Product (DAP) of 430 cGycm2.

**Methods**: A review of the DAP readings was undertaken on procedures performed at a specialist cancer centre over a 19 month period.

12Fr balloon-retained gastrostomy tubes were placed after 3-point gastropexy under conscious sedation. Where a naso-gastric tube was not in place, a catheter was inserted for gastric inflation from the mouth under screening. Procedures were performed by two experienced GI radiologists assisted by specialist radiographers on a Phillips Multidiagnost Eleva FD system with a flat panel detector. Images were acquired using both “fluoro-grab” storage as well as formal “single–exposure” as clinically indicated. The lowest fluoroscopy frame-rate (0.5/s) was used routinely.

**Results**: 100 consecutive examinations were analysed. 42% required initial insertion of an inflation catheter. A minimum of 6 acquired images were regarded as standard: 1. Gastric position and inflation 2-4. Control injection for each T-fastener insertion, 5. Guidewire insertion, 6. Final tube position. These were satisfactorily obtained and documented by recording a single fluoroscopy frame in most cases.

Mean DAP reading without catheter placement was 7.3 cGycm² (range 0.2 – 87.5) rising to 28.0 cGycm² (4.0 – 346.3) when catheter insertion was required.

**Conclusion**: With appropriate technique the radiation dose for radiologic gastrostomy using a standard general purpose fluoroscopy unit should be minimal. Operators should critically appraise their use of real-time fluoroscopy and formal exposures.

### P-090 Does oral omnipaque 350 preparation for routine abdominopelvic CT work as well as gastrografin and is it better tolerated by patients?

Georgina Devenish; Kieran Foley; Robert Bleehen

*University Hospital Wales, Cardiff and Vale Trust, Wales*

**Aims**: Using Omnipaque instead of gastrografin as an oral contrast medium for routine abdominopelvic CT at our centre was evaluated as part of a cost reduction programme. The aim of this study was to compare bowel opacification between Omnipaque and Gastrografin and evaluate any difference in patient satisfaction.

**Methods**: Seventy-two patients requiring routine abdominopelvic CT were randomly selected. 35 received gastrografin (one vial=25ml) and 37 received omnipaque (one vial=20ml), diluted in 500ml of water taken in equal measures at 60,30,0 minutes. Opacification of the bowel (stomach, duodenum, jejunum, ileum and terminal ileum) was assessed by a Consultant Radiologist, blind to the preparation received, and scored according to a 3 point system.

Patient preference was assessed using a patient satisfaction survey completed immediately after the investigation. Non-parametric tests using SPSS were performed and p-values <0.05 were considered statistically significant.

**Results**: Opacification of the terminal ileum was significantly better statistically with gastrografin compared to omnipaque (p=0.016). There was no significant difference in opacification in the stomach, duodenum, jejunum or ileum. Omnipaque was found to be significantly more palatable than gastrograffin (p=0.001).

**Conclusion**: Omnipaque is comparably more cost-effective than gastrografin, however gastrografin seemed to provide superior bowel opacification in the terminal ileum. There was no statistical difference in the remainder of

the bowel. Omnipaque was considered to be significantly more palatable than gastrografin, an important finding as a nicer taste will improve patient compliance and consequently improve preparation and sensitivity of CT. These results help justify the use of Omnipaque in our centre.

### P-091 To bleed or not to bleed: A comprehensive review of imaging features in acute gastrointestinal haemorrhage

Joel Dunn; Yaron Berkowitz; Leonardo Monzon; Derfel Ap Dafydd; Anoma Dias; Mubarik Arshad; Nick Burfitt

*Imperial College Healthcare NHS Trust*

**Purpose/Aim**: To review the imaging appearances on multidetector computed tomography (MDCT) of common pathologies causing acute gastrointestinal (GI) haemorrhage

To review the imaging appearances on corresponding conventional mesenteric angiography and interventional radiology methods of treatment.

To review imaging follow up and clinical outcomes.

**Content**: To review the imaging options in cases of acute GI haemorrhage.

Using examples form a case series of 43 patients who underwent both MDCT and conventional mesenteric angiography+/- intervention, we review the imaging chrarcteristics of common pathologies causing acute GI haemorrhage.

To discuss interventional radiology treatment methods.

To specifically review those cases where MDCT was postive and subsequent angiography was negative.

**Summary**: MDCT plays a vital role in the diagnostic pathway of patients presenting with acute GI haemorrhage. This is often followed by prompt interventional radiology treatment. By using cases from a case series we aim to review the common pathologies with their corresponding imaging characteristics and focus on which, in our experience, are most amenable to interventional treatment.

### P-092 Pictorial review of spectrum of findings of mucocoele of the appendix on CT

Deepak Pai; Chaitanya Gupta; Ajay Dabra; Rasika Singh; Claire Horton; Hussein Hassan

*Scunthorpe General Hospital; Diana Princess of Wales Hospital, Grimsby*

**Learning Objectives**- To review the spectrum of findings of mucocoele of the appendix that can be encountered in CT of the abdomen in both symptomatic patients as well as an incidental finding

**Description**- Mucocoele of the appendix is an uncommon condition seen in approximately 0.5-1% of appendix specimens. The cause for this can be both benign and malignant tumors causing luminal obstruction and accumulation of the mucin. CT is the modality of choice to demonstrate them. Detection of these in the preoperative imaging may change the surgical approach to avoid their rupture so that development of pseudomyxoma peritonei can be prevented.

We present the CT pictorial review of 14 cases of mucocoele of the appendix encountered in our practice which were confirmed at surgery and histology.

8 out of these 14 cases had calcification in their wall. 6 of them had curvilinear calcification and 2 only dot calcification. 8 of them showed only cystic dilatation of the appendix, 1 with superadded infection, 2 localised perforation and 2 widespread pseudomyxoma peritonei.

3 of these cases posed challenge in the preoperative CT to differentiate them from other cystic lesions in the pelvis but detection of curvilinear calcification helped in the differentiation.

**Conclusion**- This poster will educate the delegates regarding the spectrum of findings of appendicocoele that can be encountered in CT of the abdomen. Detection and characterisation of these is very important prior to surgery to avoid pseudomyxoma peritoneii as it can have long term devastating effects on patient's life.

### P-093 Advanced practitioners in CT colonography, does having a different skill set within advanced practitioners improve diagnostic findings?

Denise Twist; Gillian Holroyd

*St Helens & Knowsley Teaching Hospitals NHS Trust*

**Purpose**: We describe a process in CT Colonography whereby an experienced cross sectional radiographer and an experienced GI radiographer complement the diagnostic valuation of CT Colonography

**Method**: We will be retrospectively auditing the findings of CT colonography examinations performed by a GI advanced practitioner with an advanced CT radiographer and comparing with findings from examinations performed by the same GI advanced practitioner and a general CT radiographer

**Results**: We will be using the results obtained from this audit to discuss the advantages for the total patient journey

**Conclusion**: We will demonstrate the advantages of advanced radiographic skill mix in CT Colonography

## Clinical: Multisystem disorders

### P-094 Pictorial review of unusual foreign bodies identified on various imaging modalities and their differentiation from an in situ medical device

Tahira Aslam; Sumita Chawla; Ashok Katti

*University Hospital Aintree, Liverpool*

**Purpose**:We present a retrospective cohort of interesting and unusual cases of foreign bodies detected on various imaging modalities.To enhance awareness to radiology trainees and consultants alike by reinforcing their knowledge on the imaging appearances of a range of common and rare foreign bodies encountered in clinical practice.

**Methods**: Foreign bodies can be ingested, inserted into the body cavities and even soft tissues by trauma, iatrogenic injury or by self-harm.Foreign bodies have different imaging appearance depending upon the imaging method obtained and composition of the material itself.It is vital for the radiologist to familiarize themselves with different medical devices so that their differentiation from an unwanted foreign body should not become challenging.

**Results**: We present in pictorial fashion a comprehensive spectrum of cases of unusual foreign bodies highlighting their key characteristic and differentiating features from medical devices, which can be a source of confusion for radiologist.

**Conclusion**:This educational poster hopes to have availed the observer enabling radiological identification of foreign bodies and its differentiation of the common medical devices that we come across in everyday practice.

### P-095 Lymphoma: The great mimic

Cindy Leung; Victoria Trainer; Angharad Eynon

*Cardiff and Vale University Health Board*

**Purpose/Aim**: Lymphoma is a common diagnosis that is clinically and radiologically straight-forward if the textbook symptoms, signs and supportive imaging are present. However, in our institution we have experienced several cases where patients with lymphoma have presented with classical symptoms and signs for alternative diagnoses and lymphoma has been much lower down our list of differentials. Through a series of interesting clinical cases and selected radiological images we demonstrate how lymphoma is the great mimic and can present in a multitude of different ways.

**Content Organization:** Pictorial radiological images include cases of lymphoma mimicking Pancoast tumours, pancreatitis, caecal inflammatory masses, peritoneal carcinomatosis and multiple intussusceptions.

**Summary**: Although lymphoma appears somewhere on most lists of differential diagnoses, here we prove why it earns its place there and why the diagnosis should always remain at the forefront of the wary radiologist's mind.

### P-096 The incidence of contrast-induced nephropathy (CIN) following contrast-enhanced computed tomography (CECT): a contemporary review

Victoria Bonello; Edward Fitzgerald; Frank Gollub

*Epsom and St. Helier's University Hospital NHS Trust*

**Aim**: To provide an overview of the data available on the incidence of CIN following CECT.

Content: A systemic review was performed in line with the PRISMA statement. EMBASE and MEDLINE databases were utilised and the search terms used were 'contrast-induced nephropathy' and 'computed tomography'. Search limits were applied to include all articles published in English, with an available abstract, over the last ten years.

**Relevance**: There is a paucity of data related to the risk of development of CIN following intravenous contrast administration. In this context, the lack of clear guidance available creates difficulty in decision-taking and results in a wide heterogeneity of practice.

**Outcome**: 14 studies including a total of 4953 patients were identified. 3 of these studies were randomised-control trials. In 9 of the studies, CIN was diagnosed following an increase in serum Creatinine by 0.5mg/dL (>25% from baseline) within 48-72 hours of contrast administration. The incidence of CIN varied between 0-25%, however a heterogeneous population was sampled with specific patient characteristics: pre-existing renal insufficiency (8 studies); cirrhosis (2 studies); Emergency Department admissions (3 studies, 1 involving trauma patients); ICU patients (1 study).

**Discussion**: The incidence of CIN varies greatly across the patient spectrum. Although some guidance is available, it does not always provide clear direction in the risk-stratification of patients who are at most risk for developing CIN. More concrete guidance is necessary to aid radiologists in their decision making process.

### P-097 Intra-osseous lines: All you need to know as a radiologist

Behnam Shaygi; Anand Sastry; M P Williams

*Derriford Hospital*

**Aims/ Objectives**: The use of the intra-osseous lines as an alternative vascular access has been recommended by a number of important medical associations involved in the Emergency Departments (ED) such as ATLS (Advanced Trauma Life Support) faculty.

Their use has also substantially increased with the timely approach to acute management of the critically ill patients in scenarios such as traumatic or septic shocks. Subsequently, the radiologists encounter these lines more frequently mostly whilst reporting ED images.

The objective of this presentation is to familiarise radiologist trainees with the appearances, common sites and appropriate placement criteria of the intra-osseous lines.

**Content**: We are presenting a pictorial review of different intra-osseous lines with description of the common sites, indications and appropriate placement criteria in different imaging modalities.

**Relevance/ Impact**: With improvement of the acute management of the patients at the EDs the radiologists come across the intra-osseous lines more frequently.

Awareness of the appearance of these lines and ability to comment on the appropriate placement of them will improve interpretation and reporting quality of the related images.

**Outcomes**: To familiarise radiologist trainees with the appearances, indications, common sites and appropriate placement criteria of the intra-osseous lines

**Discussion**: Intra-osseous infusion provides a non-collapsible entry point to the systemic venous system. This viable primary method of vascular access is increasingly used in emergency departments (ED) and radiologists must be aware and familiar with this alternative route for fluid and medication administration.

### P-098 Top ten tips for duty radiologist

Zeid Al-Ani; Alison Bradley; Velauthan Rudralingam

*University Hospital of South Manchester NHS Foundation Trust*

**Aim**: To provide concise, up to date and evidence-based answer to the top ten questions encountered by duty radiologist.

**Content**: We asked the radiology consultants and speciality registrars on the duty radiologist rota in a large teaching hospital about their experience, difficulties and common enquires. The recent clinical evidence and guidelines were searched to find an appropriate answer to these questions. We will present these as real-life questions covering a variety of issues including:

- Intravenous (IV) contrast administration to patients with renal failure in computerized tomography and magnetic resonance imaging.
- Management of IV contrast adverse reactions.
- IV contrast administration to patients with hyperthyroidism.
- Imaging of suspected pulmonary embolism in pregnant and young females.
- Percutaneous nephrostomy requests in patients with urinary tract obstruction.
- Common issues in imaging patients post abdominal surgery and Intensive therapy unit patients
- The role of interventional radiologist in the acute management of poly-trauma patients.

**Relevance/impact**: This will provide important, accessible and reliable advice to the duty radiologist ensuring appropriate and time efficient patient management.

**Discussion**: Duty radiologist is a hectic and demanding role. In addition to interpreting various imaging modalities, it involves a wide range of enquires from hospital clinicians, general practitioners and radiographers. Sometimes this role is played by a relatively less experienced speciality registrar. We believe that these tips will tremendously help the duty radiologist to provide appropriate advice and maximise the integrated role radiology plays in patients' care.

### P-099 Radiology in the undergraduate medical curriculum: Who, how, what, when, and where?

Pervinder Bhogal; Thomas Booth; George Collins; Andrea Phillips; Stephen Golding

*St. Georges Hospital; University of Cambridge; University College London Medical School; Royal United Hospital; University of Oxford*

Radiology is rapidly evolving and plays a vital role in modern medicine. This is paralleled by increasing numbers of investigations, clinical radiology training and consultancy posts and cross-discipline utilisation of diagnostic and interventional radiology. A good grasp of radiology is therefore a pre-requisite for most clinicians, however this is not reflected in the undergraduate curricula of most medical schools, where radiological training is inadequate and clear sets of objectives for undergraduate radiology training are lacking. We aim to demonstrate why radiology should be taught to undergraduates and propose a template to redress the curricula imbalance. Potential areas for undergraduate radiology training include anatomy, physiology, and pathology teaching, radiological interpretation techniques, radiation protection and legislation and radiology guidelines. However, difficulties arise because most medical school curricula are full and the scope of potential teachers is wide. Consultant and trainee radiologists, ultrasonographers, anatomists, medical physicists, radiographers and nuclear medics all play a role. Therefore radiology is best taught in a vertically integrated manner by a multi-disciplinerary educational team lead by consultants and specialist registrars to bridge basic and clinical science. Teaching formats include one-on-one "hot seat" learning, small groups, lectures, computer-assisted and e-learning, clerkships, special study modules and elective placements. Only once this deficit in education is rectified can our speciality be utilised to its full potential to assist both undergraduates' understanding of pre-clinical and clinical medicine and doctors in their clinical practice.

### P-100 Radiology teaching experience and knowledge: a survey of UK medical students

Bhupinder Hoonjan; Darren Boone

*Colchester Hospital University Foundation Trust*

**Aim**: Demand for plain radiological investigations is increasing and prompt reporting by radiologists remains a challenge. Consequently, initial interpretation of plain radiographs by junior doctors guides patient management. However little is known about junior doctors' level of radiology training and experience. The aim was to survey final year medical students' attitudes to prior radiology teaching and interpretation. We also tested their knowledge of interventional radiology.

**Methods**: An online survey was designed following discussion with junior doctors and radiologists, and sent to students from different medical schools via email. Anonymous results were collated, raw frequencies analysed and descriptive statistics presented.

**Results**: 106 responses were received with a response rate of 60%. Sixty-nine (65.1%) participants felt their radiology learning needs had not been well addressed at medical school. Furthermore, only 5 (4.7%) of responders had received regular formal radiology teaching whilst on hospital attachments and twenty-two (21%) participants had reviewed less than 10 radiographs during medical school training. Only 10 (9.6%) and 3 (2.9%) participants respectively said they would feel confident in being able to interpret a chest x-ray or abdominal x-ray. Fifteen (14.3%) students had never had formal radiology examinations at medical school. Knowledge of interventional procedures was also poor. Eighty-five (82.5%) and eighty-six (83.5%) participants respectively were not aware interventional radiologists can treat post-partum haemorrhages or perform intramuscular injections.

**Conclusion**: Final year medical students on average feel unprepared and incompetent in interpreting basic films and feel they lack adequate teaching. Furthermore, vital services offered by interventional radiologists are largely unrecognised.

### P-101 A pilot study: Can a multifaceted approach to teaching and the timely addition of prompt notes help to improve retention of information in final year medical students

G DeLay

*Queens Medical Centre, Nottingham*

**Introduction**: Fracture interpretation skills are essential transferrable skills for medical students in preparation for their foundation years. Fracture teaching was delivered through a multifaceted approach encompassing face to face, small group tutorials, patient workshops and self assessment. We collected data to evaluate the retention and application of information taught.

**Method**: A cohort of 29 ( n=29) final year medical students were taught over a period of 8 weeks on the interpretation of fractures. They were then divided into to two subgroups of 14 (group 1) and 15 (group 2). Both groups were taught on the same week covering identical sessional material. Group 2 students were posted additional prompt notes of information between teaching sessions as memory aids. Data was collected through an online pre and post module test.

**Results**: 16 students completed the pre and post module test. There was an increase in the post test scores with 6 students obtaining distinctions. The mean score increased from 48.0% pre module to 65.6% post module for group 1 and 52.27% to 64.8% for group 2. Group1 marginally out performed group 2 despite additional notes being posted to group 2 in order to help retain information taught. Pre-test comparison between group 1 and 2, t-test (p=0.01) and post test comparison, t-test (p=0.004).

**Conclusion**: Pre and post testing is necessary to evaluate teaching and monitor student progress. Prompt notes between sessions may help in the retention of information and improve student learning. A larger study is necessary to fully evaluate this further.

### P-102 Are radiology request forms adequately completed?

Mubeen Chaudhry; Amy Arthur; Nadya Jabbar

*Mid-Cheshire Hospitals Trust*

**Aims/Objectives**: The usefulness of a radiological examination may be reduced if the clinical background and specific problem to be answered is not addressed. Inadequate information can also lead to mistakes in patient identification and delay in returning reports to the correct destination. The aim of this study was to determine whether adequate completion of plain film extremity request forms was being performed in the accident and emergency department.

**Content**: All radiology request forms should contain adequate clinical and demographic information which identifies the patient and the destination for the report. The name of the requesting practitioner and the name of the consultant or GP looking after the patient must also be specified.

**Outcomes**: A total of 93 request forms were analysed. 100% of forms demonstrated the appropriate region had been requested. Clinical information (history/examination) was given in 68% of cases. Radiological question was accurately defined in 47% cases.

**Discussion**: Clinical information and the radiological question that needs answering are two vital pieces of information for radiographic and radiological staff. The basic principles of adequate form completion should be included in the induction of new staff. In specific cases, the radiographic staff may send back individual forms which are incomplete. This study can be used to provide quantitative data in areas which have been identified anecdotally as a problem. Involving one of the relevant department staff to do this study in conjunction with radiology can give them more ownership of the data and willingness to tackle the problems revealed.

