SP1 Head & neck and neurology short paper presentations

SP1.1 Subarachnoid haemorrhage, CT head and lumbar puncture - Can our words influence clinicians' actions?

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North Bristol Trust

Background: Subarachnoid haemorrhage (SAH) accounts for 1% of headache presentations to the emergency department (Van Gijn,2007). Current guidelines suggest a non-contrast CT Head (CTH) followed by lumbar puncture (LP) if the scan is negative and performed after six hours of symptom onset (Dubosh et al, 2016). This project aims to assess if LPs are performed per guidelines and establish whether report wording impacts LP rate.
Method: CTH studies were analysed in a tertiary neurosurgical centre over a 2 month period and scans performed for SAH identified. LP rate was assessed following a negative CTH. Report language was evaluated to see if it affected LP rate. 4 categories of clinical advice were identified: 1. No advice given 2. CTH cannot exclude SAH 3. No contraindication to LP 4. LP is advised
Results: 2433 CTH were analysed of which 88 were for SAH. 48% of patients with a negative scan underwent LP. If a report advised an LP, 80% of patients had one. If no advice was given 19% of patients underwent LP. Describing CTH limitations resulted in 40% of patients undergoing LP. Stating no contraindications to LP resulted a 64% LP rate.
Conclusion: 48% of patients had an LP following a negative CTH. Wording in a CT report had a large impact on LP rate. The most effective way for a Radiologist to affect clinical practice is to give instructional advice. Describing the limitations of Radiology was less effective and failure to give any advice resulted in the poorest guideline adherence.

1.Dubosh, N.M., Bellolio, M.F., Rabinstein, A.A. and Edlow, J.A., 2016. Sensitivity of early brain computed tomography to exclude aneurysmal subarachnoid hemorrhage: a systematic review and meta-analysis. Stroke, 47(3), pp.750-755.
2.Van Gijn, J., Kerr, R.S. and Rinkel, G.J., 2007. Subarachnoid haemorrhage. The Lancet, 369(9558), pp.306-318.

SP1.2 Neurovascular CT angiography image quality - A quality improvement project

Ashik Amlani; Dan Hodson; Ana Pascoal; Elizabeth Gabriel; Ian Honey; Ulrike Haberland; Amit Roy; Sundip Udani
Guy's and St Thomas' NHS Foundation Trust

Background: Neurovascular CT angiography (CTA) in our hospital was observed to be of poor quality when compared to a local tertiary neurosurgical centre, leading to potential misdiagnosis. A multidisciplinary team investigated this further.
Methods: A radiology registrar, two neuroradiologists, a CT radiographer, a CT manufacturer research scientist and two medical physicists compared and reviewed CTAs scanned locally and at the external institution. Analysis included the CT scan protocol parameters (CTDIvol, DLP, kV, mA, collimation, detector configuration, reconstruction filter and display field of view), IV contrast injection technique (flow rate and total contrast volume), as well as subjective expert visual review.
Results: Cases of missed aneurysms were reviewed and consensus was that local scans exhibited a high level of image noise. Quantitative analysis revealed that the dose (CTDIvol) delivered by the external centre scanner was 3-4 times larger and the dose to the patient (DLP) was 4-5 times larger compared to our hospital. The average (normalised) noise level for the local studies was 2-3 times that of the expert centre studies and the contrast-to-noise-ratio was correspondingly lower by a factor of 1.3-1.6. IV contrast injection protocols also differed.
Conclusion: A combination of protocol differences and lower radiation doses were the primary causes for the non-diagnostic image quality observed. Measures implemented included protocol standardisation and a graduated increase in the CTDIvol by 2x to mitigate the suboptimal image quality. We also modified the data series transferred to PACS to aid reporting. Further work is ongoing to further optimise patient care.

SP1.3 Optimising imaging and adherence to protocols in patients with Neurofibromatosis type 2

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

Background: Neurofibromatosis type 2 (NF2) is an autosomal dominant disease characterised by multiple central and peripheral nervous system tumours. These patients are scanned regularly for treatment monitoring and surgical planning, with associated long scanning times traditionally involved. This negatively affects the patient experience, scan quality, efficiency and workflow. Specific MR protocols for adult NF2 patients undergoing neural axis imaging, including patients with cochlear implants, have been developed at our institution. These aimed to streamline imaging protocols to necessary sequences for diagnosis, disease monitoring and management decision making. This study assessed adherence to these protocols and following implementation of an e-vetting system for adult patients with NF2, assessment to measure compliance was undertaken to investigate the potential improvement of this intervention.
Methods: All adult NF2 patients who underwent an MRI head +/- spine between 01/03/2018 and 30/11/18 and second phase 14/02/2019 to 24/09/2019, respectively, were included.

