

**Results:** X-rays reduced by 24% with the new scaphoid pathway (n=121 vs 92), while CT decreased by 16.7%. MRI usage went from 0 to 45 scans in the three-month period. Mean time to MRI was 3.1 days, with an average time to diagnosis of 5.8 days. Clinic appointments decreased by 39.2% (n=79 versus 48) following the pathway change. Staff and patient feedback was overwhelmingly positive.

**Conclusion:** An early MRI pathway for XR negative scaphoid injuries is feasible in the ED. Achieving earlier, more accurate diagnoses has decreased time-in-cast for fracture negative injuries, improved patient satisfaction and reduced both inappropriate imaging and unnecessary clinic appointments. Further work is planned to expand the pathway to patients who present outside ED.

#### **A taste of our medicine: establishing a trainee-led taster week programme for junior doctors**

**Authors:** Mark Phillips, Helena Boryslawskij, Aarushi Gangahar, David Jarosz, Matthew Sarvesvaran, David Stockell

**Category:** Service delivery.

**Purpose:** The RCR encourages all training programmes to establish some form of taster programme to promote clinical radiology careers, particularly to foundation doctors and medical students. The Leeds/Bradford radiology academy is a large training scheme in West Yorkshire, with many junior doctors requesting tasters to gain exposure to clinical radiology. Therefore trainees from the academy established a programme to provide a single point of contact and to organise such experiences.

**Methods and materials:** Since the establishment of the programme in November 2016 feedback has been gathered from the participants. There were 53 participants in total. We also surveyed participants to determine their subsequent career path.

**Results:** 39 participants provided feedback. This was overwhelming positive. Statements were rated on a scale of 1–5. The average ratings for the statements 'I found it easy to contact someone to set up my taster' and 'the sessions were suited to my expectations' were 4.9 and 4.85 respectively. The average score for the overall experience was 4.95.

24 participants responded to the survey into subsequent career path. 83% said the experience made them more likely to pursue a career in radiology. 86% applied or were planning to apply for a radiology post.

The supervising consultants preferred the new system and had no negative experiences.

**Conclusion:** Setting up a trainee-led taster day programme allowed a large number of juniors to come through the department in an organised manner, with resultant positive feedback. It resulted in most participants becoming more likely to pursue a career in radiology. We would encourage all other large training scheme to consider a similar programme.

#### **All hands-on deck? The BSGAR survey**

**Authors:** James Andrew Stephenson, Hamza Elgendy, Andrew Lowe, Stuart Ashely Roberts

**Category:** Service delivery.

**Purpose:** Departments across the country are stretched beyond capacity. The RCR workforce census shows a bleak picture, consultant posts are unfilled, with 98% of trusts unable to meet reporting demand, thus team-working is vital. In 2017, there was heated debate in the corridors of power and on social media, with polarised opinions related to advanced radiographic practitioners (ARP) and sonographers (SG). In response, we questioned members of British Society of Gastrointestinal and Abdominal Radiology (BSGAR) about current departmental practises in relation to ARP and SG.

**Methods and materials:** An online survey with 39 multiple choice questions was sent to BSGAR members for completion.

**Results:** Return rate was 43%. ARP report ~ 50% of X-rays in most departments, only 12% of departments have abdominal X-rays (AXR) reported by ARP. 50% of respondents felt error rate of ARP was equal to radiologists, only 14% thought it was higher. 45% of departments mandated ARP participation in learning from errors (LFE) meetings. 82% stated

departments could not cope without ARP XR reporting. SG perform >50% of ultrasound (US) in 65% of departments, >75% in 21%, only 33% mandated participation in LFE meetings. 32% felt the error rate of SG was higher than radiologists. Fluoroscopy is performed by ARP in 76%, most having report checking or a radiologist reporting the study. Only 6% had ARP computed tomography colon (CTC) reporting and 2% CT reporting. 95% felt radiologists should be involved in advising on training and accreditation of ARP, with 76% thinking practise should be more stringently regulated.

**Conclusion:** ARP and SG are vital members of radiology departments and are perceived to perform at a high level of competence. However BSGAR members feel very few attend LFE meetings and BSGAR members suggest ARP and SG practice needs more stringent regulation, which should have radiologist involvement.

#### **The use of short codes in radiological reports when diagnosing venous thromboembolism (VTE) as a safety net**

**Authors:** Maria Sukhanenko, Brook Adams, Shishir Karthik

**Category:** Service delivery.

**Purpose:** Patients suspected of having VTE undergo either tomography pulmonary angiogram (CTPA) and/or sonovenogram (US). A positive study for VTE receives a specific short code (SSC) for increased safety and audit purposes. The aim of this audit is to identify if all VTE positive examinations received an SCC – the target being 100% compliance to the trust's standard.

