196 patients were triaged as "Head injury", 24% went on to have a CT. 70% of patients with life-threatening signs had a CT within 1 hour of request. With regards to reporting, 79% occurred within 1 hour, those that missed the standard had scans outside of classic working hours.

All patients that missed the 1 hour CT target were within the hours of 9-5 when scanner resources are stretched. Standards for reporting were harder to achieve out of hours, when radiologists are most stretched. None of the requests categorised the urgency of the scan. This highlights the need for all head injury CT's to be clinically indicated with clear requests that communicate the urgency of the scan; further departmental education and a head injury proforma are being introduced with re-audit to evaluate changes.

Clinical: Neuroradiology

P032 **Head injuries in a level 1 trauma centre: Is it safe for radiology trainees to report these scans?**

Alina Denisa Dragan; James Edmund Sarkodieh; Ashok Adams
Barts Health NHS Trust, Royal London Hospital

Background: The demands on Radiology services are increasing, not only in the number of scans and procedures but also through an element of time pressure brought on by new recommendations like the NICE guidelines for head injuries (January 2014).

Aim: Our aim was to determine the incidence and grade of discrepancies in CT scan reporting in head trauma in a busy level I trauma centre.

Methods: We performed a retrospective review of all CT scans done for head injuries over a week, in our hospital. A comparison was made between the provisional report submitted by a trainee (SpR) and the Neuroradiologist's review the next day. All discrepancies were graded according to the potential and/or actual harm to the patient.

Results: During the week under review, 601 CT scans were reported, 333 of these being emergency scans requested by the A&E department. 66 CT head scans were performed for head injuries. Out of these, we found an overall rate of discrepancies in reporting of 23%, but 15% were negligible (no harm to patient). Two cases had a potentially major discrepancy. In both of these instances, the overlooked findings were on the background of other significant intracranial abnormalities that had been described.

Discussions: The practice of having Radiology trainees reporting CT scans of head injury patients seems to be a safe one even in a busy level I trauma centre. We still advocate prompt consultant review and regular auditing of trainees oncall reporting.

P033 **Complex orbit and facial trauma - what you need to know and what you need to look out for**

Tim Skinner; John Adu; Ashok Adams; Amit Roy
Barts Health NHS Trust

Aims: Drawing on our experience of complex facial and orbital trauma cases from a Level 1 trauma centre, the aims of this poster are to:
1. Provide a pictorial review of common facial trauma fracture patterns and their categorisation
2. Provide a pictorial review of common traumatic injuries of the globe of the eye
3. Increase awareness of the potential sequelae of complex of facial fracture

Content:

CT appearances of:

- Zygomatico-maxillary complex fractures
- Naso-orbito ethmoid fractures
- Frontal sinus fractures
- Le Fort I, II and III fractures
- Mandibular Fractures

- Injuries to the lens of the eye
- Globe rupture
- Intra-conal haemorrhage foreign bodies

Relevance: The reporting radiologist must be able to recognise and adequately describe complex facial skeletal trauma, and also be aware of the numerous complications that can be expected to occur.

Discussion: A radiologist must a have comprehensive knowledge of facial fracture patterns and their sequelae. Diagnosis, and subsequent surgical management, is vitally important to prevent serious functional impairment, as well as cosmetic deformity. In particular, ocular injuries in association with major trauma may be easily overlooked at a time when life-threatening injuries may take priority. Therefore, vision-threatening injuries may go undetected in the intubated unconscious patient for hours or even days. A significant part of the diagnostic onus may therefore lie with the reporting radiologist on-call. Knowledge of the different types of potential orbital injury and recognition of the associated radiological findings is paramount and might expedite sight-saving as well as life-saving treatment.

P034 The value of MRI brain following negative CT Brain in the acute stroke setting

Mary-Louise Gargan; Terry Kok; Joyce Kearney; Orla Doody; William Torregiani
Tallaght Hospital, Dublin

Aims/objectives: To determine the value of MRI Brain following negative CT brain in the acute stroke setting.