## Clinical: Nuclear medicine

### P-103 11C-Methionine PET/CT – A pictorial review

Fiona Caswell; Alan Denison

*NHS Grampian; University of Aberdeen*

**Objectives**: To illustrate the indications and imaging findings in 11C Methionine PET/CT by way of a pictorial review.

**Background**: Methionine is a naturally occurring essential amino acid, which can be labelled with carbon-11. Since 11C has a very short half life, its use is mostly limited to centres with an on-site cyclotron.

Uptake of 11C Methionine has been shown to reflect amino acid transport and metabolism and has been shown to be increased in malignant cells. Unlike other PET tracers, uptake in normal brain is low, providing good sensitivity and contrast in malignant lesions. Additionally, non-malignant lesions such as fibrosis have low uptake and so PET/CT imaging is particularly useful in distinguishing between tumour recurrence and post-operative changes.

**Methods**: We present a pictorial review of selected 11C methionine PET/CT studies performed at our centre, to highlight the typical indications and salient imaging findings. Examples include glioblastoma recurrence, chordoma and leptomeningeal recurrence of lymphoma.

**Conclusion**: 11C Methionine is valuable in increasing diagnostic confidence in and characterising brain and spinal cord abnormalities in specific circumstances, particularly in distinguishing between disease recurrence and benign processes which can be difficult on other imaging modalities.

### P-104 Audit of use of PIOPED classification in lung scintigraphy

Mei Chin; Brian Mucci

*South Glasgow University Hospitals*

**Purpose**: Audit modified Prospective Investigation of Pulmonary Embolism Diagnosis (PIOPED) classifications use in lung scintigraphy reports.

**Background**: Modified PIOPED criteria in the reporting of lung scintigraphy have been shown to be accurate and are recommended by the Society of Nuclear Medicine. Ideally 100% of VQ scan reports should be classified in this way.

For technical reason some scans may not be classifiable therefore a target of 95 % is suggested, and those not classifies should contain a clear explanation why it is not classified.

**Methods**: 183 lung VQ scans were reviewed over a one year period. The reports were assessed as to the PIOPED classification given.

Results: 180 of 183 ( 98%) reports had a classification.. Of the 3 which did not a technical explanation was given, a single report had no explanation. The result categories wereNormal122 (67%); Low or very low 32 (18%); Intermediate 23 ( 12%), High 3 ( 1.5%), not classified 3 (1.5%).

**Discussion**. This audit assesses clarity of VQ scan reports using POPED criteria and sets standards for departmental audit of report clarity.

The prevalence of pulmonary embolism in the PIOPED study was 33%. Other workers have shown a high variation in classification between institutions. We discuss how monitoring local results can aid discussions with clinicians about pre test probability use and selection criteria.

### P-105 Lung scintigraphy in pregnancy: audit of value of ventilation scan

Brian Mucci; Catriona Turbet; Candice Galea

*South Glasgow University Hospitals*

**Purpose**: Assess the value of the ventilation component in lung scintigraphy in pregnancy.

**Background**: Published results in pregnancy using perfusion (Q) or ventilation and perfusion (VQ) show similar results. Is the Q scan alone sufficient? Guidelines advocating lung scintigraphy do not specify VQ or Q only, they simply state that dose should be minimised.

**Methods**: Over a one year period 90 pregnant patients were referred for scintigraphy. For logistical reasons some had VQ while others had Q only. The results and clinical outcomes were reviewed to asses the value of the V component.

**Results**: Of the 90 patients 66 had VQ scan and 24 had Q only. Outcomes were:

OverallNormalin 72 (81%), Low probability in 14 (16%), Intermediate probability in 3 (3%), High probability in none.

V&Q Scan group:Normalin 52 (79%), Low probability in 12 (18%), Intermediate probability in 1 (1.5%), High probability in none.

Q Scan only group:Normalin 20 (83%), Low probability in 2 (8%), Intermediate probability in 2 (8%), High probability in none.

**Discussion**: Guidance for lung scintigraphy in pregnancy give no clear evidence whether the V scan is needed. In this group of young patients with a low incidence of disease the Q scan only may be enough and reduces the dose of the examination by between 0.2 and 0.3 mSv. The logistics of using Q only are simpler and costs lower. Further work is needed to address this question. Our audit and other published work suggest that a controlled trial is justified.

### P-106 Nuclear medicine imaging in evaluation of patients with persistent hypercalcaemia following surgery for primary hyperparathyroidism

Hasan Nizami; Tarig Adlan; Thomas Gruning; Brent Drake

*Plymouth Hospitals NHS Trust*

**Introduction**: Parathyroid adenoma (PTA) is the most common endocrine abnormality of the parathyroid. There has been a recent trend to perform minimally invasive parathyroid surgery and it is becoming increasingly recognised that preoperative mapping with nuclear imaging plays a role in increasing surgical success.

**Aims and Objectives:** Analyse imaging/clinical data in patients who underwent repeat parathyroid surgery.

**Methodology**: Retrospective analysis of medical notes, biochemistry and imaging.

**Findings**: · 65 yo female p/w fatigue and bone aches. Corrected Calcium (CCa) 2.87 mmol/l (normal 2.1-2.55), parathyroid hormone (PTH) 7.4 pmol/l (1.6-6.9). Planar sestamibi and SPECT/CT showed a PTA near right lower

thyroid pole, US NAD. PTA on histology, normocalcaemia postoperatively, but CCa 2.81, PTH 9.9 on follow-up. Repeat sestamibi unchanged. PTA confirmed on histology.

· 68 yo female p/w malaise, bone ache and depression. CCa 2.8, PTH 20.6. Sestamibi showed nodule at thyroid isthmus, US NAD. Left superior PTA removed, persistent hypercalcaemia. Repeat sestamibi unchanged. Right PTA excised.

· 56 yo female, p/w low mood and body aches. CCa 3.35, PTH 32.2. Planar sestamibi normal, but large retropharyngeal PTA on SPECT/CT. US NAD. Normal left superior parathyroid on histology, postoperative CCa 2.74. Repeat sestamibi unchanged, now confirmed on US. PTA on histology, normocalcaemia postoperatively.

**Conclusion**: Nuclear imaging correctly identified PTAs preoperatively, and showed their persistence after the first, unsuccessful operation. It is tempting to speculate whether intraoperative PTH measurement or radioguided surgery would have improved the outcome

### P-107 An audit of the accuracy of PET/CT in the preoperative assessment of non small cell lung cancer

Sophie Vaughan; Patrick Fielding

*University Hospital of Wales*

**Introduction**: PET/CT imaging plays an important role in selecting patients with NSCLC for surgery. NICE guidelines currently state that all patients considered for surgical treatment of NSCLC, should undergo pre-operative PET/CT staging.

**Aim:** We aim to audit the accuracy of the T and N staging of lung cancer using PET/CT, using surgical histopathology as the gold standard.

**Method:** Retrospectively, the PET/CT's of all patients undergoing lobectomy/ pneumonectomy for NSCLC were reviewed from September 2010 to April 2012 . A total of 64 patients were suitable for evaluation, and a comparison was made between the PET/CT staging and histopathology findings.

**Results:** Taking into account the median surgical delay, the accuracy of PET-CT tumour staging was satisfactory, at 86%. The accuracy of the nodal staging was just below the 85% target, however more importantly, the N2 node staging accuracy was 92%. Discordant PET/CT findings were reviewed.

**Conclusion/Discussion:** Overall, the tumour staging results were satisfactory. However there was a tendency to overcall hilar/N1 nodes. The N2 nodal accuracy was high which is important as this will impact upon patient management and outcome.

### P-108 Supplementary imaging of the spine following bone scintigraphy: A phantom based study comparing absorbed dose of the male and female reproductive organs from radiography and computed tomography imaging

Jennifer Kelly; Andrew Tootell

*St Helens & Knowsley Teaching Hospital NHS Trust*

**Aim:** To compare the absorbed dose by the male and female reproductive organs when imaging the lumbar spine using local protocols in CR, DR, CT component of a SPECT-CT scanner and MDCT.

**Method**: An ATOM 701-D dosimetry phantom and calibrated thermoluminescent dosimeters (TLD) were subjected to radiographic examinations of the lumbar spine using standard department protocols. The TLDs were positioned within the phantom to measure the absorbed dose of the ovaries and testes. Using three repeated measures, antero-posterior and left lateral lumbar spine radiographs were acquired using local diagnostic reference levels on CR and DR technology. CT Imaging of the lumbar spine was carried out using a GE Infinia Hawkeye gamma camera and a GE Lightspeed 64 CT scanner. The TLDs were read using a Hardshaw 3500 manual TLD reader 24 hours after acquisition.

**Results**: Comparison of results using ANNOVA found that the organ dose from the different modalities were significantly different for females, but not for males. Numerical comparison of the results demonstrates that the hybrid CT acquisition resulted in a lower absorbed dose compared to the other modalities for both males and females.

**Conclusion**: This research demonstrates that the dose from the CT component of the hybrid scanner results in the lowest absorbed dose to the reproductive organs.

## Clinical: Paediatrics

### P-109 Paediatric radiography: back to basics

Nadine Jeakings; Michael Sciven

*University Hospital Southampton FT*

**Aims/Objectives**: The screaming child can strike terror in a radiographer, this presentation aims to help remove those fears and provide tools to obtain the best diagnostic image.

Relevance: With up to 50% of children presenting to radiology departments in a typical year the SCoR believe that all radiographers should be competent in imaging children.

**Content**: Paediatric imaging spans a vast age and developmental spectrum from 23 week old premature to 18 years; from 500 gram babies to 20 stone plus teenagers. This presentation will look at the developmental differences between the ages and how to tailor your imaging approach to the age and developmental level of the child. We will also discuss coomon paediatric specific pathologies and the routine imaging they require and the best ways to achieve the best images possible.

Paediatric patients are more susceptible to radiation than their adult counterparts; we will look at ways to reduce the radiation burdens on the paediatric population. Often ultrasound can be used as the first line imaging modality due to the slim body habitus, and we will discuss when ultrasound is indicated in preference to radiation-based examinations.

**Discussion**: Paediatric radiographs of common examinations will be reviewed and we will discuss why the images are or of good/bad diagnostic quality and either how to improve them or for good diagnostic, how they were obtained.

### P-110 Something sweet – does sucrose have a role in paediatric radiology?

Nadine Jeakings; Howard Portess; Heather Emery; Vijay Baral

*University Hospitals Southampton FT*

**Relevance**: One of the universal challenges within all modalities of paediatric imaging is keeping the patient still during image acquisition. We look at the use of sucrose in the neonate and infant populations and reviews the evidence base behind this. It discusses the indications and contraindications for the use of sucrose and our experience with its use. We also compares the use of sucrose to other methods of keeping the patient still during the imaging exam.

**Discussion**: Sucrose is used internationally on neonatal units, including the trust's neonatal unit . It is employed for painful and distressing procedures for example heel prick blood test. The imaging examinations performed in Children's X-Ray department are not painful but the patient may become distressed due to the unfamiliar environment and people, as well as being undressed and required to be kept still in a predefined position. Certain examinations also require the baby to be starved prior to the examination making the feed and wrap technique unachievable. We have introduced the use of sucrose in our department because sedation is rarely used and analgesia is not necessary. Following a brief training session regarding the safety and appropriate use of sucrose, it is both authorised and administered by the radiographers.

### P-111 Paediatric major trauma CT - early experiences within a newly established major trauma centre

Franchesca Wotton; Harriet Barber; Sarah Hamilton; Tinu Purayil; Julia James; Sharon Brown; Judith Foste

*Peninsula Radiology Academy*

**Background**: Our centre achieved Major Trauma Centre (MTC) status in April this year and it is well known that there is a current lack of a nationally recognised paediatric trauma CT protocol. Within our centre, paediatric patients who sustain major trauma will often undergo a dedicated trauma CT scan based upon the adult trauma CT protocol – dual-phase single acquisition including the head to the proximal/mid femur. The aims of this poster are to demonstrate our early experiences of dedicated paediatric trauma CT (patients aged 18 or less) within a newly established major trauma centre based upon the results of a 4 month internal audit.

**Methods**: An audit was carried out incorporating 1 month pre and 3 months post achieving MTC status. Examples of the parameters included are:

(1) Patient demographics

(2) Mechanisms of injury

(3) Number of patients receiving dedicated trauma CT versus those who had other imaging.

(4) Injuries demonstrated by the dedicated trauma scan

(5) Radiation doses

**Discussion**: The results of our audit showed that 12% of all patients receiving a dedicated trauma CT within the 4 month period were aged 18 or under. However, 42% of these paediatric trauma scans were normal, and sometimes a trauma CT was performed on the basis of mechanism of injury alone. The radiation doses could be lowered by modifying technique with a more targeted CT based upon the clinical picture, which further compounds the requirement for a specific paediatric trauma CT protocol.

### P-112 Imaging characteristics of spontaneous duodenal haematoma in children

Rebecca Geach; Rebecca Hunt; David Grier

*Bristol Royal Hospital for Children*

**Aim**: To illustrate the imaging characteristics of spontaneous duodenal haematoma in children

**Relevance**: Intramural duodenal haematoma is commonly described as a complication of blunt abdominal trauma, non accidental injury and as a result of endoscopic intervention. Spontaneous haematomas however are rarer and factors that predispose include, anticoagulation therapy, idiopathic thrombocytopenic purpura (ITP), thrombophillia, leukaemia and lymphoma. The intramural haematoma can be an uncommon cause of acute bowel obstruction and can be overlooked when there is no history of trauma. The diagnosis should be considered in any child presenting with obstruction. Knowledge of its characteristic imaging findings across different modalities is helpful for prompt diagnosis and appropriate supportive management as surgical intervention is rarely required and may be hazardous.

**Content**: We illustate two cases of spontaneous intramural haematoma in children both of whom were sufferring with leukaemia and presented with acute bowel obstruction. The first case was diagnosed and followed up via ultrasound and we illustrate the key diagnostic ultrasound and doppler features. This is supported in the second case with chaacteristic imaging feactures demonstrated on both barium studies and computed tomography.

**Conclusion**: Spontaneous intramural haematoma although rare can be a cause of acute bowel obstruction in children. An awareness of the imaging characteristics acros a range of modalities allows a promp diagnosis and appropriate management.

### P-113 Paediatric craniocervical swellings - old wives tale- a radiologic perspective

Nawa Sumbwanyambe; Z Al-Ani; A Elsayed; K Precod

*North East Lincolnshire; Manchester Radiology Training*

**Aim**: A learning review on suggested diagnostic algorithm in managing paediatric craniocervical masses.

**Content**. In a short case review collection, we look at different clinical scenarios of children presenting with facial and neck swellings. In conjunction with the clinical history we explore the presentation, pathologies and management pathway for the different masses according to the relative anatomic sites , differentials to be considered and age old lessons taught in the basics of medical education.

**Conclusion**: A multidisciplinary approach is required in the evaluation and management of children presenting with craniocervical masses. A wide differential list should always be considered and high index of suspicion should be maintained

### P-114 Fetal intra-abdominal calcification: location, location, location

Yousef Alwan; S Saipriya; Janette Keit; Chris Rawlingson; Carol Wallace

*Blackpool Teaching Hospitals, NHS Foundation Trust*

**Aims**: The role of the second trimester anomaly scan is to determine the presence of structural abnormalities. An abnormality that may be detected is fetal intra-abdominal calcification. The aim of this poster is to discuss by way of pictorial review causes of fetal intra-abdominal calcification.

**Content**: Anomaly scans in our centre have detected five cases of intra-abdominal calcification in the past five years. The location is important in determining the aetiology. Calcification may be within the peritoneum, limited to the liver or localised to a mass.

Peritoneal calcification can be a sign of meconium peritonitis. The causes include jejunal or ileal atresia. Coexisting abnormalities include dilated bowel and fetal ascites. A meconium pseudocyst may form in contained perforation.

Fetal liver calcifications can be on the surface and related to meconium peritonitis, or intra-parenchymal and associated with a mass. Liver masses include hepatoblastoma. Viral infections can cause liver calcification. Calcification in the adrenal gland can be due to adrenal haemorrhage, or be present in neuroblastoma tumours.

**Relevance**: Management of fetal intra-abdominal calcification is dependent on the location, associated findings, and in some cases results of infectious screens (the TORCH organisms). Isolated peritoneal calcification tends to have a favourable outcome.

**Outcomes**: While in most cases expectant management is sufficient, referral to specialist neonatal centre may be necessary, especially at time of delivery where paediatric surgical expertise is available.

**Discussion**: Fetal intra-abdominal calcification may be detected in the second trimester anomaly scan and this poster illustrates cases from our centre.

### P-115 Multisystem review of usual and unusual manifestations of infantile and childhood leukaemia

Kandise Jackson; Vivian Tang

*Central Manchester Children's Hospital*

**Objectives**: To provide a pictorial review of the use of radiology in assessment of leukaemic patients at diagnosis and during treatment

To provide examples of common and uncommon multisystem manifestations.

**Background**: Leukaemia is the most common childhood malignancy. Acute lymphocytic leukaemia accounting for 70-80% of cases and acute myeloid leukaemia accounting for 10% of cases.

Majority of children develop radiographic evidence of skeletal involvement during the course of their disease. Children can present with non-specific limb pain and pathological fractures. Leukaemia is often diagnosed by haematological investigation without the initial need for body imaging. Imaging can subsequently be used to assess findings directly due to leukaemia and also in the assessment of secondary complications relating to chemotherapy and bone marrow transplant.

More unusually body imaging is performed before a clinical diagnosis of leukaemia has been made when the presentation and haematological and biochemical investigations are atypical.

Leukaemia during infancy is considered separately in this review due to its different epidemiology, genetics, clinical features and disease pattern compared to leukaemia in older children.

**Content**: Pictorial review showing examples of multisystem manifestations of leukaemia including skeletal, CNS and extra-medullary disease in the thorax, abdomen and soft tissues. Emphasis will be placed on unusual presentation, uncommon radiological findings and infantile leukaemia.

**Conclusion**: Leukaemia can have various multisystemic presentation prior to haematological diagnosis. This pictorial review will demonstrate a range of common and uncommon radiological findings at presentation and complications relating to treatment.

### P-116 Image review for post operative cochlear implants in paediatrics

Katie Haynes; Nadine Jeakings; Heather Emery; Michael Scriven; Vince Batty

*University Hospital Southampton*

South of England Cochlear implant centre have implanted over 800 devices since 1990; these are being implanted in children under the age of one up to adulthood. The postoperative x-ray is essential for reviewing implantation prior to discharge.

This poster will review other techniques of imaging postoperative cochlear implantation in relation to the modified stenvers view currently undertaken in paediatric radiology at University Hospital Southampton.

Currently the Modified stenvers view is undertaken for all age groups, however with changing technology due to the discontinuation of skull units this method needed to be reviewed. Criteria for reviewing other techniques are reliability and ease of reproducibility. Adaptability of the technique for different patients is especially important with paediatrics having a broad developmental spectrum. Consideration needs to be given to thyroid and orbit dose with the change in technique. And crucially, any difference in image quality, as it is essential to be able to visualise the electrodes and the situation within the cochlear.

A skull phantom was positioned using techniques described within literature to visualise implanted cochlear devices. The resultant images were reviewed in relation to the current modified stenvers technique by the consultant radiologist who specialises in ENT and reports all of the postoperative cochlear implantation x-rays.

All the techniques demonstrated the cochlear adequately on the phantom. Each technique has its benefits for children of different ages and would be down to the radiographers' personal choice.