The standard being assessed against is that all positive VTE examinations are allocated an SCC. The SCC is: 'New PE is confirmed', 'New DVT is confirmed'.

**Methods and materials:** All positive CTPAs and ultrasounds (USS) performed during a three-month period in 2017 and subsequently in 2018 were identified from the radiology informatics system. Non-diagnostic and follow-up scans were excluded. Reports were individually analysed for the use of an SSC.

First and second round interventions involved continued staff education, development of IT systems enabling easier insertion of an SCC and considered proforma/boilerplate text implementation respectively.

**Results:** In the first round, 522 CTPAs were performed and 66% of the VTE positive examinations contained SSC. The total number of US studies was 551 and SSC was used in 29% of positive examinations. On re-audit, 843 CTPAs were performed and there was no change to the use of SSC. There were 1,237 US scans done and SSC was used in 73% of positive reports.

**Conclusion:** Despite the increase in the number of examinations, incidence rate for VTE remained the same. With educational input there was a significant improvement in the use of SSC amongst USs, while Results remained the same for CTPAs, despite interventions.

#### **Developing patient-specific carotid artery ultrasound imaging phantoms for clinical training using 3D printing**

**Authors:** Inshal Imtiaz, Nazia Malik, Wenfeng Xia, Efthymios Maneas, Adrien Desjardins

**Category:** Ultrasound.

**Purpose:** Ultrasound imaging is regularly used for the assessment of carotid artery stenosis, however, few avenues of practice exist outside the clinical environment and on actual patients. Our aim was to create a cost-effective phantom for use by radiology trainees in order to practice imaging before beginning on patients. To improve this, we created a carotid artery ultrasound imaging phantom, using PVA as the tissue mimicking material.

**Methods and materials:** PVA was prepared at 20 w/w% concentration with deionised water in a conical flask placed in a water bath (temperature set at 95 °C) and was continuously stirred for two hours. MRA scan of a patient was used to segment the carotid artery and create a 3D printed mould. PVA mixture was poured into the mould and it underwent freeze thaw cycles. Gel wax and glass spheres were utilised to embed the PVA carotid artery.

**Results:** The speed of sound of 5 F-T PVA (1557 ms<sup>-1</sup>) is 1 is very close to that of tissue (1540 ms<sup>-1</sup>). We were able to produce patient-specific model with a percentage error of 0.8% and 0.7% between the patient's MRA scan and ultrasound image of phantom. Thus, giving us a reliable and accurate imaging phantom to train on.

**Conclusion:** This project has produced the first patient-specific phantom for the carotid artery that can be used for clinical training. The first study was conducted on how acoustic attenuation can be tuned with each F-T cycles on a wide range of frequencies. Embedding the PVA carotid artery in gel wax is a novel concept, preventing PVA from dehydrating. Addition of glass spheres gave a realistic sonographic look of tissue. The cost of the phantom is approximately £10, so we have created a cost-effective clinical training tool.

### So I've had my renal biopsy, what happens now?

**Authors:** Sau Lee Chang, David Kay, Olivia Mansfield, Simon Sheridan

**Category:** Uroradiology.

**Purpose:** Traditionally, the management of renal cancers has been largely surgical with the radiologist confined to a purely diagnostic role. Increasingly, however, a variety of treatment options are available for renal masses with the radiologist having a central therapeutic as well as diagnostic role. Percutaneous image-guided biopsy is performed to histologically characterise lesions to aid therapeutic decision-making. Benign lesions may allow discharge or follow-up, with surgical and non-surgical options for malignant lesions. In this study, we reviewed all renal biopsies performed in our institution in a year and correlated pathology obtained with final treatment.

**Methods and materials:** Retrospective study of all diagnostic computed tomography (CT)-guided biopsy in a general hospital over one-year period and subsequent management.

**Results:** Of 74 diagnostic renal biopsies, 61 lesions (82%) were malignant, most commonly clear cell renal cell carcinoma (RCC). 13 samples were benign. Based on accurate histological results, up to eight different management plans were offered taking into consideration disease stage, patient fitness and wishes. CT-guided cryoablation (32%) was as popular as surgery (39%). Robot-assisted laparoscopic partial nephrectomy (12/26) was the most common surgical technique adopted. Non-surgical options include curative or palliative chemoradiotherapy, Pazopanib trial medication, imaging follow-up or discharge. Average interval time between diagnostic biopsy and treatment was 132 days.