Results: The first cycle and second cycle both included 50 patients. The initial phase showed that adherence to the correct imaging protocol was 17(34. Adherence to the correct protocol increased to 90% in the second cycle following implementation of the new e-vetting system and radiographer education.
Conclusion: Streamlined protocols integrated onto an e-vetting system which are automatically populated with the appropriate sequences have led to significant and potentially sustainable improvement, including shorter scanning times. This significantly improved the patient experience and clinical effectiveness through improving scan quality by reducing the motion artefact associated with prior longer scanning times. Improved departmental workflow and cost.

SP1.4 Apparent diffusion coefficient (ADC) of the spinal cord following palliative radiotherapy to the thoracic spine in metastatic prostate cancer

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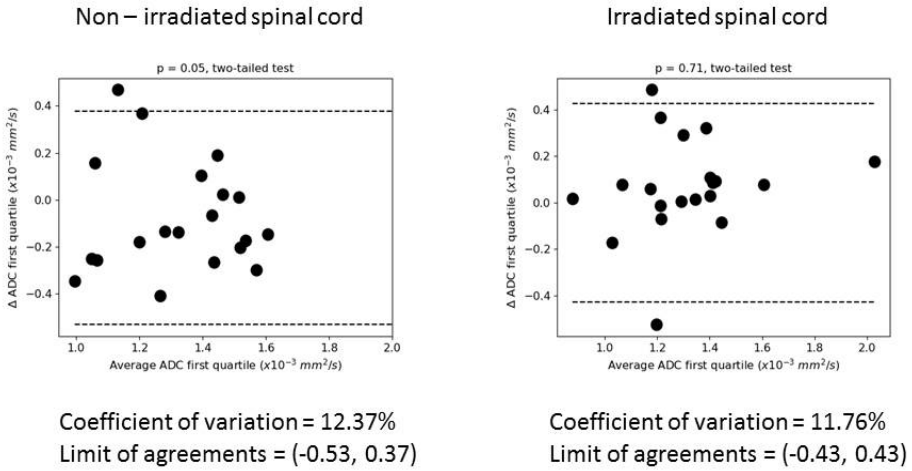
[1]The Royal Marsden NHS Foundation Trust London; [2]The Institute of Cancer Research London; [3]The Royal Marsden NHS Foundation Trust/The Institute of Cancer Research London

Introduction: Radiotherapy is an effective treatment for symptomatic bone metastases in advanced prostate cancer patients. Re-irradiation for symptomatic recurrence is performed in 8-20% but is limited by the potential cord toxicity. The ADC calculated from diffusion weighted MRI (DW-MRI) was reported to be more sensitive in detecting white matter radiation damage than T2W images, which may identify patients at risk of cord toxicity.We investigate the differences in the ADC following radiotherapy between irradiated (RxSc) and non-irradiated (NRxSc) spinal cord segments.
Methods: Twenty patients who received thoracic spinal radiotherapy for bone metastases and had DW-MRI pre- and post-radiotherapy were reviewed. We delineated the spinal cord and surrounding CSF on the ADC maps using an automatic segmentation software on the pre- and post radiotherapy MRIs. The median spinal cord ADC change on the pre and post-radiotherapy MRI were compared between NRxSc and RxSc spinal cord segments.

Fig.1 Bland-Altman plot – ADC 25th percentile



Results: Median ADC values (x10-3 mm2/s) pre and post radiotherapy, were as follows: NRxSc: 1.92 (1.65-2.08) and respectively 1.73 (1.59-1.94); RxSc: 1.76 (1.55-1.83) and respectively 1.82 (1.63-1.98) expressed as median (first interquartile range- third interquartile range). The median ADC change pre-post radiotherapy in the RxSc measured as 0.1 x10-3mm2/s (-0.06; 0.2) was non-significant.
Conclusion: In this pilot study, we have documented the ADC spinal cord measurement variability. No significant change in the median ADC of the spinal cord post radiotherapy was observed. Further work will include correlation between the median ADC values of the spinal cord in areas requiring radiotherapy and patients' symptoms.