### P-117 Imaging of Taylor Spatial Frames for leg length discrepancies

Sian Lawler

*Chelsea and Westminster Hospital NHS Foundation Trust*

**Aims**: There is an increasing use of the Taylor Spatial Frame in clinical practise these days to correct congenital leg length discrepancies in paediatrics. The radiographer's role in this process is becoming more important. Understanding of the frame itself and how it works is vital to good quality imaging.

**Content**: Leg length discrepancies of <20mm can be compensated for by the body but anything over this requires surgical correction. The Taylor Spatial Frame is one way of correcting these discrepancies. The frame offers simultaneous corrections of multidirectional deformities. The radiographer is key in producing images that are reproducible and analysable by the software used. It is key the radiographer is aware of the psychological aspects for the patient as well as the importance of imaging.

**Relevance**: There is a higher use of Taylor Spatial Frames than ever before. It is vital radiographers are aware of what is required from them.

**Outcomes**: By expanding on the radiographers knowledge and role during this process better quality images can be achieved. Being aware of the entire process the patient goes through will improve radiographers approach to these patients.

**Discussion**: With Taylor Spatial frames being used more frequently it is important radiographers have a good understanding of the frames and their use. Good quality imaging gives the surgeon a higher rate of accuracy and reliability when taking measurements which is key to the patients overall outcome.

## Innovation in service delivery

### P-118 CT thorax, abdomen and pelvis audit: an audit comparing non-trauma requests made by GPs and the accident and emergency department

Cheng Xie; Amdad Ahmed; Arpan Banerjee

*Birmingham Heartlands and Solihull Hospitals, Heart of England Foundation NHS Trust*

**Purpose**: Body Computed Tomography (CT) imaging is an important diagnostic tool increasingly used in the primary care setting and by hospital Accident and Emergency departments (A&E) to make a clinical diagnosis. The potential problem with body CT imaging is the high radiation dose incurred by patients. The Royal College of Radiology (RCR) has set guidelines to help regulate the requesting process. The aim of this audit was to review thorax, abdominal and pelvis CT scans requested by GPs and A&E, to determine what proportion are within Royal College of Radiology recommendations.

**Method**: Retrospective audit of 101 CT thorax, abdomen and pelvis requests from primary care centres and 101 from A&E department in 2012.

**Results**: 72% GP and 91% A&E referrals met the RCR referral criteria, of these 78% GP and 87% A&E referrals were suspected malignancies. 28% GP and 9% A&E referrals did not comply with RCR criteria. The non-compliant referrals ranged from unexplained anaemia, abdominal pain, hernia, to suspected gallbladder conditions without an initial ultrasound scan. 53% GP scans showed abnormalities including malignancy (20%), and in 69% A&E scans with abnormalities 37% demonstrated malignancy.

**Conclusions**: A significantly higher portion of requests made in the hospital settings meets the recommendations made by the Royal College of Radiologists. Oncology-related pathology forms a major source of inpatient and outpatient referral. Although, the GP referrals did not meet the RCR guidelines, the percentage of pathology in the two groups was fairly comparable. A detailed analysis will be presented.

### P-119 Innovative approach to 'Excellence in Quality' for ultrasound services

Ankia Meiring

*InHealth Ltd*

Our organisation continuously strives for ‘Excellence in Quality’ and as part of our initiative to improve the quality for ultrasound services; we have put together a few important key activities to ensure that the quality in our service is delivered.Our most recent addition to our Ultrasound service was the newly designed audit process that is specifically targeted at community based services. This enables the auditors to assess various categories for specific protocols followed, ultrasound image quality, report writing-skills and appropriate onward recommendations for each patient. The ultrasound examinations performed are set against revised protocols, guidelines and a robust escalation policy to ensure that the patient follows the correct pathway when abnormalities are detected. The aim of the audit is not just for overall quality but to derive which category the operator requires improvement. Remedial action is put in place for all operators that demonstrate underperformance of a category.With the continuous need to provide a service that is faster and more readily available, we have introduced locums. The short coming of this decision is constancy in quality as the turnaround time for each locum is costly. Hence our locums go through a formal one week induction program. Prior to their appointment they undergo an introduction interview to familiarise themselves with the company and also allows the organisation to ask the relevant questions to ensure that the candidate is fit for purpose. The first day is the start of the induction process to disseminate ultrasound protocols, guidelines and escalation policy and familiarise with company policies. Day 2 – 4: work alongside another sonographer with double reporting. Day 5: undergo a formal competency assessment with one of the lead sonographers. Once signed off, they will be able to work individually. If unsuccessful, the induction process will resume. Up to date, we have had no locum repeat the induction week. To develop continuously improvement across the team, we have also introduced a mandatory Saturday training clinic for all permanent staff members. This is lead by a consultant radiologist and is run on a weekly basis to allow all to rotate through the clinic 2 – 3 times per year. The clinic varies between general, gynae, small parts and musculoskeletal ultrasound cases. On this day, the sonographer is formally assessed and given the chance to bring case studies or learning objectives to discuss. This

acts as CPD activity that they can document in their portfolio.Through feedback reports, competency assessment and our audit process, we can continuously act on specific areas that need improvement. By implementing these processes have lead to a reduction in clinical complaints, gradual improvement in audit results, increased participation of the team; and direct access to specific quality areas that need to be addressed. Most importantly these processes have made our staff feel valued and motivated to be part of a team that strives for excellence in service quality.

### P-120 Magnetic resonance imaging of the claustrophobic patient in the mobile environment

Gillian Winter

*InHealth Limited*

**Aim**: To identify the key factors affecting claustrophobic patients attending for Magnetic Resonance Imaging on a mobile trailer.

**Content**: An audit of a group of patients, using semi structured interviews, was carried out to determine whether there were any actions the imaging provider could take to improve the patient experience in the mobile environment.

Relevance/impact: Mobile MRI services currently provide significant additional capacity to the provision of static MRI in the United Kingdom. Space is limited and patients with a tendency towards claustrophobia find this a challenge.

**Outcomes**: Key factors raised included:

- Lack of information about the scan at the point of referral and appointment
- Some had a previous claustrophobic episode which they did not share with the imaging provider
- Some were not aware that they could have attempted the scan feet first
- Some were not offered a chaperone for support
- Being told what will happen next following a failed attempt at MRI

**Discussion**: Information leaflets should be specific to a mobile service.

Patients must advised that they are booked on a mobile and should be asked if they have had an MRI before

Feet first scans should be offered as standard where equipment allows.

Patients expressing reservations should be encouraged to try again with a chaperone.

Music and an eye mask should be offered

In the event of a failed attempt, MRI staff should explain what will happen next and the alternatives.

### P-121 Introducing a change: New MRI protocol for detection of liver lesions in non-cirrhotic patients using hepatobiliary specific contrast agent.

Sumita Chawla; Nadya Jabbar; J Malla; Ashok Katti; Anbu Nedumaran

*University Hospital Aintree, Liverpool*

**Purpose**: Gd-EOB-DTPA (PRIMOVIST) is specifically taken up by hepatocytes and shows liver-lesion contrast not achievable with gadolinium based contrast agents that significantly improve both detection and characterization of focal liver lesion.

Our aim was to evaluate the usefulness of the 10 versus 20 minute delayed sequences in patients with non-cirrhotic using a liver specific contrast agent MRI imaging protocol.

**Method**: Standard sequences for liver imaging performed at our institution are:

-Normal Sequences localiser

-T1 in and out of phase

-T2

-T2 Fat suppressed

-T1 Immediate, Arterial, portal-venous and delayed.

-T1 (10 minutes) with contrast.

-T1 (20 minutes) delayed.

-Diffusion weighted sequences.

We collected 50 randomly selected patients with non-cirrhotic liver disease over a 12-month period in 2011.

We performed a retrospective analysis to see whether or not there was additional diagnostic benefit at 20 minutes post primovist administration when compared with imaging done at 10 minutes.

**Results**: In our institution we found that in all cases (100%) of patients did not benefit from the additional 20 minute delayed sequence. We present a spectrum of cases from our tertiary centre demonstrating no conceivable change between the 10 and 20 minutes post contrast delayed sequences.

**Conclusion**: Introduction of the new liver imaging protocols with the single 15 minutes post primovist delayed sequences, replacing 10 and 20 minute delayed sequences provides many positive factors in reducing the overall MRI Liver scanning times, improve cost effectiveness, patient compliance and reduction in MRI waiting list times.

### P-122 Audits into extravasation of contrast during CT imaging and cannulation practice.

James Allred; Ann Pinder; Frank Ellwood; Priya Suresh; Dushyant Shetty

*Derriford Hospital Radiology Department, Plymouth*

CT scan numbers in the UK have increased enormously in recent years (1.4 – 3.4 million from 1997/8 – 2008), most of which require contrast. Consequently, the pressure on hospitals has been to scan more patients in less time with an increase in post-contrast investigations without the commensurate increase in resources. Contrast extravasation is one occurrence that can adversely affect the through flow of patients within a CT scanner and its causes are multi-factorial. Extravasation should be recognised quickly and treated accordingly. As such, regular audit of extravasation incidents is essential. This has implications not only for the patient who suffers an extravasation of contrast event and endures the subsequent associated symptoms, but also has ramifications for further irradiation of the patient if the desired post-contrast scan is not initially successful and impacts directly on the time available to scan subsequent patients. Over a two year period (June 2008 – May 2010) in Derriford Hopsital, there were nine contrast extravasation incidents recorded via Datix at a rate of 0.02% based on CT scan numbers. This is being re-audited over a similar time period with the results being analysed for extravasation rates. A further audit with relevance to extravasation rates looking at cannulation practice in the CT department is being undertaken and analysed for possible cannulation training requirements of staff, ward cannulation of inpatients and any time efficiency savings that might be made to improve through flow of patients and hence increase the number of patients scanned.

### P-123 RadBENCH; Benchmarking image interpretation performance

Chris Wright

*Sheffield hallam University*

**Aim**: To allow image interpretation performance to be benchmarked (measured), within hospitals, Trusts, Nationally and Internationally.

**Method**: A quantitative approach is adopted using a series of image data banks. Candidates are free to opt-in at their discretion. All data is anonymised. Performance is measured in terms of Accuracy, Sensitivity and Specificity. Re-test is typically annually as part of CPD, but is also useful after a training intervention.

**Discussion**: The majority of Radiographers fall into the 'non-reporting' category, yet are often expected to be able to express accurate opinions on the images they produce every day of their working lives. RadBENCH facilitates progression from Red Dot > Commenting > Reporting by identifying key talent and identifying training needs. It supports the DoH ROI stategy by benchmarking an individual pre and post training event to quantify return on investment. Several applications have been tested; 1) Individual annual performance check as part of CPD, 2) Training planning for managers, 3) Selection differentiator for job interviews, 4) Selection differentiator for UCAS applications, 5) Anonymised database to support other research projects. Further research is on-going.

**Conclusion**: RadBENCH provides a major leap forward and provides an objective view of image interpretation performance. Investment funding has been secured and a multi-lingual global version of the product will be available in 2013.

### P-124 Are the multidisciplinary team meetings (MDTs) serving their education value for the radiology trainee?

Sumita Chawla; Tahira Aslam; Ashok Katti

*Department of Radiology, University Hospital Aintree, Liverpool*

**Key learning objectives**: We present a pictorial synopsis highlighting the educational importance of the various MDT meetings to the radiology trainee.

We aim to encourage the additional contribution of the radiology trainee alongside the Radiology consultants in undertaking an active role in the MDT meetings.

We emphasis the key elements involved in making a MDT meeting successful, which in turn aims to enhance the radiology trainee's detection and knowledge of the imaging findings, understanding of the related pathology and the subsequent management involved in the patient's best interests.

**Description:** The MDT model was introduced and endorsed to ensure that care delivery is consistent with the best available evidence. MDT meetings create a real time discussion forum with an output that records the activity of the meeting with regard to each patient and the decisions made. In this educational poster, we will cover the importance of the MDT meetings and how it attains the training requirements for the radiologists.

MDT meetings to the radiology trainee are best described as an invaluable tool, which serve by increasing the awareness about the various imaging findings and correlating with the appropriate treatment plan by input from other members of the MDTs.

**Conclusion**: We hope to have availed the observer with this pictorial review, acting as an eye opener, in particular to the junior radiology trainees demonstrating the exceptional educational benefit that the MDT meetings consistently achieve.

### P-125 Variation, so what?

Jim Cannon; Iain Robertson

*Managed Diagnostic Imaging Clinical Network (MDICN)*

Aim - To deliver a service led "quality" benchmarking model in Radiology. "Process" benchmarking (BM) is a model where service representatives define improvement datasets and agree what type of analysis is carried out.

Methodology - Moving services from a competitive approach [to quality benchmarking] - where nationally collected data was often disowned - to a collaborative and trusted methodology for accurate, standardised data collection and analysis.

The MDICN core team has achieved national collaboration across every territorial board where representative (modality) groups are brought together to define datasets and prescribe the process of data collection and analysis. Datasets remain anonymous until trust is developed and services understand how the analysis best fits with local planning and redesign.

Results - Early outputs from modality benchmarking in MRI have accelerated the development of new services and led to local work on throughput which has directly impacted the number of patients being seen and therefore directly reducing waiting times.

Conclusion - The "Process BM" model is a tested methodology used in quality improvement work in local government, delivering locally generated improvements based on standardised and robust data. Ownership of the whole process is the key factor in this model.

Strategic leadership at national level without the constraints of board priorities or a performance management badge has allowed the model to develop as services see fit whilst maintaining national priorities and building trust.

Local leadership is the key to driving the conversion of outputs to outcomes within services, as part of continuous improvement programmes.

### P-126 Minnie hands make light work!!!

Rachael Hilton; Stuart Wade

*The Great Western NHS Foundation Trust*

With the steady annual increase in theatre activity and the role extension of theatre nurses to undertake screening procedures there was much discussion and thought behind purchasing a Mini C-am to increase availability of theatre slots and improve time flexibility. As a number of senior theatre nurses had been given formal and practical training in order to perform radiographic examinations in theatres within the trust, it was deemed feasible and manageable to expand this service to incorporate orthopaedic surgeons who would operate and manage the radiographic aspects of the surgical case.

Following a trial of two Mini –C Arms based on practicability, ease of use, manoeuvrability, image quality and dose a unit was purchased in 2011. The chosen unit met the criteria and provided ease of use for a diverse range of users. IRMER and operator training requirements were provided by Medical Physics and the equipment supplier. On going reviews of competencies and image quality were assessed by the Radiology department.

Interim results in the 12 month period since implementation of the unit have seen an increase in theatre flexibility and activity by approximately 30%. The unit is primarily used for hand surgery both elective and trauma cases, and approximately 60% of foot and ankle cases. Implementation of the unit has enabled radiographers to be deployed to other more specialised cases. Previously they would have been required to cover all theatre cases, limiting radiographer availability and often causing patient delays. This ultimately has given the trust more theatre flexibility enhancing patient care and providing a quicker through put of radiographic surgical cases.

### P-127 Service-user involvement in research: the benefits of letting them take control

Leslie Robinson; Ann Newton-Hughes

*University of Salford*

**Purpose**: to report how using a feminist approach to service-users research unearthed unanticipated findings not entirely related to the concept under investigation but important because they were participant-derived. The presentation therefore focuses on: i) the relevance of this methodology for service-user research and ii) the findings unearthed in this particular study.

**Research Aim:** to explore experiences of breast compression with clients of the UK NHS Breast Screening programme (NHSBSP).

**Methodology**: a feminist approach was used to conduct three focus group interviews. Feminist research explores the topic from the standpoint of women and also aims to empower subjects/participants to have greater control in the research process. It is thus ideally suited to involving service-users in research about their care. Therefore, although our intention was specifically to explore breast compression as the cause of pain in the mammography examination, the feminist approach required us to empower participants to direct and control the discussion according to what was important to them about their mammography experience.

**Results**: the anxieties women have concerning mammography are broader than compression-related pain and user-guided discussion showed that issues related to equipment design; uncomfortable positioning; lack of information; and unfriendly staff can all enhance the perception of, and contribute to, discomfort and pain.

**Conclusion**: researchers interested in service-user involvement should not be afraid of allowing participants to take control of the discussion. Engaging with participants in a subjective rather than objective way can unearth unanticipated data and can give a new perspective to the research concept under investigation.

### P-128 A foot in both camps- Surviving a split clinical/academic role

Alexandra Partner; Claire Mansell; Kerry Bingley

*University of Derby*

**Aims/Objectives** This brief presentation will explore the challenges behind working in a split clinical / academic radiography post in a changing NHS climate.

**Content** Through the personal perspectives of three lecturer-practitioners we will explore the issues and opportunities that have arisen during the first year of a split clinical-academic role. In this session we will discuss the challenges associated with the transition period, the practical realities of working in a split role and the benefits to both students and employers.

**Relevance/Impact** Full time academics sometimes struggle to keep their own clinical practice current and can become detached from the practical realities of service provision. For radiographer education to succeed in HEIs, educators must be responsive to changing NHS priorities.

However, the move towards seven day service delivery and shift working has resulted in significant challenges for staff employed in a clinical-academic role.

**Outcomes** Looking forward, we will explore the potential for this role to enhance student experience, professional recognition, currency of teaching, CPD, research and scholarly activity.

**Discussion** On-going service modernisation has resulted in a need to consider how lecturer-practitioners may respond to changing service demands, student expectations and shifting professional focus. Through personal experience and feedback from colleagues, we will consider how the role could be developed to have a positive effect on radiography education, how this may be measured and the remaining challenges.

### P-129 Court on the web: Courtroom simulation for distance learning

Jacquie Vallis

*Teesside University*

This year the postgraduate forensic radiography programme has moved from blended to distance learning delivered entirely online. There were a number of aspects of the blended programme that students highly valued, such as the use of external subject specialist lecturers, practical workshops, and courtroom simulation. One of the challenges in transferring this programme to distance learning has been focussed on how these practical based sessions that rely on resources at the university can still be delivered when students will never attend. Radiographers engaged in forensic practice may be required to attend court to give evidence, something which the International Association of Forensic Radiographers (2012) states is on the increase, based on the number of requests for advice received from radiographers. The blended delivery took students into the mock courtroom during their block of attendance at the university to be cross-examined on their evidence and statement. Students reported that this process was highly important in enabling them to prepare for the real thing and in teaching them how to write a good statement. This university is the only HE provider that offers such training; therefore, the team were keen to keep this in the programme. This presentation will examine how this has been achieved with the courtroom simulation using software Adobe Connect webinar software, provided by Mizaru. In addition, the experiences of the staff and students involved will be discussed.

### P-130 Radiographer commenting: is there a reluctance to participate?

Carys Hunt; Elizabeth Carver

*Bangor University*

**Aims:**

- Establish if radiographers feel confident to comment on all anatomical regions
- Ascertain why radiographers may not participate in some aspects of commenting
- Determine if radiographers prefer to red dot or comment
- Ascertain if radiographers comment when lacking confidence in their opinion
- Ascertain if radiographers believe commenting systems benefit patient care

**Content**: Previous related research; methodology.

**Results**: radiographers' confidence in performance and preferred scheme. Potential future studies. Recommendations for improving participation in commenting.

**Relevance/impact**: The commenting system is currently a 'hot topic' in radiography. This project highlights current level of participation in a scheme in a district general hospital, and reasons for level of participation.

**Outcomes**: Results indicate that radiographers were reluctant to comment on abdominal, chest, axial skeleton and paediatric images. Reasons given were: lack of time, confidence and level of training. 42.9% would not offer indication of abnormality if they were unsure regarding confidence in their opinion. 42.9% would still offer comment if unsure and 14.2% would offer a red dot. 50% stated they preferred the commenting system to the red dot system and 71.4% agreed that the commenting system is beneficial for patient care.