**Conclusion:** Obtaining accurate histology allows tailored, patient-specific treatment selection with more diverse treatment options now available. CT-guided renal cryoablation with fast recovery and excellent safety profile is an increasingly popular option.

### Why are some renal cancers hard to spot?

**Authors:** Alison Bradley, Amoolya Mannava, Thomas Welsh, Giles Maskell

**Category:** Uroradiology.

**Purpose:** To present a pictorial review of the cross-sectional imaging features of renal cancers which have caused diagnostic difficulty in our practice.

To increase awareness of the factors which can result in a delayed diagnosis.

**Methods and materials:** Cases will be presented which have caused difficulty in diagnosis. These have been identified by retrospective review of urology specialist multidisciplinary team (MDT) records, or have come to light through our learning from discrepancies process over the past six years.

**Results:** Factors which can affect lesion conspicuity include location within the kidney, attenuation and phase of contrast enhancement. Tumours which are endophytic or relatively homogeneous can cause particular difficulty.

Some lesions have been missed as incidental findings or when incompletely imaged on studies performed for another purpose.

**Conclusion:** Features have been identified which make some renal masses more difficult to detect on cross-sectional imaging. A series of illustrative cases will be presented with appropriate learning points.

### Below the belt? Unusual presentations of testicular and scrotal pathology

**Authors:** David Garbera, Suzanne Amin, Vandan Arora

**Category:** Uroradiology.

**Purpose:** We present a multi-modality educational pictorial review of five cases involving unusual presentations (and mimics) of testicular and scrotal pathology.

**Methods and materials:** Scrotal swellings are a frequent complaint among men of all ages. A wide variety of intra and extra-testicular pathologies exist, the most common of which are benign entities including inguinal hernia, hydrocele and epididymal cyst. The most common testicular malignancies are germ cell tumours, accounting for over 95%. Initial investigations will often involve an ultrasound scan, followed by cross-sectional imaging of the abdomen, if required. The role of imaging is multifaceted and has responsibilities of lesion characterisation, discerning extent of a lesion and staging of malignancy. Imaging of clinical areas of concern may yield unusual findings, requiring careful reading.

**Results:** We document five cases illustrating unusual presentations of testicular and scrotal pathology with accompanying imaging and histological findings. These include; teratoma within an undescended testis, para-aortic paraganglioma mimicking metastatic testicular malignancy, transitional cell carcinoma mimicking metastatic testicular seminoma, herniation of the entire urinary bladder within the scrotum and ectopic testicle within the contralateral hemiscrotum.

**Conclusion:** These cases are intended to highlight unusual presentations of both common and uncommon testicular and scrotal pathologies. While some diagnoses may be clear on imaging alone, it is key to use all of the clinical and radiological information available (knowledge of an undescended testis, for example) to suggest an 'outside the box' diagnosis if appropriate.

### Prognostic value of PI-RADSv2 score

**Authors:** Dione Lothar, Amy Davis

**Category:** Uroradiology.

**Purpose:** We evaluated the diagnostic accuracy of PI-RADS (Prostate Imaging and Reporting Data System) version 2, correlating multiparametric magnetic resonance imaging (mpMRI) and histological outcomes.

**Methods and materials:** We retrospectively analysed data from 96 patients referred into the prostate cancer pathway between December 2017 and August 2018. Patients with a PI-RADS scores of three and above on mpMRI were referred for transperineal biopsy (TP-Bx). MpMRI studies were double reported by radiologists trained in prostate MRI.

Correlation was made between PI-RADS score and histological grade. Tumours with a Gleason grade of 4+3 and above and/or a core tumour length equal to and above 6 mm, were considered clinically significant.

**Results:** Mean patient age was 68.9 years. Mean prostate specific antigen (PSA) and PSA density were 15.3 and 0.25 respectively. Mean time from mpMRI to TP-Bx was 20.4 days.

The overall cancer incidence was 76%, of which 82% (62/75) were clinically significant. Twenty-eight mpMRI studies were reported as PI-RADS 3; malignant cells were identified in 46% and just over a quarter (28%) were clinically significant cancers. In the PI-RADS 4 group, malignant cells were detected in 83%, 67% of which were clinically significant cancers. Malignant cells were detected in 87% of those with a PI-RADS score of 5 and 82% were clinically significant.

A Gleason grade of 3+3 was the most frequently reported histological outcome. The highest grades were identified exclusively within the PI-RADS 4 and 5 groups however.

**Conclusion:** In our study, the majority of clinically significant cancers were correctly identified using the PIRADS v2 framework. Diagnostic accuracy improved however at higher PI-RADS scores as the probability of cancer increased.