p154 **Neonatal head ultrasound for paediatricians - a website and workbook**

Iwan Roberts; Lucy Bradley

Sheffield Children's Hospital NHS Foundation Trust

Background. Paediatricians in training may be expected to carry out neonatal head ultrasound with limited training and support. Without access to RITI, there seem to be limited resources to support good practice. This project was carried out as part of a 6-week medical student attachment in paediatric radiology.

Method. Existing resources were explored and were found to be limited. A web-site was created and information was loaded with a view to helping paediatricians in training. Trainees are often quite capable of handling and manouevring the probe and need help to obtain the necessary views. Details included machine set-up, images required and common pathologies. Trainees were consulted throughout the process and their feedback was used to help with design. The website is accessible via smart-phone. A workbook has been developed with tips for technique, updated learning objectives for ST1/2, ST3/4 and neonatal grid trainees. There is a sign-off sheet to monitor progress.

Results. Early feedback has proved very positive. Trainees have limited time and resources for training and the resources have proved popular.

Conclusion. Clinicians need accessible resources to support high-quality clinical and radiological practice. This project has explored how non-radiologists view resources for ultrasound.

p156 **A retrospective study in the United Kingdom to establish the prevalence of spinal fractures on skeletal survey in suspected inflicted injury, the radiation dose associated with the lateral spine and the necessity of this projection for initial and follow up imaging**

Jenna Tugwell-Allsup; Walid Al-Deeb

Betsi Cadwaladr University Health Board, Wales

Background: The number of spinal fractures detected on skeletal survey (SS) for suspected inflicted injury varies within literature causing debate as to the necessity of lateral spinal projection/s within the protocol. This study aims to strengthen evidence as to the prevalence of spinal fractures in these cases at a UK paediatric hospital by exploring both initial and follow up surveys and the associated radiation.

Method: A retrospective study of SS performed for suspected inflicted injury in children younger than 24 months from 1st June, 2007 - December 31st, 2013. Data was collected from the Radiology Information System where reports were analysed for definite verses equivocal fractures. Follow-up imaging was also considered and reviewed. Dose area product (DAP) was recorded for each SS and individually for the lateral spine.

Results: Of all 179 SS identified, no definitive spinal fracture was reported. Two equivocal cases were identified with suspicion of vertebral body fracture on initial SS, but both were confirmed to be normal variants on subsequent spinal MRI scan. The average DAP for all SS was 43.8 cGycm2, (24.3 SD) with lateral spine contributing to 18% of the total DAP of the entire SS.

Conclusion: Although no spinal fractures were identified for this study, strong evidence still exists to the inclusion of the lateral spine radiograph(s) for the initial SS. Consideration should however be given to its exclusion from follow-up SS. Also, MRI scan is suggested if there is a positive spinal fracture identified on initial survey in order to confirm diagnosis.

IMAGING TECHNOLOGIES & INFORMATICS

P157 **An audit on errors in voice recognition generated radiology reports**

Abul Haque; Moustafa El-Badawy; Sardar Qasim

Burton Hospitals NHS Foundation Trust

Background Voice Recognition Software (VRS) has been available to the medical profession for over three decades[1]. However, the widespread use of VRS in Radiology was delayed until more recent advances in technology such as PACS[2]. Studies have shown the use of VRS significantly reduces the Radiology report turnaround time[3]. However, it is not a flawless system. Through an audit we aimed to look at the error rate of VRS-generated reports by Consultant Radiologists at our Hospital.

Method We made use of the Royal College of Radiologists (RCR) guidelines as our standard and classified errors into three groups - Minor, Moderate and Major[4]. Overall error rate should be <5% and Major errors 0%. We looked at reports over a four-month period and from four different modalities - Plain film, Ultrasound, CT and MRI. For each Consultant we randomly selected 12 reports per modality (3 per month) making a total of 48 reports per Consultant. A total of 336 reports were analysed and classified into one of the three groups.

Results 294 reports (88%) contained no errors. However, 42 reports (12%) contained an error. Of these 36 were Minor, 5 Moderate and 1 Major.