Content: This was a retrospective study over a 6 month period: 1st January 2014 to 30th June 2014. Patients were selected from the stroke and radiology databases. Inclusion criteria included patients with the clinical findings suggestive of stroke, who had a negative CT, followed by an MRI, within a 24 hour time frame. Review of scans was done by two radiologists in consensus.

Relevance/impact: Our findings demonstrate the importance of MRI Brain in the work up of an acute stroke.

Outcomes: 92 scans were reviewed in total, and of these 75 were included in our study. Scans were excluded when clinical criteria for acute stroke were not fulfilled. There were 40 males and 35 females. Age range 29-86 years with an average age 62 years.

There were 22 positive MRIs in total. 21 were positive for stroke and one MRI was positive for a tumour. There were 53 negative MRIs.

In summary, overall 28% of patients with negative CT's had positive MRI scans for acute stroke and one unexpected tumour.

Discussion: While CT continues to be the gold standard for acute stroke due its rapid access and availability, MRI following negative CT has been shown, from our data, to be of clear value in the diagnosis of acute stroke.

P035 Challenges of diffusion weighted imaging of brain areas with high susceptibility changes

Yen San Kiew; Xiu Mei Jamie Ho; Tee Meng Tan; Helmut Rumpel
Singapore General Hospital

Background: Diffusion weighted imaging (DWI) of small brain lesions in areas with high susceptibility changes is a clinical challenge with regard to distortion artefacts. Huge susceptibility differences between nearby bony structures, lipids, and surrounding cerebrospinal fluid may arise especially in ultra-high field magnetic resonance imaging systems.

Purpose: The specific aim is to reduce susceptibility artefacts inDWI with in-plane resolution of 1 mm or less by using read-out segmented echo-planar imaging (EPI).

Content: To reduce the distortion artefacts, a good balance of parameters for high resolution DWI-EP is demonstrated when:
1) Parallel imaging shortens the EPI-train length at the cost of signal-to-noise ratio (SNR)
2) Read-out segmentation shortens the EPI inter-echo time at the cost of acquisition time, but increases SNR.

Taking these interdependencies into account, we use parallel imaging factor of 2 and read-out segmentation of 5 for lesions in the brainstem, but a parallel imaging factor of 3 and read-out segmentation of >5 for orbital lesions.

Discussion: Undesirable distortion effects at the interfaces between tissues of different susceptibility properties in the phase encoding direction causing measurements of the diffusion weighted signal of small brain lesions poses challenges. Reduction of these susceptibility effects can be attained by decreasing the accumulation of the phase errors by using read-out segmented EPI and change in parallel imaging factors. Depending on the location of the brain lesions and careful balancing of the parameters greatly reduces the distortion effects.

P036 **Pseudoprogression or true progression? Meta-analysis of post-treatment glioma radiological techniques**

Sarah Abdulla; Stephen Walker; Thankamma Ajithkumar
Norfolk and Norwich University Hospital

Glioblastoma (GBM) is a common brain tumour in adults which, despite multimodality treatment, has a poor median survival. Efficacy of therapy is assessed by clinical examination and magnetic resonance imaging (MRI) features. There is now a recognised subset of treated patients with imaging features that indicate “progressive disease” according to Macdonald’s criteria but subsequently show stabilisation or resolution without a change in treatment. In these cases of “pseudoprogression” it is believed that non-tumoural causes lead to increased contrast enhancement and conventional MRI is inadequate in distinguishing this from true tumour progression.

Incorrect diagnosis is important as failure to identify pseudoprogression could lead to an inappropriate change of effective therapy. The purpose of this meta-analysis is to assess the sensitivity and specificity of radiology techniques included diffusion weighted imaging, MR spectroscopy, perfusion MR, PET imaging and SPECT imaging.

P037 **The role of imaging in the diagnosis of Alzheimer's disease and vascular dementia**

Katherine Sharkey; Cath Williams
University of Liverpool

Aims/objectives: The aim is to explore and evaluate how effective current structural and functional imaging is in the diagnosis of Alzheimer’s disease (AD) and vascular dementia (VaD).