**Discussion**: It appears that level of training may not be perceived as adequate and this may affect confidence and participation. Recommendation is that further training and updates may improve confidence and improve level of participation, with audit of participation after 6 months.

### P-131 Audit of the quality of DATIX incident reporting for contrast extravasation

Sophia Sakellariou; Giles Roditi

*Department of Radiology, Glasgow Royal Infirmary*

**Background:** Iodinated contrast media are the most commonly used injectables in Radiology today. Extravasations can occur during hand or power injection in 0.1%–0.9% of cases but is more common in the latter. Small extravasations of contrast result in minor or no effect to the patient, but occasionally effects are severe with subsequent requirements for tissue debridement and/or surgical intervention.

Extravasation incidents are reported in the DATIX system and analysed. Most of the information relating to the incident is electronically inserted by the incident reporting person in free text format. The authors hypothesised that this method of data input is inconsistent and unreliable for accurate incident reporting.

**Method/Results:** Based on previous experimental computational fluid dynamics (CFD) results relating contrast media parameters with probability of extravasation, nine items of information were considered essential for inclusion in the free text section of the incident reports for accurate documentation of extravasation incidents.

A retrospective audit of the records demonstrates a vast divergenge in the quality of information reported on DATIX with an average of 4 items reported per record and a range of 1-9 items per record. Most records have limited documented evidence of actions being taken in response to the adverse event.

**Rationale for inclusion: I**t is proposed that the introduction of a pro-forma will improve the documentation of information and allow for better data collection leading to improvement in the service and patient management as well as provide data that will further inform research and audit.

## Errors and discrepancies

### P-132 Disagreement in chest x-ray interpretation: comparative analysis between consultant radiologists and a reporting radiographer

Nicholas Woznitza; Stephen Burke; Suvarna Amin; Kamini Patel; Kathryn Grayson; Keith Piper

*Homerton University Hospital; Statistics by Design; Canterbury Christ Church University*

**Aims**: Accurate image interpretation is crucial to enable correct patient management by clinicians. Image interpretation is a subjective task, and studies demonstrate significant observer variation in x-ray interpretation. There is little work examining the agreement between consultant radiologists and reporting radiographers in chest x-ray (CXR) interpretation.

**Methods**: A random sample of cases (n=100) was selected from a consecutive series of 1,000 CXR reports produced by the reporting radiographer in clinical practice. Fifty images were reviewed by each radiologist who examined the radiographer report for accuracy and agreement, including 50% duplication of cases between radiologists to determine inter-radiologist variation. The radiologist's evaluation was independent, blinded to the proportion of cases receiving multiple radiologist opinions. Inter-observer agreement analysis using Kappa was performed.

**Results**: Eight discrepancies were produced between the radiologist and radiographer interpretation; four of these occurred in cases which received two radiologist opinions. Only one discrepancy was confirmed by both radiologists; three cases produced findings in which a radiologist was in disagreement with the other radiologist and radiographer. Only one major discrepancy was identified. This case was deemed normal, in agreement with the

radiographer report, by one radiologist. CT confirmed small volume lymphadenopathy and tuberculosis diagnosed. Inter-observer agreement (Kappa, K) between the radiographer and the three radiologists was found to be almost perfect, K=0.91, 95% Confidence Intervals (0.79,1.0), K=0.91 (0.79,1.0) and K=0.83 (0.68,0.99) respectively. Inter-radiologist agreement was found to be K=0.82 (0.52,1.0) and K=0.91 (0.75,1.0).

**Conclusions**: The level of inter-observer agreement between radiologist and radiographer reports compares favorably to inter-radiologist variation.

### P-133 Are we getting the message across? An audit of radiology reports

Jawad Naqvi; Richard Sawyer

*University Hospital of South Manchester*

**Purpose**: Poor structure and use of ambiguous "hedge" terminology in radiology reports may hold significant medico-legal implications. This audit was undertaken to assess the quality of the conclusion provided and the use of "hedge" vocabulary in radiology reports.

**Materials/methods**: 44 radiology reports (20 plain film, 11 CT, 13 MR) were randomly chosen from the PACS in a major teaching hospital trust, including both in-house (28) and teleradiology (16) reports. Standards were: 100% of report conclusions answer the clinical question posed (derived from RCR Reporting Skills audit) and with ≤1 "hedge" per sentence (derived from Hall et al 1990). A medically qualified non-radiologist graded the answer provided in report conclusions using a subjective iterative scale ranked from 1-5. Reports met the standard if scored ≥4/5. "Hedge" terms were defined using the literature (Wallis et al 2011).

**Results**: 37/44 requests provided an explicit question. 32/37 (86%) reports adequately answered the question (score ≥4/5, 76% in-house, 100% teleradiology). Average grade of answer was 4.14/5 (3.96 in-house, 4.46 tele-radiology). 36/44 (82%) reports avoided hedging (≤1 hedge per sentence, 81% in-house, 88% teleradiology). Average number of hedges was 1.3 (1.64 in-house, 0.7 teleradiology).

**Conclusion**: Standards were not met; 86% of reports answered the question and 82% avoided "hedging". Results suggest teleradiology outperforms in-house reporting and may reflect the greater complexity of cases reported in-house. Further work is planned to expand the sample size, increase the number of observers and clarify the grading scale before providing recommendations to radiology trainees on reporting syntax.

### P-134 Wrong site surgery - how well does radiology prevent this?

Tracy Au Yong; Shahid Hussain

*Heart of England NHS Foundation Trust*

**Aims/Objectives:** This year a never event occurred in this author's trust where a patient underwent wrong site surgery. The root cause analysis identified multiple contributing factors, in particular the wrong information given on the radiology request form and the subsequent radiology report not identifying the side of the lesion. This sparked an interest as to whether reporters were reporting laterality of abnormalities on the imaging as routine practice.

**Content**: This retrospective audit looked at reports from different reporters; modalities (33% magnetic resonance imaging, 33% ultrasound, 33% computed tomography) and anatomy (pelvis, brain, spine, abdomen, chest) over a time period before the never event was discussed at a departmental discrepancy meeting.

**Relevance/Impact:** The National Patient Safety Agency estimates that wrong site surgery occurs between one in 4,550 and one in 780 cases. The incidence of wrong site surgery related to unreported side of pathology in diagnostic imaging is small, but has significant impact on patient outcome.

**Outcomes:** We found that all reports across the modalities done during this time had correctly reported laterality in abnormalities. In addition, 83% of referral requests specified side of symptoms where applicable.

**Discussion:** All the reports reviewed in this audit identified the side of any abnormality, suggesting that this occurrence was a one-off incident. Whilst such occurrences are thankfully rare, this sentinel event has reminded us of the importance of ensuring our radiological reports contain the anatomical site and side of abnormalities.

### P-135 "Is that your final answer?" an audit of provisional versus final reports of on-call CT imaging

Mubeen Chaudhry; Sudha Muly; Ravi Adapala

*Wirral University Hospitals Trust*

**Aims/Objectives:** The on-call CT reporting service is generally provided by a two-tier rota, consisting of a registrar with indirect supervision by an on-call consultant. Provisional reports are issued at the time of scanning and a final report issued later when reviewed by a senior colleague.

The aim of this study is to ensure that a high standard of accuracy is provided by the Radiology registrars on call.

**Content:** No defined standard of discrepancy rates is set. The literature suggests discrepancy rates of between 2.6 – 5.4 %. The local target used was 5 % for non-significant discrepancies and 2.0 % for significant discrepancies. Five registrars were included in this study with retrospective data collection performed.

A total of 70 studies were analysed with 4 discrepancies noted. Discrepancies were noted in a total of 4 cases. Of these, 1 was deemed to be significant and 3 non-significant, giving an overall discrepancy rate of 1.4% for significant findings and 4.3% for non-significant findings.

**Outcomes:** Discrepancy rates of the on call reporting registrars falls within those noted in studies performed in other centres. With more experience, confidence and judgment improves thus ensuring prompt and accurate reports are issued.

**Discussion:** Consultant-led supervision during an on-call period ensures real-time rectification of potential reporting errors. It is important to document in the report if discussion with the on-call Consultant has been performed. If a particular CT examination is noted to have higher discrepancy rates, targeted training or supervision to improve reporting accuracy may be performed.

### P-136 Errors in final radiology reports generated using voice recognition software

Caroline Parkin; Vandan Arora; Paul Hulse

*North Western Deanery School of Radiology*

**Objective**: Audit the frequency and spectrum of errors in radiology reports generated using voice recognition software in a single Radiology Department.

**Content**: 160 radiology reports from December 2011 - February 2012 were selected according to grade of reporter and imaging modality to reflect the typical workload of 16 Radiologists (14 Consultants, 2 trainees). Errors were categorised and results presented to the reporters. The process was subsequently repeated in June 2012. This poster presents results of the completed audit cycle.

**Relevance**: Voice recognition software can shorten report turnaround but is associated with transcription errors that can alter the meaning of reports. Published error rates vary between 4.8% and 23%. Awareness facilitates vigilance and avoidance of these errors.

**Outcome**: Initially 16% of reports (26/160) contained errors, word substitution being the most common error type, with one very significant error that changed the meaning of the report. Re-audit results demonstrated 12% of reports (19/160) were erroneous, extra words being the most common error type, but no very significant errors were identified.

**Discussion**: Completion of the audit cycle demonstrated an interval reduction in errors. Both audits highlight a spectrum of errors, with word substitution and extra words being the most common. Errors are more common in longer reports (specifically CT reports) and reports authorised later in the day (after midday). Extra vigilance with these reports and the use of preset macros is recommended. We advocate reflection on the potential causes of errors, action to minimise these and regular audit to facilitate continual improvement.

### P-137 The Radiology Events Register (RaER): incident reporting in radiology

Catherine Mandel; Natalie Hannaford; Jane Grimm; Tim Schultz

*Peter Maccallum Cancer Centre; Australian Patient Safety Foundation; The Royal Australian and New Zealand College of Radiologists*

**Aims/ Objectives :** To describe the process of developing a radiology-specific incident reporting system, the benefits and challenges.

**Content**: Incident reporting has a central role in improving safety in high-risk industries. Adoption in healthcare is patchy and lags behind other industries.

The Radiology Events Register (RaER) started in 2006 as the first dedicated radiology incident reporting database. It accepts reports of adverse events and near misses from anyone working in, or interacting with, medical imaging.

Encouraging the reporting of incidents is challenging: a variety of educational tools and incentives have been used. Feedback to the profession has included case studies, peer-reviewed journal articles, conference presentations, workshops and a biennial conference. The database has been used for research into radiology safety issues.

Surveys of attitudes to the database and reporting have been conducted.

**Relevance/Impact:** Incident reporting that is relevant to radiology and applied within a just culture has great potential to improve patient safety.

**Outcomes:** Establishing a dedicated incident reporting system is not difficult if experienced partners are used. Encouraging healthcare practitioners to use the system, and extracting system learnings, are more difficult and require constant promotion, incentives and engagement.

**Discussion:** Incident reporting is a key tool in the quest to improve safety in healthcare. The use of specialty-specific reporting systems is useful as the content and analysis can more accurately detect and address issues within the specialty. Until a just culture is established and reporting becomes second nature, there are ongoing challenges in getting incident reports entered.

### P-138 When it all goes wrong – what should we tell the patient?

Ann Pinder

*Plymouth Hospitals NHS Trust*

We have had many debates in our radiology department about whether to, and how to inform the patient if they have been involved in an untoward incident involving radiation.

The relaunch of the 'Being Open' policy by NPSA in 2009, and questions from the CQC in relation to a reported incident prompted us to finalise a many times drafted policy in 2012. We took data from the Health Protection Agency report HPA-CRCE-028 which categorised the radiation induced cancer risk to the patient as low, very low, minimal or negligible, and used the highest level (low) to be that at which we would inform the patient. These incidents would also be reported to the CQC or HSE.

This poster will outline the main points of our policy:

- At what level of risk do we inform the patient
- When do we, and who informs the patient
- How this is documented
- Any follow up documentation.

To date we have only informed one patient and that has been a recent event – by the time the poster is produced we hope to have an update on how this was dealt with and received by the patient.

The poster will also include pros and cons of giving patients information regarding errors with radiation.

### P-139 MRI-induced soft tissue pain: Incidental finding of a 15 year old foreign body

Theofilos El Sayed Omar; Ussamah El-Khani

*Keele University Medical School; Department of Plastics, Reconstructive and Aesthetic Surgery, St Thomas' Hospital, London*

**Aims**: To highlight the importance of past medical history when screening for MRI contraindications, and the importance of plain imaging referral for patients suspected of having metallic foreign body embedment/injury.

**Content**: We present the case of an 82 year old female who developed right middle finger pain during MRI. Prior to the scan, the patient filled out a routine MRI patient safety questionnaire which did not reveal any apparent contraindication to MRI.

**Relevance**: The presence of foreign body in the gastrointestinal tract, foot and eye through ingestion or trauma is well reported in the literature. Foreign body in the digits without the patient being aware of it appears to be much rarer.

**Outcomes**: Examination confirmed no obvious sensory-motor deficit, and no soft tissue or joint pathology was palpable. A plain radiograph of the right hand revealed a 2cm metallic spike on the radial aspect of the right middle finger distal phalanx.

**Discussion**: Strong magnetic fields encountered in MRI may cause the object to migrate in an unpredictable manner. Previously reported incidents of undetected foreign bodies during MRI have proven fatal. Screening questionnaires rely on the patient/carer's knowledge, but this is not always reliable. This becomes more problematic when considering groups of patients who may not be fully compliant with the screening process. This case report is a reminder that the responsible clinician should be vigilant when screening for metallic foreign bodies on completion of the MRI checklist, and should adopt a low threshold for plain imaging prior to MRI.

### P-140 Cardio-respiratory radiology discrepancies

Praveen Varra; Indrani Venkatadasari; Shahid Hussain

*Birmingham Heartlands Hospital, Birmingham*

**Aims:** To report commonly missed cardiovascular and respiratory lesions on radiological imaging at our institution, identified via the discrepancy meeting and suggest tips on how to prevent future misses.

**Content:** We present a pictorial review of cardiovascular/respiratory errors identified at the quarterly discrepancy meetings at our institution. We suggest a checklist of reviews to ensure that errors do not happen again.

**Relevance:** In spite of the prolonged training; series of exams/assessments, radiology trainees/consultants occasionally miss/misinterpret lesions on radiological imaging with variable patient consequences. The purpose of the discrepancy meetings is to revisit these misses/misdiagnoses and learn from them, as per the RCR guidelines - Standards for Radiology Discrepancy meetings 2007.

**Outcomes:** 64 discrepancies reviewed over 18 months.

Cardiovascular discrepancies - RCA to coronary sinus shunt, ASD, PEs and an AVM.

Respiratory discrepancies - lung cancers, lung metastases, retro-cardiac and a hamartoma.

**Discussion**: CXRs are common and complex - contributed to majority of the discrepancies; lung cancers, predominantly tricky retro-cardiac nodules due to composite heart shadow. The AVM miss on CXR is a rare pathology, was present on the old images.

The misses of shunts on CTPA were uncommon pathologies, not commonly looked for by general radiologists and registrars. However, missing multiple PEs on CT is a serious discrepancy.

What can we learn from these mistakes?

1) If you don’t look for it, you won’t pick it up plus review old images.

2) Systematic review of CXRs- Lung apices, hila, retro-cardiac, bones and soft tissue lesions (Breasts/axillae).

3) Always review and comment on the heart on CT/CTPAs.

4) Remember CXR/CT limitations.

### P-141 Pictorial review CT head soft tissue normal variant pitfalls

Paul Lockwood

*Canterbury Christ Church University*

**Intended learning outcomes** - To recognise the varied neurological appearances of soft tissue normal variants with the brain. Highlighting the importance of differentiation of normal and variant anatomy from the pitfalls of misdiagnosing a pathological condition

**Content** -Pictorial review of 12 common examples of neuroradiological normal variant conditions of the brain, including cerebellum, ventricles, and calvarium.Relevance -There are an increase of radiographers taking up CT Head Reporting courses throughout the country due to the increased workload of CT departments and NHS funding of stroke units in district general hospitals

**Outcomes** - To increase reporting radiographers and CT radiographers knowledge and learning of cerebral anatomy and variants.

**Discussion** - The differentiation of a normal anatomical variant tends to come from experienced recognition of established patterns of variation from either empirical visual assessment or evidence based research material that allow the reduction of false-positive findings and reduce unnecessary additional diagnostic imaging.

## Patient dose measurement and management

### P-142 The incidence of contrast induced nephropathy in EVAR procedures

Gulraiz Ahmad; John Overton; Jawad Naqvi; Abysinia Sibanda; Taohid Oshodi

*The Royal Oldham Hospital; University Hospital South Manchester*

Contrast media is often used in imaging and non-invasive procedures such as endovascular aneurysmal repair to enhance an image profile. The most commonly used contrast media have previously been gadolinium and iodinated contrast media.

Contrast induced nephropathy is the most frequently used term to describe kidney injury seen after exposure to iodinated contrast media. It has been defined as increase in serum creatinine by 44micromols or >25% serum creatinine rise above baseline within 48 hours after contrast administration. (ESUR guidelines 2007)

**Aim**: To assess the comorbidities of each patient and to find the optimal amount of contrast that should be administered to a patient to prevent contrast induced nephropathy, whilst also providing an adequate image.

**Method**: We have carried out a retrospective audit of 50 EVAR procedures carried out from April 2012 to February 2013, assessing how much contrast media was used in each patient. We have also collected data for the pre-procedure and post-procedure eGFR and serum creatinine levels to assess whether any of the patients suffered from acute contrast induced nephropathy. Results showed that people with existing comorbidities were more prone to developing CIN.

### P-143 Audit of radiation dose from CT KUB examinations at Nottingham University Hospitals

Christopher Clarke; Rosemina Ahmad

*Nottingham University Hospitals*

There has been an exponential increase in the use of CT KUB over the past decade. This is of particular concern in the population scanned as patients are generally young and often repeated stone formers requiring multiple scans. This study compares the radiation dose of locally performed adult CT KUB examinations with the national standard, with an aim to optimising patient dose.

A prospective analysis was undertaken of all adult CT KUB doses performed over a two month period at Nottingham University Hospitals (NUH). Five CT scanners were included and the dose length product (DLP) obtained for each patient scanned. The mean DLP for each scanner was calculated and converted to an effective dose to compare to the national standard.

In total 199 scans were performed with a mean patient age of 47 years old. There was a difference in mean effective dose for each scanner, with older scanners giving a dose above the national average and approximately twice the radiation dose when compared to the newer scanners. Overall the mean effective dose for adult CT KUB examinations at NUH was below the national average.

In order to optimise patient dose, we are now comparing the different scanners by testing with standardised Perspex phantoms. Changes will then be made to the CT KUB protocols to optimise noise to signal ratio and patient dose. A re-audit of patient dose is due to be undertaken in early 2013.

### P-144 An analysis of cardiothoracic patient radiation doses recorded in RIS

Oliver Morrish

*East Anglian Regional Radiation Protection Service, Cambridge University Hospitals NHS Foundation Trust*

**Aim**: To analyse retrospective patient dose data contained within a radiology information system and investigate the practicality of using this to replace prospective paper audits.