Conclusion The Hospital Radiologists were missing the target of overall error rate by 7% and Major errors by 0.3%. Additionally, almost 75% of errors were in CT or MRI. These reports were on average significantly longer than Plain film or Ultrasound. Hence, highlighting a correlation between length of report and probability of errors.

1. Leeming, B.W. et al. (1981) Computerized radiologic reporting with voice data-entry. Radiology. ***138****(3), 585-588. 2. Mehta, A. and McLoud, T.C. (2003) Voice Recognition. J Thoracic Imaging.* ***18****(3), 178-182. 3. Pezzullo, J.A. et al. (2008) Voice recognition dictation: radiologist as transcriptionist. J Digit Imaging.* ***21****(4), 384-389. 4. The Royal College of Radiologists. (2016) Voice Recognition System Report Accuracy. [online] Available at https://www.rcr.ac.uk/audit/voice-recognition-system-report-accuracy* ***[Accessed 2 December 2016].***

p158 Implementation of paperless workflows in radiology departments across the UK

Sarah Booth

London South Bank University

Background The government drive for paperless working in the NHS has been well documented. The multi-faceted complexity of the radiology workflow makes implementing paperless processes particularly challenging. The aim of this research was to ascertain the extent to which radiology departments have implemented paperless workflows across four key workflow processes; examination referral, examination vetting, ID and pregnancy verification and report communication.

Method An online questionnaire comprising both open and closed questions was completed by 91 respondents from radiology departments across the United Kingdom, from 5 respective job roles.

Results Departments have implemented paperless working for all four processes, however some more successfully than others. Figures show reduced usage of electronic referrals from referrers outside the organisations compared to those from within. Vetting, ID/Pregnancy and report communication all demonstrate some electronic working however there is evidence of tandem systems utilizing paper and electronic methods suggesting not all departments have made the transition and there is still some reliance on paper.

Conclusion This research gives an indication of progress of paperless implementation in radiology departments across the UK. Some departments are well on their way to being paperless by 2020; however there is disparity amongst organisations. Departments who have successfully implemented electronic workflows could provide valuable learning for those who are still addressing the paperless challenge.

p159 Utilising wireless hospital network to improve workflow and efficiency of mobile radiography

James Cheong; Francis Tan; Andik Irwan; Sng Li Hoon; Ooi Chin Chin; Png Meng Ai; Sarat Kumar

Singapore General Hospital

Background: There had been increasing demand for mobile radiographic images to be available in the Picture Archiving and Communication System (PACS) as soon as they were acquired for better patient management and care. Therefore there was a need to improve workflow and efficiency of mobile radiography without any compromise on radiographic image quality and service delivery.

Aims/objectives: To reduce image arrival time in PACS by improving the work processes of mobile radiography.

Materials and Method: A pre (non-wireless) and post (wireless) approach was employed for this study. The total duration of this study was four weeks, two weeks for each of the approach. The acquisition times of all radiographs from the mobile radiography system were taken and the arrival times of all radiographs in PACS were also taken for both non-wireless and wireless approach. The non-wireless and wireless data were populated and compared.

Discussion: Present study showed that the availability of radiological images in PACS from the time of acquisition improved significantly using the wireless approach. The data showed that the mean time of 44 minutes was required for images to arrive in PACS after acquisition for the non-wireless approach while the wireless approach took only 2.3 minutes. Our preliminary experience suggested that the wireless mobile radiography system were able to operate seamlessly with shorter time interval for image arrival. The system would enhance workflow and improve efficiency of mobile radiography by speedy delivery of radiological images and information to the clinicians for making timely diagnosis and treatment for patients.

p160 The use of global worklists for peer review: A Scottish reporting radiographer's perspective

Amanda Rutherford; Lucy Taggart

NHS Greater Glasgow and Clyde

Background: The availability of the global worklist has streamlined the process for the reporting radiography team across several sites in Greater Glasgow and Clyde to participate in frequent peer review for audit and teaching purposes.