Content: This critical literature review examines current publications for AD and VaD.

Outcomes: Cerebral Computed Tomography (CT) is argued to be the preferred initial imaging examination as it rules out other pathology (Benyon et al., 2012).

Several studies report high sensitivity values in dementia diagnosis using Magnetic Resonance Imaging (MRI) techniques with significant improvements in those values when specific markers are used (Duara et al., 2008)(Jacobs et al., 2011).

Bouldek et al. (2011) reported that positron emission tomography (PET) and single positron emission computed tomography (SPECT) have a high sensitivity and specificity (80%-90%) in detecting AD. Functional imaging such as Pittsburgh compound B (PIB) PET, perfusion CT (pCT) and arterial spin labelling (ASL) with MRI are new modalities in this area (Zhang et al., 2012)(Tang et al., 2013)(Bron et al., 2014).

Discussion: Within this scope of research it appears there is currently no definitive answer to which modality is superior in diagnosing AD and VaD, although it appears that structural imaging plays more of a role in the diagnosis of VaD and AD. However, in the future the author believes the accuracy of functional imaging will be recognised and thus preferred. It could be recommended that metabolic and perfusion imaging could be of more use in monitoring the effects of new drugs on dementia patients.

P038 **The impact of incidental findings found during imaging on neurologist's workloads**

Jennifer Boyd-Ellison[1]; Tom Booth[2]
Western General Hospital[1]; King's College Hospital[2]

Objectives: The objectives were (1) to determine the impact of IFs upon neurologists' workloads and healthcare budgets and (2) to examine neurologists' concerns regarding the clinical management of these 'patients'. A qualitative prospective study was performed using constructivist grounded theory.

Relevance: The study showed the impacts of IFs upon the neurologist, 'patient' and the healthcare system. The study also showed the need for further research studies and clinical trials to examine both the natural history of subclinical IFs and the efficacy of intervention. In some scenarios it has been proposed that patients undergo consent for further imaging because of the possibility that an IF is discovered.

Outcomes: Neurologists currently managed the increasing workload of 'patients' referred to them who have IFs found during neuroimaging. However, this increasing workload was thought not to be sustainable in the future. Neurologists experienced 'patient' management dilemmas and noted the financial costs to the healthcare system associated with IFs. Neurologists stated that 'patients' were affected by anxiety and subject to financial implications. The lack of information regarding potential IFs provided to patients by referring clinicians prior to scanning was highlighted.

Discussion: Neuroimaging is invaluable during the assessment of neurological disease but often uncovers incidental findings (IFs). Neurologists experience IF management and treatment difficulties mainly because of the limited evidence-base surrounding the medical significance of IFs and their treatment.

P039 **A pictorial review of MRI neuroimaging assessment tools in the diagnosis of dementia**

Haseeb Chaudhary; Mark Caplan
Warrington and Halton Hospitals NHS Foundation Trust

Introduction: The role of neuroimaging in dementia nowadays extends beyond its traditional role of excluding neurosurgical lesions. Radiological findings may support the diagnosis of specific neurodegenerative disorders and sometimes radiological findings are necessary to confirm the diagnosis. It is a challenge for neuroimaging to contribute to the early diagnosis of neurodegenerative diseases such as Alzheimer's disease. Early diagnosis includes recognition of pre-dementia conditions, such as mild cognitive impairment (MCI). In addition, early diagnosis allows early treatment using currently available therapies or new therapies in the future.

Aims and objectives: The aim of this pictorial review is to highlight the important neuroimaging MR features used in the diagnosis of dementia and pre-dementia conditions with illustrative case examples from our institution. This presentation will help radiologists, neurologists and elderly care physicians help diagnose the various dementia types much more effectively and accurately and thereby providing the most appropriate treatment for these patients.

Methods and materials: In this pictorial review we will present the common systematic scales used in the assessment of dementia. With particular focus on the GCA-scale for Global Cortical Atrophy, MTA-scale for Medial Temporal lobe Atrophy, Koedam score for parietal atrophy and Fazekas scale for WM lesions. As well as the importance of understanding strategic infarcts and their common appearances.