**Method**: RIS data was extracted consisting of 44,225 records from a specialist cardiothoracic hospital. Analysis was carried out using the fields relating to the radiation exposure including the dose type and quantity. These records could be further broken down by the equipment used, examination date and radiographic operator. Data was compared to results from traditional prospective audits.

**Outcomes**: Excluding those records where no dose information was expected to be recorded, 8.0% of records were recorded as having no dose. There were also significant numbers of examinations recorded with extremely high and low doses. A visual inspection of the dose value histograms showed that there was uneven distribution of these values at either end of the range and therefore median dose values proved to be an unreliable indicator of average patient dose. Filtering the data to exclude points outside two standard deviations gave mean values that were comparable to those obtained in prospective audits. Further filters based on the number of data points and standard error enabled derivation of local diagnostic reference levels (LDRLs).

**Conclusion**: There were no systemic patterns found in the entry of anomalous data. With filtering, RIS data may be used to audit patient radiation doses and a number of LDRLs have been set for a wide range of cardiothoracic procedures.

### P-145 Investigation on the influence of dose minimization management on the PET image quality

Hishar Hassan; Fathinul Fikri Ahmad Saad; Salasiah Mustafa; Noramaliza Mohd Noor; Abdul Jalil Nordin

*Centre for Diagnostic Nuclear Imaging, UPM; Department of Imaging, Faculty of Medicine and Health Sciences, UPM*

**Purpose:** The study aims to prove that a reasonable-to-excellent PET image could be achieved via a low-dosed of 18F-FDG injected.

**Methods:** This is a retrospective analysis of 50 oncology patients who were injected with an average of 332.27±34.08 MBq of 18F-FDG for PET/CT whole body examination. Patients were divided into 2 groups based on total activity of 18F-FDG injected: less than 333 MBq (305.24±11.87 MBq) (group 1) and more than 333 MBq (366.67±17.73 MBq) (group 2). Multiple Image Projection (MIP) PET images were scored visually by two qualified nuclear radiologists using a three-point scoring scale (poor, reasonable and excellent). The agreement between radiologists was analysed using kappa measure of agreement (K). The coefficient of variance (COV) was measured in a right lobe of liver to quantify noise. The prediction on reasonable-to-excellent PET image by the total activity of 18F-FDG injected was analysed using a Chi-squared test (x2). A p value of $< 0.05$ was considered significant.

**Result:** Agreement on PET image scoring was substantial, with a kappa value of 0.760. The prediction of the PET image quality adopting the low-dosed 18F-FDG injected has been found to be significant ($p < 0.05$). However, higher noise is observed at low activity injected which may not hamper the overall quality of image yield.

**Conclusion:** A reasonable-to-excellent PET image quality could be achieved by administration of low-dosed of 18F-FDG technique. Nevertheless, improvement in the routine protocols would obviate the loss in image quality when dose < 333 MBq is used.

### P-146 The effects of CT dose reduction software and patient body mass index on total CT dose

Simon Greenwood; Richard Hawkins

*Mid Cheshire Hospitals NHS Foundation Trust*

**Purpose:** To evaluate the effect of using adaptive statistical iterative reconstruction (ASIR) technology on CT dose levels and to investigate the degree of CT dose variation with body mass index (BMI).

**Method:** Over a period of 1 week, 241 patients (128 female, 113 male; mean BMI 27.2) underwent 64-slice multidetector CT scanning (at 40% ASIR) and data was obtained for BMI and total CT dose.

**Results:** For patients with a normal BMI (20 – 25) the mean CT dose levels were all below the traditionally recommended dose ranges (CT head 0.8 mSv (recommended 1 – 2 mSv), CT abdomen / pelvis 5.5 mSv (8 – 14), CT chest / abdomen / pelvis 8.9 mSv (13 – 18) and CT chest 2.2 mSv (5 – 7)).

The largest data set was the CT abdomen / pelvis group, which demonstrated a very strong correlation between total CT dose and patient BMI (R2 = 0.85) and showed a greater than 10-fold increase in total CT dose between the BMI groups of BMI < 20 and BMI > 40 (2.9 vs. 34.8 mSv, $p < 0.05$). This pattern of dose increase was echoed for the CT chest / abdomen / pelvis group (5.3 vs. 31.8 mSv, $p < 0.05$), CTPA + CT chest group (1.8 vs. 9.3 mSv, $p < 0.05$) and CT KUB group (1.2 vs. 8.2 mSv, $p < 0.05$).

**Conclusion:** CT doses are lowered with the introduction of statistical iterative reconstruction technology. However, there is a huge variation in total CT dose with patient BMI, highlighting the need for BMI-specific CT dose tables and scanning protocols.

### P-147 Dose comparison between CT urography and traditional IV urography

David Little; Amit Parekh; Paul McCoubrie

*North Bristol NHS Trust*

**Aim**: To compare the doses between CT urography (CTU) and IV urography (IVU)

**Content**: Our poster will present the results of a retrospective radiation dose comparison between 50 consecutive CTUs and 50 consecutive IVUs.

**Relevance**: CT urography has largely replaced the IVU in the investigation of haematuria and other urinary tract pathology. In our centre CTU is performed as 3-phase examination which means a high radiation dose compared to an IVU series which normally involves 5-7 radiographs of the abdomen.

**Outcomes**: 50 consecutive CTUs and IVUs were reviewed and the dose information recorded from the radiology information system. The number of radiographs in the IVU series ranged from 2 – 11, the average number of radiographs was 5.3. There were five 2-phase CTU examinations and forty-five 3-phase CTU examinations. The mean dose from CTU was 24.6mSv, median dose 20.0mSv and the standard deviation 13.5mSv. The mean dose from IVU was 5.1mSv, median dose 4.3mSv and the standard deviation 3.0mSv.

**Discussion**: CTU is a high dose study (average: 24.6mSv), almost five times the dose of an IVU (average 5.1mSv). CTU has advantages in terms of increased sensitivity and the ability to pick up non-urinary tract causes of pain however we must be able to justify the increased dose. Using lower dose CTU techniques such as a biphasic injection protocol or omitting the plain scan can reduce doses and this is something we are exploring in our centre following these results.

### P-148 Is adequate information being given for rejected CT requests?

Davina Mak; Shahid Hussain

*Heart of England NHS Foundation Trust*

**Background**: It is essential that clinicians requesting CT scans supply radiologists with sufficient information to assess the urgency, relevance and context of the scan. Rejected scan requests can lead to delay in diagnosis, poor patient satisfaction and inefficiencies.

**Aims**: To establish if reasons for rejections are appropriately communicated back to requesting clinicians with guidance given on 1) reasons for rejection and 2) contact details of radiologist 3) to evaluate if those patients who were rejected subsequently had a CT scan.

**Method**: Retrospective study of all rejected CT requests at our institution during April 2012. All data was collected from CRIS, Radiology information system.

**Results**: There were 104 rejected requests. 6% stated no reason for rejection. 66% of rejected CT requests provided contact information. 35% of rejected scans were not indicated according to clinical history provided and of these 64% had no further imaging requested. 21% were rejected due to lack of clinical information, 16% because other modalities were advised, and 15% required further discussion with a radiologist. Overall 50% of rejected requests had no further requests for scans.

**Conclusion**: Radiologists who vet scans need to be aware of the need to effectively communicate reasons for rejection and provide guidance and training to clinicians on the indications for CT scans but also how to better investigate a patient. In turn clinicians must supply sufficient clinical information to allow radiologists to understand the needs of the scan and more importantly to report its findings so they are clinically relevant.

### P-149 Low dose CTPA; the death of perfusion imaging?

Claire Brettle; Laura Thwaites; Princemon Mathew; Andrew Beale

*Great Western Hospitals NHS Foundation Trust*

The aim of the audit was to optimise low dose techniques for CTPAs using current dose saving software.

There are currently two methods used to establish the presence of pulmonary emboli; Computed Tomography (CT) and Nuclear Medicine (NM). NM can only offer a probability of emboli by demonstrating filling defects. CTPA is the gold standard that visualises emboli.

CT is a high dose examination. With its increase in use, manufacturers of CT have sought to optimise dose reduction techniques including iterative reconstruction (IR) and kV modulation.

We currently use a Siemens 128 AS+ which has been upgraded with SAFIRE (IR) and CARE kV (kV dose modulation) and mA dose modulation.

Retrospective audits were completed, comparing patient dose before and after these packages were installed.

4 Separate cohorts were analysed. All involved consecutive patients for CTPA.

| | |
|---|---|
| Group 1 | scanned at 100kv |
| Group 2 | scanned with CARE kV |
| Group 3 | scanned with CARE kV and SAFIRE |
| Group 4 | scanned at 80kV <80kg, 100kv >80kg |

All 4 groups of patients had diagnostic quality CTPA scans.

**Conclusion** : Using SAFIRE and CARE kV we have now optimised images whilst reducing doses to an average of 1.3mSv. This suggests that NM, with an average dose of 2.3mSv, should only be used when CT is unavailable. Further dose reductions may be possible using model based software. We are continuing to audit.

### P-150 Dose audit of gastro-endoscopic services

Paul Reid; Suzanne Amin

*Aintree University Hospitals NHS Foundation Trust*

**Aims** - The aim was to reduce the average aquired patient dose recieved by patients who are undergoing E.R.C.P. procedures, without compromising on the high diagnostic quality of the images produced.

**Content** - An audit was carried out in January 2012 which compared screening time, dose, and image quality between the equipment previously used for E.R.C.P.'s and the newley installed equipment. Although it showed a decrease in screening time, and an obvious improvement in image quality, a significant dose increase was noted. Dose reduction methods and were introduced, and a re-audit was carried out 10 months later.

This audit resulted in us seeing screening time staying roughly the same, and image quality remaining very high, yet resulted in a dramatic decrease in average patient aquired dose.

**Relevance / Impact** - As E.R.C.P. procedures are a common procedure undergone by many patients, by reducing dose, and performing the procedure in as few sessions as possible, this can only be of benefit to the patients.

**Outcomes** - The January audit showed a decrease in screening time of 16%, with an increase in dose of 21%.

The re-audit gave the results of screening time increasing by just 1%, yet average patient aquired dose decreasing by 41% as a result of the methods introduced. Diagnostic image quality remained unchanged.

**Discussion** - Although dose has been dramatically reduced, I believe that it is possible to reduce it further, without affecting the quality of the imaging, or the care or treatment that the patient will recieve.

## Computer assisted detection/diagnosis and image perception

### P-151 Triple phase pancreatic MDCT scanning- pros and pitfalls

Hussein Hassan; M Arrayeh; Z Al-Ani; K Prescod

*North East Lincolnhsire; Manchester Radiology Training*

**Key Learning Objectives**. Awareness of the advantages of triple phase pancreatic scanning for lesions but an increased awareness that increased sensitivity for small tumors requires adjunct imaging.

**Description**. Triple phase MDCT is used for evaluating pancreatic lesions since it increases the sensitivity and specificity of lesion identification. However, in a collection of cases presenting with pancreatic lesions, the triple phase pancreatic scans were reviewed. A number of lesions were difficult to detect even despite the triple phase CT and subsequently required adjunct imaging such as MRI or endoscopic ultrasound for lesion identification. This impacts on the patient outcome if early treatment is instigated.

**Conclusion**. Triple phase CT has been quoted to have sensitivity of around 80% in the literature,but clinicians need to pursue non detection with additional tests in patients where malignancy is strongly suspected..

### P-152 Low-dose versus high-dose CT acquisition on a PET/CT system for lesion detection: a free-response receiver operating characteristic study

Amy Wareing; Peter Hogg; John Thompson; David Manning; Katy Szczepura; Sobhan Vinjamuri

*Robert Gordon University; University of Salford; Royal Liverpool and Broadgreen University Hospitals NHS Trust*

**Aim**: To determine whether significant differences in lesion detection performance exist between a diagnostic quality CT (DQCT) acquisition and a CT attenuation correction (CTAC) acquisition within an anthropomorphic chest phantom.

**Method**: An anthropomorphic chest phantom containing a range of sizes and densities of simulated lesions was scanned on the GE Discovery VCT 64 slice PET/CT using low (42mA, 0.5s rotation) and diagnostic quality (293mA, 0.5s rotation) CT acquisition protocols. No phantom movement occurred between acquisitions to ensure that lesion positions remained the same on each set of images. Scanning produced 184 cases (47 abnormal cases containing 59 lesions; 45 normal cases), these were evaluated by 10 observers using ROCView. A free-response receiver operating characteristic method was used, this allowed observers to localise and score multiple decision sites. Decision sites were classified using an acceptance radius. The jackknife alternative free-response receiver operating characteristic (JAFROC) figure of merit (FOM) was used for significance testing. A difference would be considered significant at $p<0.05$.

**Results**: A significant difference in lesion detection was seen ($p = 0.01$) in favour of the DQCT acquisition. The JAFROC FOM for the CTAC and DQCT acquisitions were 0.781 and 0.848 respectively.

**Conclusion**: For accurate lesion detection in an anthropomorphic chest phantom there is a diagnostic advantage in using a high-dose CT acquisition. Further work would evaluate the potential for optimisation of this high-dose acquisition. Questions are also raised over the value of acquiring an attenuation map at 42mA, if this could be provided by a much lower dose acquisition.

### P-153 Adaptive iterative dose reduction versus filtered back projection for lesion detection: a free-response receiver operating characteristic study

Ioannis Vamvakas; Peter Hogg; John Thompson; David Manning; Katy Szczepura

*Wrexham Maelor Hospital; University of Salford*

**Aim**: This comparative analysis examines lesion detection within an anthropomorphic chest phantom for adaptive iterative dose reduction (AIDR) reconstruction and filtered back projection (FBP).

**Method**: An anthropomorphic chest phantom containing a range of sizes and densities of simulated lesions was scanned on the Toshiba Aquilion ONE 320-slice CT system. The phantom was scanned on 20, 40, 60 and 80mA and reconstructed using either FBP or AIDR. No phantom movement occurred between acquisitions to ensure that lesion positions remained constant. Scanning produced 68 cases (34 abnormal containing 46 lesions; 34 normal). 11 observers using ROCView evaluated images. A free-response receiver operating characteristic method allowed observers to localise and score multiple decision sites. Decision sites were classified using an acceptance radius. The jackknife alternative free-response receiver operating characteristic (JAFROC) figure of merit (FOM) was used for significance testing. A difference would be considered significant at $p<0.05$.

**Results**: A significant difference in lesion detection was seen ($p = 0.0005$). The JAFROC FOMs suggest that lesion detection performance was improved above 20mA. No significant difference in lesion detection performance was seen between FBP and AIDR at any specific mA level.

**Conclusion**: Lesion detection performance can be maintained at a statistically equal level above 20mA within an anthropomorphic chest phantom. It is interesting to note that, despite improved signal to noise ratio, AIDR did not offer a statistically significant improvement in lesion detection. Further work would investigate the value of AIDR when optimising the image between 20mA and 40mA.

### P-154 The impact of pre-operative MRI in breast cancer in a Northern Irish Centre

MP Eastwood; AHK Ang; E Gibson; Calvin Ng; MR Whiteside

*Antrim Area Hospital*

**Objectives:** Retrospective case based review of patients with breast cancer to assess the benefit of breast MRI over other imaging modalities in Antrim Area Hospital in 2011.

**Content:** Cancer sizing (mm) was documented for MRI and ultrasound, with mammography findings noted and actual size documented from final pathology. Upgrade classified as lesion sized correctly on MRI but not on other imaging as greater than 35mm, therefore potentially requiring mastectomy.

**Relevance:** MRI is more sensitive than conventional imaging in staging breast cancer with a correct change of treatment in 12-32% of patients. The multi-central COMICE trial failed to show that the addition of MRI to conventional triple assessment was associated with a reduced re-operation rate. Our study looked at the accuracy and impact of breast MRI in a single centre when undertaken by a group of expert radiologists.

**Results:** 40 consecutive breast cancer staging MRI examinations took place in 2011. 19/40 (47.5%) had lobular carcinoma. Patients undergoing standard triple assessment had a re-operation rate of 15.5%, compared with 7.5% in patients undergoing MRI pre-operatively. MRI correctly upgraded 12/40 (30%) breast cancers, 7/19 (36.8%) in lobular cancer. 55.3% of lesions were within 20% of actual size on MRI compared within 29.4% on US ($p=0.034$).

**Conclusion:** MRI in this study reduced re-operation, upgraded 30% of patients to mastectomy and was significantly more accurate at sizing lesions than US. We conclude MRI is of value in routinely imaging breast cancer prior to surgery.

## Radiation protection and quality assurance

### P-155 Exclusion of the lens of the eye in CT head examinations - closing the audit loop

John Adu; Niamh McGuinness; Kamini Patel

*Homerton University Hospital*

**Introduction:** The current standard set by the Royal College of Radiologists states that 100% of CT head scans should be performed with the baseline set so as to exclude the lens of the eye, thereby reducing the radiation dose to the eyes and the likelihood of cataracts formation.

**Aims:** To re-audit the practice of CT head scans performed at our institution against the RCR standard. Scans were reviewed to assess whether the lens of one or both eyes were included in the field of examination.

**Materials and Methods:** We performed a retrospective audit of 50 CT head scans performed in February 2012. Data obtained were compared to results from the 2011 audit cycle.

**Results:** In 2012, 19 scans (38%) included one or both lenses on CT compared with 24 scans (48%) in 2011. 31 scans (62%) excluded the lenses of both eyes in 2012 compared to 26 scans (52%) in 2011. The improvement in practice between 2011 and 2012 did not reach statistical significance (p=0.14, chi square test).

**Discussion:** Recommendations from the 2011 audit cycle included: (i) updating the local protocol for CT head scans, (ii) emphasizing to radiographers the importance of excluding the lens and (iii) implementing specific training sessions for radiographers. These recommendations led to an overall improvement in performance in 2012.

**Conclusion:** The re-audit shows that although there has been an improvement, we are still below the standard set by the RCR. On-going training and education for radiographers aims to address this issue.

### P-156 IQ works analysis tree for measurement of square wave contrast transfer factor in mammography

Jason Fazakerley; Ryan Jones; Mike Higgins

*Integrated Radiological Services*

**Aims/Objectives:** Square Wave Contrast Transfer Factor (SWCTF) is a parameter used to assess detector resolution in full field digital mammography systems. IQWorks is a software package that allows analysis of test images through the construction of an automated analysis tree. The aim of this study is to construct an IQWorks analysis tree that can automatically calculate the SWCTF from a test image of the resolution grating test object.

**Content**: The analysis tree consists of an edge detection algorithm that can detect the edge of the TOR Max phantom and also the edge of the resolution bar grating. Then Regions of Interests (ROI's) are automatically placed in accordance with the test protocol described in NHSBSP Report 0604 and a series of simple math modules calculates the SWCTF at multiple different spatial frequencies. A PDF report is then produced displaying the results of the test. The analysis tree will be then tested by applying the tree to test images acquired under the conditions described in the test protocol and results will be compared between those measured manually.

**Relevance/Impact:** Automated analysis reduces the time required to analyse images and automatic ROI placement removes potential error in ROI placement.

**Discussion:** The biggest challenge in creating an analysis tree is finding an edge detection algorithm that can successfully detect the edge of the object of all images.