Relevance/Impact: Peer review is essential for assessment of a reporting radiographer's performance in clinical practice. Looking to the future of Radiology services in Scotland and the proposed model of working as 'shared services'.

Discussion: - Engaging with IT solutions available to facilitate cross site learning. - Less time out of department and travelling to peer review meetings - Increasing feasibility and frequency of peer review across geographical boundaries

p161 **The diagnostic radiological image - identifying the benefits from the literature**

William Cox [1]; Penelope Cavenagh [2]; Fernando Bello[3]

[1]*University of Portsmouth;* [2]*University of Suffolk;* [3]*Imperial College London*

Background The volume and costs of diagnostic imaging examinations are rising (NHS England 2016). Therefore, there is a need to ensure that the maximum benefit is extracted from these resources. Benefits management literature suggests that the initial step for benefits realisation is identification (Bradley 2006). A literature review was undertaken to assess existing understanding of the available benefits.

Method A structured narrative approach was utilised in order to promote trustworthiness & dependability, whilst minimizing bias and error. 5 databases (CINAHL, Cochrane, ProQuest, PubMed, ScienceDirect) were interrogated using search terms identified through application of the SPIDER tool: The returned literature was screened for quality and content using predefined inclusion and exclusion criteria.

Results After screening, n=519 papers were returned and categorized as follows:

- Primary benefits (n=470). These are benefits extracted from the image which align with the rationale for acquisition (e.g. detection). These benefits tend to accrue directly to clinical stakeholders and patients by extension.
- Secondary benefits (n=63). These are benefits unrelated to the rationale for acquisition. They were categorised as being educational (e.g. promoting understanding) or relational (e.g. promoting communication, engagement, or trust) in nature. These benefits may accrue to a wider group of stakeholders, e.g. patients or carers.

Conclusion There is currently limited evidence in the literature of appreciation of secondary benefits. This lack of recognition means that some of these benefits may not be realized. There is a need, therefore, for further work to identify these benefits, if they are to be accessible for all stakeholders.

p162 **A comparative analysis on the fastest modality and fastest method to load multiple images when reporting on an integrated national PACS system**

Maria Banatwala [1]; James Timoney [2]; William C Torreggiani[3]

[1]*Tallaght Hospital, Dublin;* [2]*Waterford Regional Hospital, Ireland;* [3]*Adelaide and Meath National Children's Hospital, Dublin*

Background: Nimis PACS is the National integrated computerised system in Ireland for reporting radiological images. As with any system, speed in downloading images is critical to functionality. This study aims to record and compare the actual time taken to load single studies in four modalities; Plain Film Radiographs (PFR), ultrasound (US), CT & MRI. It compares loading times opening single studies versus multiple studies cumulatively. In addition, it assesses if there is any temporal relation to time taken to load studies.

Method: Data was collected over 4 days; 2 mornings and 2 afternoons. Image loading times were recorded for 80 PFRs, 40 USS, 40 CTs & 21 MRIs. The time taken from clicking "open study" to the first image appearing on-screen was recorded.

Results: An average of 6.29, 4.05, 5.38 and 5.93 seconds were taken to load PFR, USS, CT and MRI images respectively. It took 6.88 seconds to open PFRs in the morning versus 5.96 seconds in the afternoon. The load times for opening 5 studies cumulatively for PFRs, US, CTs and MRIs were 9.87, 13.88, 3.85 and 2.53 seconds respectively.

Conclusion: PFR take the longest time to load, followed by MRI, CT and last US. Studies load 0.92 seconds faster in the afternoon than in the morning. Loading five studies at a time versus opening one study at a time took longer for both PFRs and US but shorter for MRI and CT. Overall, it is faster loading 5 scans cumulatively than loading 5 scans separately per patient.

p163 **Open upright MRI in the real world**

Melanie Jones [1]; Deborah Horne [1]; Alan Breen[2]

[1]*Bournemouth Open Upright MRI;* [2]*Institute for Musculoskeletal Research and Clinical Implementation, AECC*

Background The spread of open upright MRI scanning is a relatively new development in the UK and such scanners are seldom, if ever found in NHS sites. The intricacies of such technology are of little interest to some in the medical profession, but to patients it can open up a field of imaging from which they may have previously been excluded.