Conclusion: A greater understanding of the imaging characteristics of dementia is crucial to making an accurate diagnosis, this pictorial review will facilitate development of a easy systematic approach to MR neuroimaging which can be used by both physicians and radiologists.

P040 **Quantitative MRI assessment of the relationship between bone marrow fat-water ratio and apparent diffusion coefficient in a normal population**

Misha Kathirgamanathan; Krishanantham Ambalawaner
Guy's and St Thomas' NHS Trust

Following ethical review board waiver, a retrospective analysis of 113 adult patients who had undergone 1.5T T1 DIXON and DW-MR (at b-values: 0,100,800 s/mm2) of the upper abdomen between 2011-2013 was undertaken. The aim of this study was to assess the normal distribution of fat-water ratio and apparent diffusion coefficient (ADC) of spinal bone marrow and their relationship in the normal population. Establishing the normal distribution of fat-water ratio and apparent diffusion coefficient of bone marrow provides a baseline with which to assess

haematological/metastatic disease in future studies. Patients with haematological disorders/spinal metastases were excluded. ROI analysis centred on the lumbar vertebra was performed on the composed fat-water ratio parametric maps from the T1 DIXON sequence and ADC0-800 parametric maps from DW-MRI. Median (range) of marrow fat-water ratio and ADC were 52.03 (18.19-76.08) and 389.02 (76.43- 755.28) mm2/s respectively. Fat-water ratio differed with age (above and below fifty years, median 57.35 vs 41.79, p=0.001) demonstrating a positive correlation (r=0.583, p <0.001), but did not differ with gender (p=0.881). ADC values differed varied with age (above and below fifty years, median 368.12 vs 414.88, p<0.001). There was also a difference in ADC with gender; females had a higher ADC (median 431.65 vs 362.63, p= 0.001). Fat-water ratio and ADC were inversely related (r=-0.181, p=0.055). This is in keeping with the physiological replacement of hematopoietic marrow with fat marrow with age.

P041 **Pictorial review of dural enhancement**

Fiona Caswell[1]; Georgia Priona[2]
University Hospital[1], Aberdeen Royal Infirmary[2]

Aims/objectives: The dura mater is the outermost layer of the meninges, which covers the brain and spinal cord. The dura consists of two layers; an outer endosteal layer and an inner meningeal layer. It forms a sac that envelops the arachnoid mater ,surrounds and supports the dural sinuses and carries blood from the brain toward the heart.

Dural enhancement (also called pachymeningeal enhancement) refers to enhancement of the dura following intravenous contrast, most commonly seen on MRI and can be due to a variety of causes.

Relevance/impact: The diagnosis of pachymeningeal enhancement often proves difficult and must be specifically looked for.

Outcomes: We present a selection of clinical cases demonstrating various causes of dural enhancement including spontaneous intracranial hypotension, neurosarcoidosis and intracerebral abscess in order to highlight the salient imaging findings.

Discussion: Improved identification of dural enhancement can only be achieved with prior knowledge of relevant pathology and identification of the salient imaging characteristics.

P042 **Early experiences of research MR scanning of unstable neuro ICU patients with subarachnoid haemorrhage**

Juliet Semple[1]; Payashi Garry[1]; Matthew Rowland[1]; Rufus Corkill[2]; Jon Westbrook[2]; Kyle Pattinson[1]
University of Oxford[1]; Oxford University Hospitals[2]

We aim to present our experience of performing novel MRI research techniques on unstable neuro intensive care (NICU) patients with severe aneurysmal subarachnoid haemorrhage (SAH).

Early experiences will be detailed to include:

- Consent when lacking capacity
- Implant safety at 3Tesla (embolisation coils and intracranial pressure (ICP) monitors)
- Practicalities of transfer, ventilation and drug support
- Physiological monitoring challenges
- Collection of research and clinical data
- Evacuation and resuscitation procedures
- Image analysis challenges.