### P-157 Mammography AEC checks: correcting CNR measurements made with different sets of PMMA blocks

Thomas Couch; Mike Higgins; Ryan Jones

*IRS Limited*

Differences between sets of test equipment can be problematic to medical physicists when they want to compare measurements with baselines from previous routine QA surveys. In mammography, small differences in the quality of PMMA blocks and aluminium sheet can produce differences in measurements of contrast to noise ratio (CNR) which are sufficiently large to cause systems to fail tests of AEC performance which compare CNR measurements to baselines set on commissioning surveys. The aim of this investigation was to determine a correction factor that can

be applied to measurements made using a set of PMMA/Al in order to mitigate the differences in quality between it and a second set of PMMA/Al. Both sets of kit were used to perform AEC checks on several different digital mammography systems and the data was used to perform a regression analysis to determine a function which can accurately convert CNR measurements made using one set of kit to their equivalent values from a second set. The resulting regression model was highly accurate ($R2 > 0.95$) and was consistent across a range of different digital mammography system manufacturers and models. As workloads increase, the problem of making comparisons between different sets of test equipment is likely to become more commonplace; the methods used to calculate a correction factor in this study may provide a template for dealing with this issue and allow medical physicists to track changes in system performance over time with different sets of equipment.

### P-158 The increased SID technique: what is preventing implementation in clinical practice?

Desiree O'Leary; Maria Joyce

*University College Dublin*

**Purpose:** Evidence in literature demonstrates that increasing the source to image-receptor distance (SID) can optimise specific radiographic projections yet despite this evidence-base the technique is not commonly practiced within all radiology departments. The present work aims to bridge the gap between evidence and practice by interviewing allied health professionals to investigate the feasibility of implementing the technique in clinical practice.

**Methods:** Opinions were sought from multiple sources and professionals including radiographers, medical physicists, professional body council members and university lecturers to triangulate the data. Data were collected via telephone and departmental surveys, self-administered questionnaires, focus groups and individual interviews. Analysis via key words and themes was undertaken.

**Results:** Results demonstrate that despite increased SID being beneficial for dose reduction, perceived limitations were identified which contribute to the poor uptake of the technique in practice. Tradition, the capacity to change practice and radiographic equipment were perceived as the main obstacles against clinical implementation. 75% of radiographers working with modern equipment did not perceive any disadvantage to the radiographer in extending the SID by 30-50cm compared to 59% of radiographers working with older equipment. When radiographer perceptions of implementing the technique were analysed however, 100% of radiographers responded positively to increased SID implementation especially ‘if given more information’.

**Conclusions:** The research concludes that there are no insurmountable issues preventing the implementation of the increased SID technique in clinical practice. The key to effective implementation is to adopt a multi-disciplinary approach and actively disseminate information amongst hospital management and radiographers.

### P-159 Increasing the source to image receptor distance: a simple optimisation strategy

Maria Joyce; Desiree O'Leary; Mark McEntee; Patrick Brennan

*University College Dublin; The University of Sydney*

**Purpose:** Previous work has established that for film screen and computed radiography sizable reductions in effective dose are achievable using the increased source to image-receptor distance (SID) technique although some contention exists among authors as to the magnitude and mechanism of these reductions. The hypothesis stating that reduction in radiation dose due to increased SID is linked directly to the inverse square law and is independent of the image receptor therefore still requires demonstration. The purpose of this work was to comprehensively investigate all aspects of increased SID in optimisation to conclude on the extent of possible dose reductions for direct digital radiography (dDR).

**Methods:** The dose-reduction potential and image quality at various SIDs was investigated using dDR for lateral cervical spine, antero-posterior abdomen, occipital-frontal and lateral skull projections. Entrance surface dose was measured using thermoluminescent dosimeters and effective dose (ED) calculated using PCMXCv2.0. Image quality was assessed using visual grading analysis.

**Results:** Increased SID resulted in significant decreases ($p \leq 0.05$) in ED ranging from 8.7% for the abdomen (130cm SID) to 39.4% for the lateral cervical spine (210cm SID). Image quality was maintained or improved for all projections tested with increased SID. The results found that increasing the SID above 100cm was consistently the optimum choice.

**Conclusion:** Increasing SID reduces radiation dose while maintaining clinically acceptable image quality. It is recommended that current imaging guidelines are updated to reflect these findings. Diagnostic Imaging professionals should adopt this simple optimisation strategy in clinical practice to reduce the radiation dose to the patient.

### P-160 Emergency doctors knowledge of radiation dose and risk

Anna Paes; Suzanne Oates

*Prince of Wales Hospital, Sydney, Australia*

**Aims/ Objectives:** To assess Emergency doctors' knowledge of radiation doses and risk regarding commonly requested imaging investigations, pre- and post- education on this topic.

- Use a questionnaire to assess existing knowledge.
- Education session covering relevance to practice, radiation doses and potential harms.
- 6 weeks later, reassess knowledge with the same questionnaire.

**Content:** We created a questionnaire requesting the "equivalent Chest X-ray dose" of 11 investigations, and the cancer-related risk of 2 investigations. Surveys were completed by doctors in an inner city Emergency department. An oral presentation, or written information for those unable to attend the presentation, discussed the questionnaire and clinical importance of the topic.

Results of our first questionnaire showed a average score of 47.3%, with an improvement to 71% average score on the second questionnaire after education. The results of our statistical analysis will be available soon.

**Relevance/Impact :** With the escalating use of imaging in the Emergency department, together with the legal responsibilities of doctors when referring patients for investigations involving ionising radiation, an adequate understanding of the potential risks involved is paramount to choosing the most appropriate imaging modality and allowing patients to make fully informed decisions. There is an ongoing need for continuing education of doctors working in Emergency Departments.

**Outcomes :** We have displayed a poster in our Emergency Department reminding our doctors to continue using the ALARA (as low as reasonably achievable) principle, by balancing the risks and benefits of investigations and considering radiation-free alternatives where possible.

### P-161 Establishing a MRI quality assurance toolkit

Darren Hudson

*Nuffield Health*

**Aim**: to support the company's overall quality objectives by providing a standardised approach to performing quality assurance checks on our MRI systems, both static and mobile. It was hoped a unified approach would help raise and maintain standards whilst also providing a means of evidencing system performance for external assessment such as BUPA.

**Methods**: following review of literature, published guidelines and discussion with the Group MRI Safety Advisor, a selection of visual checks and generic technical tests were put together. It was important the process wasn't time consuming or complicated, provided results that were meaningful and of use, and could be applied across different makes of scanner with minimal financial outlay.

The toolkit included monthly equipment checks, weekly setup tests, and a rotating assessment of selected coils looking at signal, ghosting and uniformity.

It also outlined the importance of departments including some form of breast coil QA within the programme as screening is carried out on a lot of sites.

**Results**: once confident with the procedures involved, tests and their interpretation take around 15 minutes. Results obtained are easily calculated within a spreadsheet and can be quickly checked for deviation against baselines.

**Outcomes**: early results from publication of the toolkit have already detected faulty coils that were in clinical use and provided early detection of system faults, helping to minimise downtime and maintain image quality.

### P-162 Regadenoson (Rapiscan): Tips and tricks

Peter Strouhal; Peter Turner; Fiona Whittingham; Helen Balmforth

*Royal Wolverhampton Hospital Trust*

**Aims**: Our institution like many was struggling to cope with demand for myocardial perfusion scintigraphy. Given claims about the product, it could simplify and shorten the stressing technique so allowing increase patient thru'put in the same time frame. We share our experiences of learning on the go.

**Content**: Bullet points with illustrations on simple and not so obvious aspects to MPS stressing with Rapiscan to further optimise the techniques for patients and staff.

**Impact/Outcomes**: Increased thru'put with atleast comparable patient comfort and safety and with increased staff conveneince is possible with this product, off-setting possible increased costs.

**Discussion**: Cost effective solution showing that spending a little more initially can bring benefits down stream.

### P-163 Electronic delivery of annual IRMER update and radiation safety awareness

Nicholas Taylor

*Great Western Hospitals NHS Foundation Trust*

Providing annual IRMER updates to radiology department staff through presentations to groups of staff was shown to be problematic due to staff availability, time constraints and multiple departmental locations.

The development of format which could be delivered via the existing on-line training software would enable improved access to material for staff involved with ionising radiation at a time of their convenience and provide documented evidence to comply with mandatory training requirements.

The content, developed with input from the RPS and RPA covers relevant IRMER legislation and information with regards to increased awareness of radiation safety. Ten multiple choice questions at the end of the core material assess knowledge and a certificate of completion issued for CPD records.

The core material can be amended as required with annual reviews of content scheduled.

Quarterly reports indicate individuals who have completed the module, the time spent on it and the pass result obtained. The data can be cross referenced by line managers against relevant staff highlighting individuals who have not completed the module.

Initial results in the first year of using this delivery format has shown a significant improvement of access to information by staff when compared to attendance at organised presentations in time which could be utilised clinically.

### P-164 A preliminary description of a new best practice approach for assurance of regulatory compliance in radiation protection

Rachael Ward; Nicholas Rowles

*Plymouth Hospitals NHS Trust*

**Aims:** In 2011 we altered the management of radiation protection compliance, implementing a comprehensive programme providing statutory assurance, identifying areas of weakness and placing responsibility for demonstrating compliance with Clinical Directorates.

**Method:** We developed an audit cycle covering requirements under IRR, IR(ME)R and EPR. A 3 year cycle was proposed, with critical requirements audited annually. All requirements were cross-referenced to CQC regulations and NHSLA requirements with a single set of indicators used. A support structure for directorates was established

through “user groups”, supported by a senior Clinical Scientist to troubleshoot, aid the process and share best practice. Reports were submitted quarterly to the Trust Radiation Protection Committee and Safe Care Group.

**Results:** Previously, compliance against statutory regulations was not clear. The RPC received reports containing subjective evidence reliant on the Radiation Protection Service, little contribution from clinical directorates, providing inadequate assurance to the Trust Board. The changed arrangements provided robust, good quality evidence. Quarterly audits suggested overall compliance to be well-monitored and improving. At the end of Quarter 3 the RPC received a summary of the previous year’s compliance, and recommendations were made to Clinical Directors. The changed arrangements will allow future comparative audits of compliance to be undertaken.

**Relevance:** Due to legislation, trusts require robust assurance of safety and quality, especially under CQC regulations and foundation requirements. Trusts should ensure that they can demonstrate compliance and assure regulators of continually improving care. This process allows assessment of compliance and will monitor improvement.

## General

### P-165 Establishing an MR lymphography service for patients with chronic lymphoedema

Patricia Martin; Lindsey Christie; Shelley Waugh; Ruth Stretton; Elena Crowe; Thiru Sudarshan

*NHS Tayside*

**Purpose:** Chronic Lymphoedema (CL) of the lower extremities is a debilitating condition, and conventional imaging is often inadequate for diagnosis and clinical management. Magnetic Resonance Lymphography (MRL) is a useful non-invasive technique for evaluating CL. The purpose of this work is to provide a pictorial review of our initial experience in performing MRL within the context of establishing a clinical MRL service.

**Methods:** Twelve patients with known CL were referred for MRL. Imaging was performed on Siemens scanners (1.5T Avanto, 3.0T Trio) using body, spine and peripheral angio coils. Pre-contrast Fast Low Angle Shot (FLASH) coronal images were acquired at three stations - abdomen, upper legs and lower legs. Subsequently a gadolinium contrast agent with Lignocaine was injected between the toes, and post-contrast data were acquired at each station at 0, 10, 20, 30, 40 and 50 minutes. Pre- and post-contrast images were subtracted and maximum intensity projection (MIP) images derived.

**Results:** In all cases the main lymphatic vessels in the leg and thigh were clearly demonstrated. Two were radiologically normal (no pathology detected), but the other ten contained some degree of pathology at one or more station. Deep vessel obstruction, dilated vessels and collateral lymphatic vessels were all well visualised.

**Conclusions:** MRL can provide detailed anatomical information of the lymphatic system and soft tissues in patients with CL of the lower extremities. This enables a more accurate diagnosis and is now the modality of choice for the investigation of CL at our centre.

### P-167 Role of nanotechnology in medical imaging

Muhammad Afzal

*The Islamia University of Bahawalpur, Pakistan*

Like many other applications of nanotechnology in the field of science and technology this technology is also attracting researchers in diagnosis and treatment of diseases. Man-made nanoparticles, of the order of 100 nm, can be used for imaging and diagnosis of diseases at initial stages. A number of nanomaterials are under development for their applications in diagnosis and treatment of diseases. This technology is not only proving to be capable to enhance diagnosis capability of the traditional imaging modalities like MRI but also introducing other methods of detecting abnormalities in patients. This review indicating that in future it may one of the most promising techniques for imaging abnormalities.

### P-168 ‘The waves of sound’ - A short history of evolution of ultrasonography for medical imaging

Lalita Malghan; Ramachandra Chittal; Tinu Purayil; Ajay Sahu

*Hull Royal Infirmary, Hull; Leeds Radiology Academy, Leeds; Peninsula Radiology Academy, Plymouth*

**Objectives**:

1.We will provide a glimpse of history and evolution of development of ultrasound.

2. Briefly discuss about recent developments and possible future applications of US.

**Description**: Ultrasound is one of the most commonly used imaging modality in our daily imaging practice. The journey that led to the invention and use of ultrasound for medical imaging has been long and it can be traced back to as far as 6th century BC when Greek philosopher Pythagoras performed experiments on the properties of vibrating strings. In 1942, Karl Dussik (Vienna) started its use for medical purposes in brain imaging followed by its use in Musculoskeletal imaging in 1958. Professor Ian Donald (Glasgow), used it for gynaecological purposes in 1955 followed by first B-mode scan in 1972 by McDonald and Leopold. After this ultrasound has become an integral part for diagnostic and therapeutic use in different specialities including obstetrics, cardiology (ECHO), anaesthesia, neonatology, ophthalmology, urology etc. The list of contributors in this process is endless and there were interesting observations and experiments which all eventually evolved into the existing technology.

**Conclusion**: We hope to present in this poster a vivid account of all interesting facts and historical events, which led to the invention of ultrasound and its application in diagnostic radiology. We will also cover the recent advancements such as microbubble, 4D ultrasound, elastography and fusion imaging and many other future possible applications.

### P-169 An amazing journey of evolution of Xrays: Revolution of medical diagnosis

A Patel; R Chhital; T Purayil; L Malghan; A Sahu

*Plymouth Hospitals NHS Trust; Leeds Teaching Hospitals NHS Trust; Hull and East Yorkshire Hospitals NHS Trust*

**Objectives**:

1. We will look at the history and evolution of Xrays for medical use.

2. Briefly discuss all the related investigations and possible future applications.

**Description**: X-rays are part of the electromagnetic spectrum, an ionizing radiation with wavelengths shorter than ultraviolet light. X-rays are used to view a non-uniformly composed material in form of an image, which can be developed in order to display areas of different density and composition. Plain xrays are the most commonly used day to day examination worldwide (as in 2010, 5 billion medical imaging studies were performed).

X-rays have been used for medical imaging, since German physicist Wilhelm Röntgen discovered them in 1895. In the same year, Thomas Edison investigated materials' ability to fluoresce when exposed to X-rays. The other important early researchers in X-rays were Ivan Pulyui, William Crookes, Johann Wilhelm Hittorf, Eugen Goldstein, Heinrich Hertz, Philipp Lenard, Hermann von Helmholtz, Charles Glover Barkla, Nikola Tesla and Max von Laue. The use of X-rays for medical purposes (which developed into the field of radiation therapy) was pioneered by John Hall-Edwards in Birmingham, England in 1908.

**Conclusion**: Tomography, fluoroscopy, digital radiography and CT scanning are various topics related to Xrays, which we will cover in our review. CT uses multiple xrays by clever reconstruction techniques to generate a 3D representation of the scanned object/patient. We aim to display all the historical aspects of xrays with a clear time line and also discuss various uses, advantages, futures advances and challenges.

## Student radiography

### P-170 Dose audit of adult chest radiographs

Wang Kei Ma

*University of Salford*

**Background**: As required by the Ionising Radiation (Medical Exposure) Regulations 2000 (IR(ME)R) dose to patients should be kept as low as reasonably practicable (ALARP) and dose audits for selected diagnostic examinations are performed to optimise patient radiation dose. The chest radiograph is one of the most frequently performed radiographic examinations. About 1 million of chest x-rays were performed in the UK during 2008 which accounted

for 28% of all x-ray examinations (Hart et al., 2008). A review of radiation doses delivered to patients undergoing posterior-anterior (PA) chest examinations in a teaching hospital in North West England was undertaken.

**Aims**: To evaluate the radiation doses delivered to patients from PA chest examination.

**Method**: A 6 month period retrospective study was carried out for 5 computed radiography (CR) and 2 digital radiography (DR) x-ray machines. Data collection was performed by exporting examination date, room, projection, kV, mAs and dose area product (DAP) from Clinical Research Informatics System (CRIS). Average DAP values from each x-ray unit were calculated and compared with current national and local diagnostic reference level (DRL).

**Results**: The average chest PA dose for the DR system is lower than CR system and the average dose in Room 2 exceeds the national DRL.

### P-171 How effective are CTPA and MRA in the investigation of pulmonary emboli?

Nikul Chauhan; Sophie Willis

*City University London*

**Aim**: To investigate the clinical effectiveness of CT Pulmonary Angiography (CTPA) and MR Angiography (MRA) in the diagnosis of patients presenting with symptoms indicative of pulmonary emboli (PE).

**Content**: A system literature review was undertaken in order to identify primary studies comparing radiation dose, image quality and clinical effectiveness of CTPA and MRA for the diagnosis of PEs. A search of Ebscohost, Ovid Online and Scopus was conducted to find citations deemed relevant to the research question. A modified Critical Skills Appraisal Programme (CASP) tool was used determine the quality of the included citations.

Relevance/Impact: CTPA is currently the reference standard for imaging potential PE. However there is a suggestion that the use of MRA should be further explored due to the limitations, e.g. the high radiation dose, associated with CTPA.

**Outcomes**: An initial search identified 1118 citations. On further screening, 12 primary research studies were included in the systematic literature review. Very good diagnostic accuracy and image quality of MRA was found in the included studies, comparable to that of CTPA in the diagnosis of PE. The benefit of no radiation dose and safer contrast agents are the most significant advantages with MRA imaging.

**Discussion**: This systematic literature review suggests that whilst CTPA is likely to remain the reference standard in the diagnosis of PE, there is scope for MRA to play a greater role. Most significantly the findings suggest that MRA should be used on patients that have early symptoms of PE.

### P-172 A self audit to compare DAP to DRL for PA chest examinations

Thomas Gately; Katy Szczepura

*University of Salford*

**Purpose:** The Ionising Radiation (Medical Exposure) Regulations 2000 (IR(ME)R) require all British hospitals to implement diagnostic reference levels (DRLs) for all X-ray examinations. It is also a requirement that doses to patients are routinely audited to assess whether these levels are exceeded.

This work was a self-audit of a third year diagnostic radiography student to ensure DAP readings were within DRL for PA chest examinations.

**Method:** The survey was undertaken on one digital radiography (DR) unit, using local protocols and AECs, the only variable was field size. Patients not of standard size were excluded. In total, 24 patients (male = 12, female = 12) were surveyed and dose-area product (DAP) recorded. Image critique was also performed to assess collimation.

**Standard:** The local and national DRL is 0.10 Gycm2. A standard of 100% was expected.

**Results:** The average DAP reading was 0.083Gycm2 and only 7 male and 6 female patients were correctly collimated.

**Discussion:** 7 examinations were above the DRL, this was due to overcollimation.

On further assessment of the collimated field size (CFS) it was found that overcollimation was more likely to occur for female patients than for male patients.

This is likely due to a lack of operator confidence when positioning female patients.