Purpose: The purpose of this poster is to demonstrate that the need for open upright MRI isn't always based on performing weight bearing studies. This new innovation allows us to image patients who may never have been able to undergo MRI due to inability to lie flat or to severe claustrophobia.

Summary: In our first year of service nearly a third of patients referred for upright MRI of the lumbar spine had reportable findings relating to the spinal or nerve root canals that were in some way differentiated by upright MRI scans. Due to the changes in dimensions in the spine and spinal canal, Upright and positional MRI can also assist in the identification of dynamic instability. Approximately 30% of our patients are claustrophobic and would not otherwise be able to be scanned without sedation or anaesthesia. In addition, a small proportion require open or upright scanning due to physical deformities, gastrointestinal or respiratory conditions that prevent enclosed and/or recumbent positioning. Overall, 24% are scanned upright. Image 1 semi recumbent position for brain MRI

p164 **Recurrent prostate cancer following therapy: Can textural analysis of Attenuated Diffusion Coefficient (ADC) MR and T2 images help?**

J. Stirling [1]; R. Alonzi [2]; N.J. Taylor [1]; W.L. Wong [1]; A.R. Padhani [1]; B. Sanghera[1]

[1]*Paul Strickland Scanner Centre, Northwood;* [2]*Academic Oncology Unit, London*

Background: Aftertherapy, prostate glands lose zonal image contrast which hampers interpretation. Texture and lacunarity analysis may help characterise recurrent tumour from normal post therapeutic tissue. Currently, scanning techniques are reliant on the clinicians' visual interpretation of the final image. Textural analysis is a post processing technique, unlike region-of--interest or histogram analysis, that is able to quantify underlying visual aspects using the spatial distribution of measured signal intensities, not seen by the human eye.

Purpose: Readers will be shown how to optimise prostate DWI sequences. The reason why texture and lacunarity analysis may help in the classification MRI images of recurrent prostate cancer will be explained. An insight into many of the challenges of texture analysis and how it relates to different MRI sequences will be presented.

Summary: This poster investigates differences between diffusion weighted and T2 imaging post therapy using quantitative texture and lacunarity analysis and how it may help to characterise recurrent prostate cancer. It will be illustrated by images such as figure 1. It will show and explain a couple of common texture analysis methods. Figure 1:(a, d) ADC and T2 image of the prostate gland, (b) a ROI of restricted diffusion (red), non-restricted diffusion (blue)and (c) lacunarity plots showing curves from restricted areas (red) and non-restricted areas (blue). Likewise, (e) a ROI of low T2 intensity (red), higher T2 intensity (blue) and (f) lacunarity plots showing T2 intensity corresponding to restricted areas (red) and non-restricted areas (blue) on the ADC image.

References 1) Goh V, Sanghera B, Wellsted DM, Sundin J, Halligan S. Assessment of the spatial pattern of colorectal tumour perfusion estimated at perfusion CT using two-dimensional fractal analysis. Eur Radiol 2009;19(6):1358â€"1365 2) Sanghera, Bal, Stirling, J James, Glynne-jones, Rob, Goh, Vicky. Reproducibility of 2D and 3D Fractal Analysis Techniques for the Assessment of Spatial Heterogeneity of Regional Blood Flow in Rectal Cancer. Radiology 2012; 263(3): 865-873

p165 **Barriers to introduction of X-ray patient dose management systems**

Hugh Wilkins

University of Exeter

Background Dose management systems, which automatically collect and analyse patient dose indicators from image files, have been introduced in recent years, made possible by the transition to digital radiological imaging. They offer significant benefits, for example the ability to collect high quality 'big data' in real time, overcoming problems of transcription errors, small sample sizes, delays and occasional selection bias associated with traditional methods of manual paper-based dose audits. However their adoption into routine practice has been slower than might be expected, given that in theory they can transform the process of auditing of radiation doses to patients from X-ray imaging procedures, in turn facilitating derivation of reference levels and optimisation of diagnostic X-ray medical exposures.