Undertaking research MRI scans in unstable and intubated SAH patients poses significant challenges. SAH patients are at significant risk of complications and currently, there is a lack of MRI data in the acute phase post-rupture. Being able to provide MRI at this time point could provide insight into the pathophysiological processes causing secondary cerebral injury after SAH.

Six intubated and ventilated patients have been recruited and undergone serial research MRI including clinical and novel sequences. Four were reliant on vasopressors during the early scan. Three returned at three months for follow up imaging.Experience of research MR scanning of unstable NICU patients with SAH has shown it is both feasible and

safe. A 25 minute research scan protocol can easily be achieved within a total door-to-door transfer time of 90 minutes. Feedback from NHS clinicians responsible for these patients' care is uniformly positive. Responses from study participants at follow up are also positive. Confidence has been gained scanning this small cohort and 2 future ITU based studies with intubated/ventilated patients are due to start in 2015.

P043 **A case of pulsatile tinnitus, visual blurring and diplopia**

Sundip Udani
Southmead Hospital, Bristol

57 year-old opthalmology nurse presented with a one year history of left sided pulsatile tinnitus. She was admitted with increasing left sided retro-orbital pain, proptosis and diplopia.

On examination she had a left abducens nerve palsy, visual acuity 6/9 in the right eye and 6/18 in the left eye. A bruit was heard over the left eye.

On CT there was prominence of the petrous and cavernous segments of the left internal carotid artery. There was early filling of the left superior ophthalmic vein which was dilated and also the left superficial sylvian vein, pterygoid venous plexus and left inferior petrosal sinus. Appearances were suggestive of a left carotid-cavernous fistula.

Diagnostic angiography by the left internal and external carotid arteries demonstrated a brisk fistula supplied predominantly by the ascending pharyngeal artery in the region of the left hypoglossal canal draining into the varicosity of the inferior end of the inferior petrosal sinus.

A venous catheter was placed at the base of the right inferior petrosal sinus and microcatheter was then navigated via the inferior petrosal sinus, right cavernous sinus, intercavernous connections to the left cavernous sinus, down the left inferior petrosal sinus to the varicosity. A series of coils were then placed within the right varicosity and lower inferior petrosal sinus to the point of occlusion until there was stasis within this vessel. At this point the fistula appeared to be completely occluded.

The clinical and radiological features of the case will be presented, and educational points will be highlighted.

Clinical: Breast

P044 **Bright things in the breast on ultrasound - not always benign. A pictorial review of the possible causes**

Nuthan Gupta; Furhan Razzaq
Warrington and Halton Hospitals NHS Foundation Trust

Introduction: According to the BIRADS classification, an echogenic lesion in the breast is defined as a lesion that is more hyperechoeic than the fat in the subcutaneous tissue in the breast. Conventionally, all hyperechoeic lesions on ultrasound were thought to be benign. However, a recent study by Linda et al showed that hyperechoeic lesions are mostly benign but can rarely be malignant (0.5% cases) 1, 2.

Aims: This study looks at both benign and malignant hyperechoeic lesions of the breast and aims to reiterate that echogenicity on ultrasound alone is not solely a criterion for distinguishing between benign and malignant lesions. The characterisation of lesions on ultrasound must be made on the basis of the most worrisome finding.

Content: Here, we discuss a range of benign hyperechoeic breast lesions such as haematoma, fat necrosis, sebaceous cyst, hamartoma, lipoma, abscess, nodular fasciitis and malignant hyperechoeic lesions of the breast such as ductal carcinoma in situ, invasive ductal cancer, invasive lobular cancer, metaplastic cancer, angiosarcoma and papillary intracystic carcinoma of the breast.

Conclusion: Any echogenic lesion on ultrasound needs to be correlated with clinical features, mammographic changes, location of the lesion and demographics. Lesions with suspicious features on ultrasound and mammography need to be biopsied to establish the diagnosis.

References:

Anna Linda et. Al., AJR, May 2011