Additionally two examinations required repeat exposures both were male patients, a possible cause for this was the operator's over confidence in male patient positioning therefore over collimating and missing anatomy.

**Conclusion:** The patient's gender impacted on the operator's selection of CFS and requires further investigation.

### P-173 Mammography - the relationship between compression force and paddle movement

Wang Kei Ma; Peter Hogg; Judith Kelly; Sara Millington; Stephanie Kelly

*University of Salford; Countess of Chester Hospital*

**Purpose**: Image blurring has become more noticeable with the introduction of full field digital mammography. Research has demonstrated that paddles can move during mammography imaging; such motion may induce image unsharpness. This study investigates the relationship between paddle movement (mm) and compression force in Newtons (N).

**Method**: Six mammography machines with 12 flexible and 9 fixed paddles (n=21), calibrated to give compression force in N, were evaluated. Paddle movement was measured mechanically using 2 calibrated linear potentiometers. A deformable breast phantom was used to mimic female breast. For each paddle, 'machine given' N and paddle movement (mm) were recorded each second for 40 seconds with the phantom in a compressed state (at 80N).

**Results**: Graphs of 'change in N' (δN) against 'change in paddle position' (δmm) were plotted; these gave R2 <0.86 (regression) for straight line graphs. A directly proportional relationship between δN and δmm was demonstrated in all cases. Gradients of the graphs were significantly different for flexible and fixed paddles (p=0.004). Fixed paddle average, standard deviation, and maximum amount of mm movement in 40 seconds were 0.54, 0.28 and 1.35; flexible were 0.45, 0.20 and 0.94. Approximately 60 % of paddle movement occurred within the initial 10 seconds after applying compression.

**Conclusion**: A direct relationship exists between δN and δmm. Fixed paddles move more than flexible paddles. If the drop in compression force in a female breast is known then using the relationship derived from the phantom the actual motion can be estimated.

### P-174 Lateral hip radiography- which technique produces the lowest organ dose combined with best visual image quality

Sana Khalid; Peter Hogg; Andrew England; Hussien Zahed; Tracy O'Regan; Stephan Trimble

*University of Salford*

**Purpose**: To determine whether inclusion of an anti-scatter radiation grid is necessary for horizontal beam lateral hip radiography.

**Method**: A human tissue equivalent anthropomorphic phantom was used to generate horizontal beam lateral hip images at various conditions with and without an anti-scatter radiation grid. Pre-set exposure parameters were used, whereby kV was increased from 80 by factor of five and mAs remained a constant at 40. Same exposure parameters were executed for both techniques. In total thirty X-ray images were produced using a computed radiography (CR) system. Using a forced choice comparison method these images were scored against a devised image quality criterion by a panel of nine observers. Organ dose for both male testes and female ovaries were calculated using thermo luminescent dosimeters (TLDs).

**Results**: Study data suggested that optimum technique for horizontal beam lateral hip radiography varied between genders. For females an air-gap technique (without grid) using 80kV, 40mAs, 200cm SID and 10cm OID produced the best image quality whilst providing the lowest organ dose of 0.087648mGy to the ovaries. For men a technique which induced a grid produced the best image quality with the lowest testicular dose of 0.0362208mGy using 80kV, 40mAs and 120cm SID.

**Conclusion**: Results demonstrated that gender specific modifications may need to be applied in order to optimise imagequality with lowest gonadal dose. Currently insufficient emphasis has been given to gender specific

modifications to radiographic technique. Further research on a range of examinations is recommended using both CR and digital radiography systems.

### P-175 Light beam diaphragm collimator errors and their effects on radiation dose for AP pelvic radiography

Hannah Brookfield; Anthony Manning-Stanley; Andrew England

*University of Liverpool; Salford Royal Hospitals NHS Trust*

**Puprose**: To investigate the range of collimator errors in clinical X-ray rooms and to estimate their possible effects on the radiation dose for AP pelvis examinations.

**Methods and Materials**: A collimator test tool was suspended at three heights (14, 21 and 28cm) above the table bucky in nine X-ray rooms. Heights corresponded to the patient thickness (mean, +/-2SD) from 100 patients who previously underwent AP pelvic radiography. The X-ray beam was visually collimated to the inner boundary of the test tool and exposed to radiation. Differences between the visualized field size and the resultant X-ray field size (corrected for magnification) would indicate a collimator error. Using a pelvic phantom minimum textbook collimation was set and then changed and verified in order to simulate a range of possible collimator errors. Phantom examinations used a standard technique AP pelvis technique with exposure termination using outer AEC chambers. Dose-area-product (DAP) values were recorded.

**Results**: Out of nine X-ray rooms all but one produced a smaller irradiated area than was visually set. Errors ranged from a 16% reduction in irradiated field size to a slight over irradiation by 0.4%. With the possibility that these errors could be larger in other institutions/rooms a range of (-27% to +18%) errors were simulated. Increasing the field size by 1cm (superior/inferiorly) increased the DAP by 5%. Laterally, a 1cm increase caused a 4% rise. Increases of 1cm in both planes raised DAP by 4%.

### P-176 Minor variations in lateral and AP lumbar spine centring, effects on radiation dose and image quality

Hannah Brookfield; Anthony Manning-Stanley; Anthony Ward; Andrew England

*University of Liverpool; Salford Royal Hospitals NHS Trust*

**Introduction**: Accurate radiographic centring is a well established method for reducing radiation dose (RD) and ensuring optimal image quality (IQ). Currently published centring points were not developed in a digital era. Revision of standard centring points (CP) for high radiation dose examinations e.g. lumbar spine radiography may allow further dose optimisation.

**Methods**: Using a phantom and a digital X-ray unit (with AEC) the centring points for anteroposterior (AP) and lateral lumbar spine projections were varied. For each variation the resultant RD was calculated and IQ was assessed by two experienced observers.

**Results**: For AP and lateral projections no significant differences in IQ or RD were demonstrated when varying the CP in the superior-inferior plane. A positive (dose reduction) correlation was identified when moving in the medio-lateral plane (AP; r=0.173 p=0.042) and also in the anteroposterior plane (lateral; r= 0.958, p=<0.01). For the AP projection one CP produced an image with a higher IQ score in comparison to a standard centred image but with a 7% reduction in RD. One lateral image achieved an increased IQ score when compared to the standard but required a 12% increased RD. A 10mm superior and anterior off-centring in the lateral projection gave equal IQ but with a 13% lower dose.

**Conclusion**: For both projections there were situations where marginal revisions to the CP may allow a reduction in RD. For lateral projections minor variations in centring are more likely to cause a significantly reduced IQ. Further research in the clinical environment is therefore warranted.

### P-177 Exploring the challenges of increasing levels of patient obesity for diagnostic imaging departments

Nadine Miller; Sophie Willis

*City University London*

**Aim**: To investigate the ways in which the challenges associated with increasing levels of obesity can be met within the diagnostic imaging department.

Content: This presentation will outline the findings of a system literature review that was undertaken in order to identify the ways in which diagnostic imaging departments can overcome the challenges associated with imaging bariatric patients. A search of Medline, EMBASE, ScienceDirect, Scopus and PubMed was conducted to find citations deemed relevant.

**Relevance/Impact**: Obesity is deemed to be one of the major health challenges of this century and is continuing to increase in prevalence across all age groups. Chronic health conditions associated with obesity are necessitating an increase in the use of medical imaging. It is anticipated that CT/MRI and interventional imaging will experience some of the greatest increases in service demand. Therefore ensuring imaging service provision is capable of meeting the associated challenges is a necessity for future service provision.

**Outcomes**: This study found that whilst the majority of literature focused on examples of modified equipment design to accommodate larger patients, this neglected to consider the cost implications to departments. The findings most readily synthesised into current practice centred on the implementation of appropriate pre-scan screening for patients.

**Discussion**: Pre-scan patient screening can help establish the likelihood of successful imaging for patients. Examples of strategies included; measuring patients girth prior to CT/MR imaging for correlation with bore size, checking patients weight against the maximum for safe working of equipment, increasing field-of-view during imaging, exploring differing imaging pathways.

### P-178 Can radiographers visually categorise patient's into correct body mass index bands?

Karen Knapp; Holly Beale; Victoria Charles; Natalie Cruickshank; Krystyna Majewska; Susan Rimes; Christopher Vanstone

*University of Exeter; Taunton & Somerset NHS Foundation Trust; Royal Devon & Exeter NHS Foundation Trust*

**Aims/ Objectives**: The aim of this study was to investigate whether radiographers can visually categorise patients into correct body mass index (BMI) bands.

**Content**: Photographs taken anteriorly and laterally of eight participants were provided for radiographers to evaluate along with the height of the participants. Twenty radiographers across two hospitals participated in the study. They categorised each participant as optimum weight, over-weight, or obese using the WHO criteria bandings. The study was approved by University ethics and all participants signed informed consent.

**Relevance/Impact**: The introduction of dose-monitoring software such as dose-watch by GE Healthcare provides better data when the patient's BMI is entered. However, in a busy radiology department measuring and weighing patients is impractical.

**Outcomes**: The three participants in the optimal BMI group were correctly classified by 46% of the radiographers, with 54% classifying them as sub-optimal. The overweight participant was correctly categorised by 58%, but considered to have an optimal BMI by 42% of the radiographers. The four obese participants were correctly categorised 5% of the time, were categorised as overweight by 70% and categorised as optimal by 25% of the radiographers.

**Discussion**: Radiographers are unable to accurately visually categorise participants into BMI bandings, with a tendency to under-state the BMI banding. This is likely to be due to the increase in population size and the psychological shift in what is considered to be normal. This needs to be taken into account when asking radiographers to visually assess patient's BMI.

### P-179 Fact or fiction: an analysis of the 10 kVp rule in computed radiography

Elizabeth Allen; Peter Hogg; Wang Kei Ma; Katy Szczepura

*University of Salford*

**Purpose**: To determine whether increasing the tube voltage by 10kVp whilst reducing the tube current by 50% ('10kVp rule') produces similar perceptual image quality.

**Method**: 391 matched pairs of anthropomorphic chest phantom X-ray images were produced on a computed radiography (CR) system. Five experienced clinicians graded the images using a 2 alternative forced choice comparison method. Effective dose (E) was calculated for all images using dose calculation software, based on acquisition parameters and DAP readings.

**Results**: Perceptual image quality scores prior to and following application of the '10kVp rule' were found have no statistical difference ($p>0.1$), indicating that the increase in kVp and reduction in mAs had no impact on the perceived image quality. In all cases E reduced, with an average 36% (s.d 7%) after the rule had been applied ($p<0.001$).

**Conclusion**: Results demonstrate that application of the 10kVp rule significantly reduces effective dose, with no significant reduction in perceived image quality. Further research should be conducted for a range of examinations using CR and digital radiography (DR) systems. Given these findings, we propose that optimisation within a clinical setting should consider the use of the rule on a more regular basis.

### P-180 A first: retrospective audit of Red Dotting occipitomental views

Claire Melia

*University of Salford*

An audit of a student auditor's ability to identify abnormalities on OM projections.

**Rationale:** General observation of the low frequency of Occipitomental view commenting in clinical placement. It was assumed the complexity of these images rendered them unfavourable in a informal red dotting system.

**Method:** A sample size of 50 images meeting specific inclusion criteria were selected retrospectively from the Trusts Radiological Information System (RIS), and viewed using a high resolution Picture Archive and Communications (PACs) monitor. Data was recorded and anonymised. The images were reviewed methodically using McGrogors Lines system, and a definitive red dot decision was recorded on the data collection tool as 'no abnormality detected' (NAD) or 'abnormality detected' (AD). The standard to which the the auditors accuracy was compared is the contractual required accuracy of a Reporting Radiographer (95%).

**Results:** Sensitivity and specificity was calculated as 75% and 78% respectively. These results were higher than the auditor anticipated. The majority of the sample size represented true -ves (66%) suggesting the auditor specificity as statistically reliable when compared to sensitivity (true +ves 12%). Accuracy fell short of the desired optimum standard by 17%. This was deemed an acceptable shortfall, due to the inexperience of the auditor in this specific knowledge and skills area.

### P-181 Effect of fluoroscopy parameters on dose

Glenis Johnston; Carla Mercer; Alice Milligan; Richard Newman; Colette Stewart

*University of Exeter*

Our aim for this project was to establish best practice by developing quantifiable data of the effects of different parameters on dose reduction when performing a fluoroscopy examination in an interventional room.

The study was performed using Phillips fluoroscopy equipment in an interventional room representing a pelvic angioplasty examination. The pelvic sections of an anatomically correct Rando phantom were used and our study focused on the effects of collimation, magnification, fluoro flavours and frames per second on dose. We altered one parameter at a time and measured the dose as Dose Area Product readings. The effect of each parameter was calculated as a percentage dose change from a baseline value.

The intended outcome of the study was to provide data that will give a stronger basis for implementing changes to local departmental protocols. Stating that particular parameters produce lower dose is not as powerful as being able to state the exact effect of the parameter change as a percentage dose increase.

The results showed that increasing the frame rate from 1 to 2 per second caused an 82% increase in dose. A 52% reduction could be achieved by using fluoro flavour 1 as opposed to standard fluoro flavour 2. The doses produced in acquisition mode were approximately 10 times those produced in standard fluoroscopy mode.

Our study suggests that limiting the use of acquisition mode, where appropriate, is the most important factor in reducing dose. This has potential benefits for both staff and patients.

### P-182 Has the introduction of digital radiography possibly allowed for radiographic practice to decrease in quality?

Benjamin Vranjkovic

*Hertfordshire University*

**Purpose:**This presentation will consider the impact that digital radiography has had on the knowledge and understanding of exposure factors and image quality.

**Content:** There is a growing trend among today's students' being inculcated into a culture of 'button pushing' which can lead to over reliance on pre-set exposure factors on digital systems. The presentation will inform whether digital imaging systems have allowed too much leeway on image quality and if this has affected patient care. The ability of the radiographer to use quality assurance and delete images has allowed for poor quality images to be turned into diagnostic images or never seen. This is a positive in that radiation dose is kept to a minimum (ALARP) but means that errors in exposure factor selection are being made. The impact of this is that this may lead to more images being taken and therefore greater radiation dose to the patient.

**Methods:** A questionnaire survey has been conducted to student radiographers at an educational institute to gather their knowledge and understanding of the study topic area.

**Results:** The study yielded mixed responses with regards to the use of pre-set exposure factors, knowledge and understanding of exposures when using digital imaging systems and differences in opinion of resultant image quality

**Conclusion:** There is over reliance on pre-set exposure factors which does have implications for practice and patient care.

### P-183 Scottish Islands – a student diagnostic radiographer's experience

Fiona Oludipe

*RGU, Scotland*

Radiography is a profession that can be enjoyed throughout the world, and this all begins from being a student radiographer. Whilst being a student radiographer, many clinical placements are successfully completed. When on a clinical placement, there are the initial fears but also the realisations of what was actually gained from completing the placement. These fears and realisations are magnified when given the opportunity to do a clinical placement in a Scottish rural hospital. Many fears were felt before this particular placement, mainly because it was so far from family and friends. Being alone in an unknown rural village is not for the faint hearted. However it was Summer time, beautiful countryside to explore and the bonus of working alongside a great group of radiographers. Being fearful of the unknown should not let us shy away from what could potentially be a life changing experience. It is these experiences that can help mould excellent radiographers and improves employability, as students can benefit from the diversity of clinical placement sites and from this can gain a wider range of skills. Clinical placements are an invaluable opportunity to put knowledge gained at university into practice. This particular clinical placement in the Scottish Islands provided an excellent foundation to build upon with endless radiography knowledge whilst providing an amazing experience and ultimately a higher level of learning was gained here compared to previous placement sites within Scotland.

### P-184 Feed-Forward Sandwich; The students perspective

Sarah Naylor; Chris Wright

*Sheffield Hallam University*

**Aim**: To evaluate the 'feed-forward sandwich' (FFS)from a student's perspective.

**Method**: A qualitative SWOT approach via questionnaire was utilised to receive feedback from the current third year cohort of Diagnostic Radiography students (n=28) where the FFS has been utilised as part of their clinical training.

**Results/Discussion:** 40%of the respondents felt that assessing students will be difficult when they newly qualify, however 95% felt that the feed-forward sandwich technique would be a great tool to help them. Experiential learning has taught them the importance of providing balanced feedback as part of clinical assessment and the need for constructive comments that are actionable.

**Conclusion:** Results confirm the earlier research with assessors, in that the feed-forward sandwich is a desirable approach to giving and receiving feedback.

### P-185 The research radiographer; who?

Jennifer Piper; Nadine Jeakings

*Oxford University*

**Aims :** The role of the Research Radiographer is undervalued; these individuals play an invaluable role in the development of the profession and the completion of the governments drive for NHS led research. The aim is to look at the national overview of the role, and radiographers views regarding the research role.

**Outcomes :** Radiographers often have little or no knowledge of the research process and are simply undertake the imaging. Radiographers often give the opinion that research is not an established form of clinical work and therefore holds little relevance to their practice. There are only a few Radiographers around the UK with a defined research role.

**Discussion :** The establishment of a group within the SOR to link Research Radiographers together, raising the profile. This would not just be advantageous to the profession but to radiology departments across the UK that struggle with the demand placed on them. Mapping out strategic hubs of Radiographers involved within research would help to bridge gaps in knowledge and help to raise the profile of research in radiography.

With the recent investment of >£100 million from the government for the NIHR (National Institute of Health Research) will inevitably lead to clinicians and researchers increasing demands upon radiology. Promotion of the role

will bring benefits to investigators from protocol conception to study completion. Radiographers should feel empowered to become actively involved in research with new funding streams available.

### P-186 The impact of training of image interpretation on radiographer's skills of reporting: A literature review

Farah Akram

*Shaukat Khanum Memorial Cancer Hospital & Research Centre, Bradford*

**Objective**: The objective of this study is to evaluate the impact of training of image interpretation on radiographers' skills of reporting.

**Methods**: A literature search was performed through different database such as Science Direct, The Cochrane Library, MEDLINE, CINAHL, pubmed central Google and Google Scholar. Search terms were derived from PICO to find the relevant material. The literature was filtered using inclusion and exclusion criteria to remove irrelevant studies. The articles identified were analysed and reviewed according to guidelines of Centre of Review and Dissemination (CRD). Studies were critically appraised according to the criteria of Standard for Reporting Diagnostic Accuracy Studies (STARD).

**Results:** Ten studies were identified for review after excluding a number of irrelevant articles according to the inclusion and exclusion criteria. These studies compared the reporting skills of radiographers before training and after training based on pattern recognition and image perception. The differences in their sensitivity and specificity were significant in terms of improvement.

**Conclusion:** The evidences from the studies in this literature review suggest that training of basic concepts of image interpretation improves radiographer's reporting skills. However, discontinuation of training leads to reduced sensitivity and specificity of radiographers reporting. It is inferred that the radiographers need to continue their learning and short-courses according to Continuing Medical Education (CPD).

### P-187 Training for theatre radiography is there room for improvement?

Nicholas Taylor

*Great Western Hospitals NHS Foundation Trust*

There are many surgical procedures which require the use of fluoroscopic radiographic equipment in order to achieve a successful outcome requiring the radiographer to have an understanding of how to prepare the equipment in relation to the patient and the projections required.

There is little published and on-line material when compared to general radiographic technique, although there is some useful material available from manufacturers, and training is commonly through observation and instruction by other radiographers who in turn have received training in a similar fashion.