Method Anecdotal accounts attest to resistance to attempts to introduce dose management systems. This has led to reflection on reasons for such resistance. Such reasons constitute barriers to the introduction of these systems.

Results Real and postulated barriers to the widespread adoption of this innovative technology include: capital/revenue costs at a time of significant cost pressures; competing IT/management priorities; information governance patient confidentiality fears; perceived reluctance to divulgence of dose data (perhaps for fear of it being seen as a key performance indicator ushering in 'Big Brother' performance management); and poor understanding of radiation dose risks and IRMER legal requirements.

Conclusions Individuals and organisations seeking to introduce dose management systems may need to be aware of such barriers when considering their introduction, and weigh them against the substantial potential benefits offered by these systems.

p166 **Compliance with RCR standards for sign offs in radiological reports**

Ravindran Karthigan

Epsom and St Helier's NHS Trust

The Royal College of Radiologist states that those radiologists who formally reports images must sign off with the following as a minimum: 1. Full name 2. Professional status 3. General Medical Council Number.

We looked at 100 reports from various consultants in a single trust and recorded which of the above were included in the sign off. The results we obtained showed the following: 1. Full name 95% 2. Professional status 95% 3. General Medical Council Number. 15% The results were positive with respect to name and status, we were surprised to that 5% were not signed off at all and only 15% had their GMC number on their reports. The results were fed back to the department and we are working on trying to make the sign off include all the aspects automatically when the radiologist signs there name.

We implemented an auto-signature for the radiologist when they dictate which gives an automatic signature including their name, professional status and GMC number. Following this we re-audited this with the following results. 1. Full name 97% 2. Professional status 97% 3. General Medical Council Number. 93% The results showed a large improvement in the compliance. We also found that the main reason why it wasn't 100% was due to amendments which were made without dictate. In

Conclusion the use of an auto signature improves the overall compliance with the RCR standards and we hope to implement this trust wide.

1.Berlin L. Communicating radiology results. Lancet 2006: 367: 373-375 2.Garvey CJ, Connolly S. Radiology reporting- where does the radiologist's duty end? Lancet 2006 367: 443-445

RADIATION PROTECTION AND QUALITY ASSURANCE

p167 **Assessment of doctors' knowledge on radiation risks and exposure during in emergency department**

Mawya Khafaji; Salman Radwi; Rashid Barnawi; Ahmad Aljifri

King Abdulaziz Univeristy, Saudi Arabia

Background: With the growing use of diagnostic imaging modalities in emergency medicine practice, comes the concern about their risks. This study aims to assess the knowledge of radiation exposure doses and risks among doctors working in emergency department.

Methods: A validated questionnaire was distributed to 120 emergency doctors and doctors from other specialties rotating in emergency departments of 8 hospitals. Participants were asked to answer questions regarding possible risks associated with radiation exposure and to estimate the radiation doses that patients were exposed to during various radiological procedures. Chi-squared test, an Independent t-test and One-Way ANOVA with LSD as Post-Hoc analysis were used for analytical purposes.

Results: A total of 90 doctors completed the questionnaire. 52 of them were residents, 26 were specialists, and 11 were consultants. 22% of them had formal training on radiation protection. None of the doctors estimated all the doses correctly. The overall correct answer rate for residents was 17.1%, compared to 22.7% for specialists and 40% for consultants ($p = .003$). Those who had formal training did not have a statistically significant higher rate of correct answers ($p = .411$), and no specialty had a statistically significant higher rate of correct answers when compared to other specialties ($p = .857$).

Conclusion: This study delineates that doctors working in emergency department had poor knowledge about radiation doses received by their patients and the risks associated with the exposure to radiation in the different imaging procedures. This issue warrants attention considering the increasing use of the radiological

p168 **MRI incidents: A review and proposed categorisation**

Darren Hudson

InHealth Group, London

Background: Safety is paramount in MRI, with review of incidents and monitoring for trends a key aspect of providing assurance and reducing risk.