Potential problems with the development of training material on radiographic technique in the operating theatre is the variation between hospitals on radiographic requirements and equipment used, however there is scope for a basic format showing the orientation of the equipment to the patient and projections commonly used for different procedures providing a starting point which can then be adapted according to departmental requirements which could prove particularly useful for student and newly qualified radiographers who have yet to experience a wide range of examinations performed in the operating theatre.

Initial use of such a format has been provided to newly qualified radiographers starting with the trust which they can use as a reference point to help them prepare for examinations which they may have not experienced when on clinical placement as students. Elements of the same information can also be used by theatre staff to aid in room preparation and access requirements for radiographic cases.

### P-188 Reviewing a case-based learning program "SOLAR" in radiography education

Kristal Lee; Marilyn Baird

*Monash University*

**Aims/Objectives**: Over 10 years ago a Case-Based Learning (CBL) Program called SOLAR (Student Oriented Learning About Radiography) was introduced into a Radiography Degree Program. This research aims to determine current student engagement in SOLAR focusing on how the program could be improved and potentially incorporated into other educational institutions.

**Content**: The structure of SOLAR will be presented outlining how the students engage in real-life clinical cases by using suggested resources to create a clinical action plan (CAP) covering the professional issues involved in each scenario. After submission students are presented with an Expert CAP from which they write a comparative report focusing on their learning outcomes. Discussion will include how this program is incorporated into all 4 years of the course along with the results of the student feedback surveys.

**Relevance/Impact**: CBL is an effective tool used in many healthcare professions but there is limited literature available in the Radiography setting. This presentation will introduce the audience to SOLAR giving them tangible methods of incorporating effective CBL into their syllabus.

**Outcomes**: Preliminary results from the students indicate that tutorial discussion facilitates better understanding compared to simply reading the Expert CAP. Students were in favour of using more audio-visual presentation methods to help them better understand the background of the clinical scenario.

**Discussion**: CBL is a valid learning tool that has the potential to be used more widely within the field of Radiography. The SOLAR program is an excellent avenue for this to occur within.

### P-189 Enhancing radiography students understanding of depression: A workshop design involving service users

Karen Knapp; Joanne Welsman; Susan Hopkins; Eugene Mullan

*Medical Imaging, University of Exeter; Clinical Psychology, University of Exeter*

**Aims/ Objectives**: The aim of this abstract is to describe a well-received method of teaching radiography students about depression.

**Content**: This presentation will describe a depression workshop for increasing student radiographers' awareness and understanding of depression and anxiety. The workshops are delivered through collaboration between medical imaging and clinical psychology, using a member of the lived experience group.

**Relevance/Impact**: Depression affects approximately 20% of people throughout their lives and due to co-morbidities; it is likely this percentage is greater within the population seen within an imaging department. However, many radiographers have little understanding of the impact depression has on the ability of patients to engage with the service they offer and the barriers this can cause. The workshops have been designed to increase the understanding of depression among student radiographers, along with developing the potential impact of being depressed on patient-radiographer interactions. The students work through some exercises to share their understandings of depression through visual mediums. The session is summed up with the use of some video clips of the stories of some service users who suffer from depression.

**Outcomes**: The students have reviewed the workshops highly and their understanding of depression has increased as a result. The use of a service user is incredibly powerful and the students welcomed this approach to teaching them more about mental health.

**Discussion**: This is a highly successful method for developing an understanding of depression and the impact of this in service users for student radiographers.

## Other

### P-190 The role of CT in acute respiratory failure in the recruitment of ECMO

Georgina Charlton; Nicholas Barrett

*Guy's and St Thomas' Hospital*

Extra-Corporeal Membrane Oxygenation (ECMO) provides temporary life support to patients with severe but potentially reversible respiratory failure by the oxygenation of blood outside of the body. A machine pumps the patient's blood through an artificaial lung (membrane) which oxygenates the blood and removes carbon dioxide before returning it back into the body.

With conventional treatment the ventilator is adjusted to make up for the patient's reduced lung function, increasing the amount of oxygen put into the lungs by the ventilator and increasing the pressure at which it is delivered. High pressure ventilation with large amounts of oxygen can cause further injury to the lungs and prevent them from recovering. The aim of ECMO in acute respiratory failure is to allow the injured lung to recover and heal.

There are many contraindications for ECMO and with the use of Computed Tomography(CT) these can be identified by performing a scan of the body as a screening method. This aids the diagnosis of the cause of acute respiratory failure and also eliminate other intra cranial and intra abdominal pathologies.

Performing non contrast volume CT scans of the chest with high resolution reconstructions at a high and low ventilatory pressures help differentiate subtle changes in the distribution of disease in the lungs. This poster outlines the scanning techniques used and the subsequent decision pathways and considerations needed to succesfully treat patient's with acute respiratory failure.

### P-191 The use of Onyx in peripheral vascular interventions: a pictorial review

Asim Shah; Jai Patel

*Leeds Teaching University Hospitals Trust*

**Purpose/Aim:** To review potential applications of Onyx in peripheral interventional procedures and to demonstrate its advantages and limitations based on a pictorial review of cases.

**Content summary**: Onyx is an elastic polymer comprised of ethylene-vinyl alcohol copolymer dissolved in dimethyl sulfoxide with micronized tantalum powder. The latter provides contrast for fluoroscopic visualization.

Originally Onyx was approved for embolization of cerebral and dural vascular lesions. Potential applications for its use in peripheral vasculature have since emerged. Although no level one evidence, results of published case series are encouraging in treating various vascular lesions: arteriovenous malformations, aneurysms, false aneurysms, type II endoleak and acute hemorrhage.

Onyx is classified as a liquid, nonadhesive, nonabsorbable, permanent embolic agent and is unique compared to other embolic agents due to its non-adhesive, cohesive character allowing controlled injection with deep penetration.

A good technique, familiarity with liquid embolic agents and handling precautions are obligatory to prevent potential complications related to nontarget embolization, the microcatheter getting stuck in the target vessel, pulmonary and angiotoxicity.

The objective of this work is to discuss, through a pictorial review of cases, the indications of use of Onyx in peripheral interventional procedures and to demonstrate its advantages and limitations.

### P-192 IVC filter retrieval rates at a typical district general hospital-the reality?

Asim Shah; David Shaw

*Mid Yorkshire NHS Trust*

There has been recent interest in IVC filter placement and their retrieval rates. Both the BSIR and SIR published results of multi-center data.

Typical removal rates being 78% and recommendations for the responsibility of retrieval to lie with the radiologist performing the IVC filter placement.

We audited 4 years of retrospective data from September 2007 to November 2011. In this time 62 patients had IVC filter placement, of which 33 were potentially retrievable filters. Only 18 out of the 33 temporary IVC filters were removed- a 54 % retrieval rate. Since a designated radiologist/radiographer has been nominated to list and recall all patients with temporary filters in situ.

A re-audit was performed between November 2011 and June 2012. This showed that a total of 14 IVC filters were sited during this time, out of which 7 were potentially retrievable. 5 out of the 7 temporary IVC filters were removed-a 71% retrieval rate. The two filters that have not been removed still fell in a retrievable time frame.

Our audit shows that IVC retrieval rates are greatly improved, when primary responsibility of removal lies with the radiologist/radiology department. However, another re-audit with more numbers will be needed to make these observations statistically significant.

### P-193 Data free at the point of need

Jim Beagle; Mike Roberts

*The London Clinic*

The London Clinic describes data as 'the lifeblood of any hospital'. It recognises that clinicians need access to the right patient data, at the right time, in order to provide the best possible care. It also understands the consequences if, for any reason, this data isn't available.

This session will discuss the Clinic's vision for 'Data Free At The Point Of Need' and the challenges they have, and continue to face, in executing such a strategy across their organisation. In this session, the London Clinic will:

Share the forward thinking approach, adopted by The London Clinic, to managing patient and other critical data

Illustrate the importance of data interoperability as part of their strategic goal

Consider the impact of vendor neutrality in achieving their vision

Examine business continuity and disaster recovery in the context of their vision

Outline the first steps organisations should take when embarking on such a strategy

### P-194 Does intravenous urography remain an accurate study in the imaging of acute renal colic in the presence of CT KUB?

Shayan Ahmed; Zafar Ahmad; Aisha Naseer; Nicholas Reading; Stuart Graham

*Whipps Cross University Hospital, Barts Health NHS Trust*

**Introduction:** Renal colic is a common presentation in the Emergency Department. Intravenous urogrpahy was previously the gold-standard for the imaging of acute renal colic but has since been superseded by CT KUB.

**Aims:** To determine if intravenous urography remains an accurate study in the imaging of acute renal colic or whether it should be replaced by CT KUB as the first-line modality within our department.

**Materials and Methods:** A retrospective analysis of all 108 IVUs within our department for acute renal colic during a 3 month period to see how many were conclusive for stones and how many required further supplementation with CT KUB. A comparison was made between respective IVU and CT KUB findings to assess concordance between the two modalities.

**Results:** IVU outcome: positive for stones 21/108 (19.4%), negative 65/108 (60.2%), inconclusive 22/108 (20.4%).

CT KUB following IVU: In-patient 18/108 (17%), within 4 weeks of discharge 13/108 (12%), Total 31/108 (29%).

Concordance between IVU and in-patient CT KUB: Agreement 12/18 (66%), Disagreement/stones missed on IVU 6/18 (33%), non stone pathology found on CT KUB not seen on IVU 4/18 (22%).

**Discussion:** A significant proportion of patients required a CT KUB following an inconclusive IVU. CT KUB had a greater accuracy in detecting urinary tract stones, and was able to delineate non-stone pathology missed on intravenous urography.

**Conclusion(s):** CT KUB is a more accurate and effective method for the evaluation of acute renal colic which will now replace intravenous urography as the first-line modality in our department.

### P-195 Extraosseous uptake within the abdomen and breast on whole body bone scan: a pictorial review of interesting cases

Nirav Patel; Andrea Howes

*St Helens and Knowsley NHS Trust*

**Purpose**: Bone scintigraphy with technetium-99m labelled diphosphonates is one of the most frequently performed radionuclide investigations. Whilst lacking specificity, its high sensitivity makes it extremely valuable for assessing a number of pathological bone conditions. Extraosseous uptake of tracer can also occur as an unexpected finding and may provide a clue to the presence of significant soft tissue pathology. Recognition is therefore important when interpreting the whole body bone scan.

**Methods**: During a one year period in our institution we identified a number of bone scans with significant extraosseous uptake. We illustrate a variety of interesting cases involving tracer uptake within the abdomen and breast, providing correlation with cross-sectional imaging and the relevant clinical history.

**Results**: Six cases of significant extraosseous uptake within the abdomen and breast were identified. Within the abdomen these included uptake within extensive omental cake, liver metastases and a paracolic metastatic soft tissue mass. Within the breast these included uptake within gynaecomastia, breast lymphoedema and apparent rib uptake actually due to recent breast sentinel node injection.

**Conclusion**: Whole body bone scan is a highly sensitive test which helps in the diagnostic evaluation of numerous conditions involving both bone and soft tissue. Understanding of the normal distribution of tracer within the skeleton and soft tissues, and correlation with other relevant imaging is therefore essential for any radiologist reporting bone scintigraphy to allow the correct diagnosis of pathological disease processes.

### P-196 Ultrasound guided splenic biopsy; complication rates and diagnostic yield

Rebecca Johnson; Richard Hopkins

*Gloucester NHS Foundation Trust*

**Aim**: Splenic biopsy is associated with a high complication rate, particularly haemorrhage. Consequently it is not widely performed, however it can be an important diagnostic tool in isolated splenic lesion or enlargement. Literature describes this risk as ranging between 0 and 12%.
This study aimed to determine the safety and diagnostic accuracy of ultrasound guided percutaneous splenic biopsy of both focal splenic lesions and splenomegaly in a single centre.
**Method**: A retrospective review of our electronic database identified 23 ultrasound guided splenic biopsies performed in 23 patients between March 2007 and May 2012. Of these 13 were men, and 10 women. Their ages ranged from 23 to 82 with a mean of 59. 21 had a suspected pre-biopsy diagnosis of haematological or metastatic malignancy, and 2 of granulomatous disease such as sarcoidosis. Using our online PACS system and patient notes the frequency of diagnostic samples, and both minor and significant complication were calculated.
**Outcomes**: A specific diagnosis as a direct result of biopsy was reached in 74% of cases (17/23). 87% of biopsies yielded adequate tissue for analysis (20/23). Complications occurred in 22% of biopsies (n = 5). Major complication such as haemorrhage occurred in 4% (n = 1), minor complication such as pain in 18% (n = 4). Splenectomy was not necessary in any cases.
**Conclusion**: Splenic biopsy is a relatively safe procedure with high diagnostic yield, and is a valuable tool in the assessment of focal splenic lesions or splenomegaly in the absence of extra-splenic disease.

## P-197 Assessment of technical quality of Computed Tomography Pulmonary Angiogram (CTPA)

Artur Wiechowicz; Lakshmi Kanagarajah; Bhavin Upadhyay

*Basildon and Thurrock University Hospitals NHS Foundation Trust*

**Aims/ Objectives:** To establish the causative factors responsible for indeterminate (those that are inadequate to establish a diagnosis due to technical reasons) computed tomography pulmonary angiography (CTPA) studies within our department.

**Relevance/Impact**: CTPA is currently the examination of choice in patients with a high clinical suspicion of PE[1]. However, patient and technical factors can result in indeterminate studies and therefore inconclusive reports[2]. Previous studies have reported the percentage of indeterminate studies to be up to 10.8% [3], with motion artifact followed by poor contrast enhancement cited as the most common causes.[3]

**Outcome**: The reports and images of 50 consecutive CTPA studies were reviewed.

Of the 50 examinations, 6 studies (12%) were classed as indeterminate. Of these, four (67%) were due to motion artifact from patient respiration; one (17%) was due to high noise level; one (17%) was due to streak artifact from the SVC. Other technical factors that could potentially affect the quality of a CTPA study including collimation, reconstruction algorithm, contrast enhancement of left main pulmonary artery and field of view did not lead to any indeterminate studies.

**Discussio**n: A larger percentage of CTPA examinations were deemed indeterminate in our series (12%) than the standard stated in the literature (up to 10.8% )[3]. The majority of indeterminate studies in our study were due to motion artifact (67%), which was also the case in the study conducted by Jones et al (74%).

1. Making best use of a Department of Clinical Radiology, Guidelines for Doctors, Sixth Edition 2007, The Royal College of Radiologists, London

2. O'Dowd EL, Birchall JD Berg RJ. P260 Managing the indeterminate CT pulmonary angiogram: do we get it right? Thorax 2010; 65:A187

3. Jones SE, Wittram C. The indeterminate CT Pulmonary Angiogram: Imaging Characteristics and Patient Clinical Outcome. Radiology 2005; 237:329-337

## P-198 Retrospective review of 1000 CT Urograms performed in a single centre

David Little; Ewan Simpson; Helen Burt; McCoubrie Paul; Mark Thornton; Amit Parekh

*North Bristol NHS Trust*

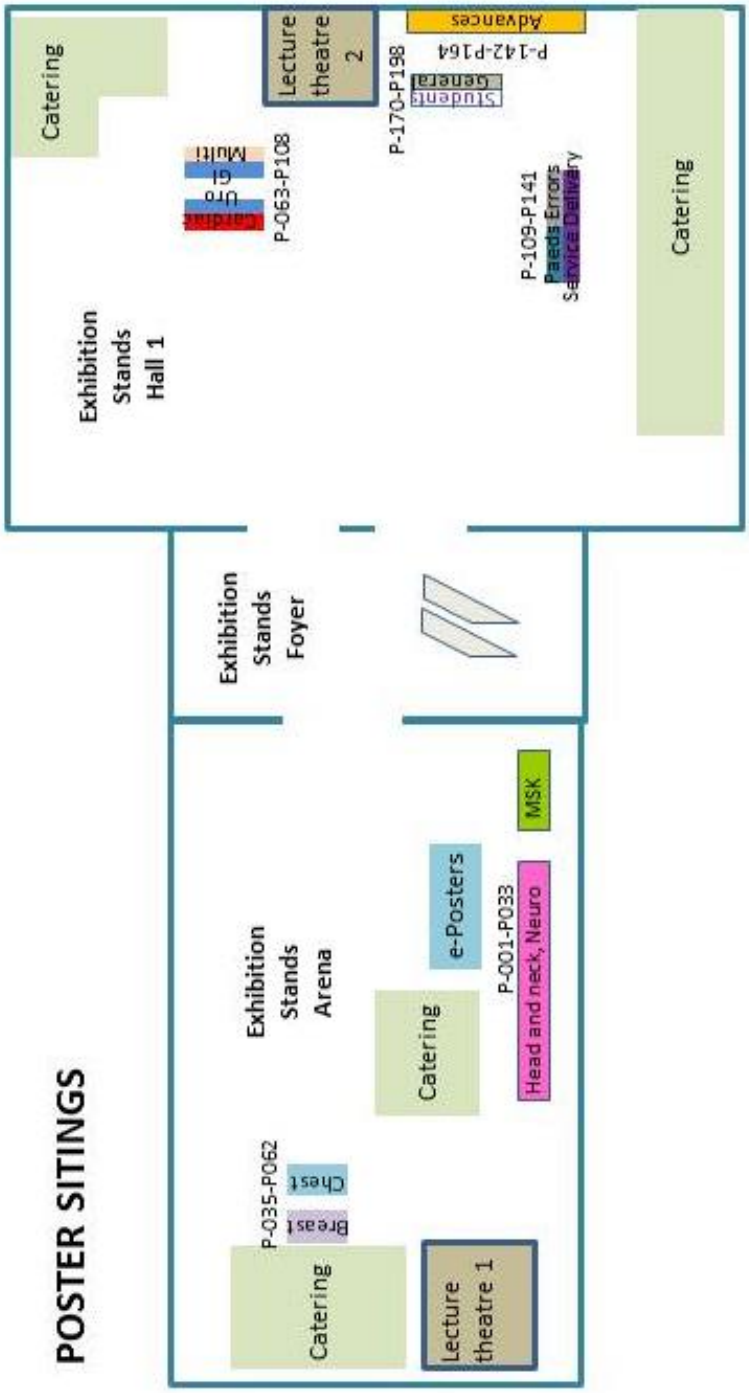
**Aim**: To evaluate the use of CT urography in our centre.

**Content**: We will present the results of a retrospective review of 1000 consecutive CT Urograms performed in our centre. This includes patient demographics, study indications, representative doses compared to IVU (50 studies only) and the presence of upper tract TCC, other urinary tract malignancy or other important findings.

**Relevance**: CT urography has largely replaced the IVU in the investigation of haematuria and other urinary tract pathology. In our centre it is performed as 3 phase examination which means a high radiation dose, we must therefore be able to justify performing the investigation and use it in the correct patient groups.

**Outcomes**: 9 scans were excluded. 991 CT Urograms were performed over a 27-month period, predominantly in patients aged between 50-89yrs. The most common indications were macroscopic haematuria (474/992), microscopic haematuria (152/992) and known lower tract malignancy (87/992). 29/992 scans were reported as showing a new upper tract TCC with a further 20/992 possible new upper tract TCCs. Other new urinary tract malignancies found included RCC (15/992) and bladder malignancy (36/992). Several important incidental findings were also noted, for example ovarian malignancies and AAAs requiring treatment or surveillance.

**Discussion**: CT Urography is a high dose study. The pick-up rate of upper tract TCC is low but there are some advantages of CTU over IVU. We have identified specific groups of patients in which CTU is most useful.

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