Lutz, S. et al. (2017) Palliative radiation therapy for bone metastases: Update of an ASTRO Evidence-Based Guidelines, Practical Radiation Oncology. Elsevier Inc., 7(1), pp. 4-12. doi: 10.1016/j.prro.2016.08.001.
Philippens, M. E. P. et al. (2009) Radiation effects in the rat spinal cord: evaluation with apparent diffusion coefficient versus T2 at serial MR imaging., Radiology, 250(2), pp. 387-97. doi: 10.1148/radiol.2502071374.

SP2 History of imaging short paper presentations

SP2.1 History and evolution of artificial intelligence

Elizabeth Beckmann
Lanmark

At this time of discussion about Artificial Intelligence in Radiology it is interesting to review the origins of AI. As early as the 1st Millennium BC, aspects of Mechanical or formal reasoning, where the human thought process can be mechanised were proposed by Chinese, Indian and Greek Philosophers. Over the centuries Aristotle, Euclid and Al-Khwarizmi who gave his name to the " Algorithm" developed their ideas. In the 17thC Leibniz began to articulate the physical system hypothesis that became the philosophy for research in AI. In Alan Turing's 1950 paper he referred to the possibility of machines that can think and

defined the "Turing Test" which was the first real proposal of Artificial intelligence. Walter Pitts and Warren McCulloch analysed the network of artificial neurons and in 1951 Marvin Minsky with Dean Edmonds built the first Neural network machine. At the Dartmouth conference in 1956 John McCarthy presented " Artificial Intelligence" as the name for the field. This is generally accepted as the real birth of AI. Research started on AI in Medicine in the 1960s. By the 1990s AI had been introduced into Radiology particularly in CAD and Expert systems. AI techniques are now integral in many clinical systems in Imaging and Therapy. This paper will review the history and origins of AI and in particular in Imaging and Therapy. Learning outcomes- participants will gain an understanding of the origins of AI and its development into the fields of Imaging and Therapy.

SP2.2 Early chest radiology pioneers and the beginnings of chest radiology

Arpan K Banerjee
British Society for the History of Radiology

Introduction: In this talk I will present some of the contributions of the early chest radiology pioneers including Francis Williams, Hugh Walsham, Holzknecht and Beclere's contributions to early chest radiology. Following Rontgen 's discovery it soon became apparent that the chest could be imaged with this technique and not just the bones.

Methods/results: In the USA Francis Williams was one of the first doctors to fluoroscope the chest in April1896. His experience with a large number of cases led to him opening a department of Radiology at the Boston City Hospital in 1898 although several tests were still being conducted at the MIT. He wrote one of the earliest books on the subject in 1901 In the UK, Hugh Walsham a physician and pathologist became a pioneer of chest radiology at St Bartholomew's Hospital in London. He started of as an assistant to the electrical department in 1896 ending up as consultant in 1917. In 1906 he wrote 'The Rontgen Rays in diseases of the chest' with Harrison Orton which became the standard text in the UK. In Vienna, Guido Holzchecht pioneered chest radiology and wrote his textbook on the subject in 1901. Beclere in Paris the father of French radiology wrote his book on Chest tuberculosis in 1899. Beclere was instrumental in forming the French Society of Radiology which held its first scientific meeting in 1909.

Conclusion: Potted biographical sketches of these pioneers will be presented.

SP2.3 Miss Marion Frank (1920 - 2011) "I have never been a good radiographer, but I knew how to get out of trouble"

Adrian Thomas
Canterbury Christ Church University

This year of 2020 marks both the centenary of the Society of Radiographers and also of the birth of Marion Frank. Marion would have wanted to celebrate the centenary of the Society that she loved so dearly. Marion and her family left Germany in 1937 and came to England. Marion and her twin sister were working at the Royal Northern Hospital in London when they encountered the pioneer radiographer Kathleen Clara Clark who persuaded them to enter radiography. Marion progressed rapidly and became Head of Radiography at the Middlesex Hospital. She became President of the Society of Radiographers and said that she enjoyed herself and that her main role was that of communication. Marion Frank and Kathleen Clark were both involved in the foundation of the International Society of Radiographers and Radiological Technologists (ISRRT). Her hospitality was legendry and the door of her flat was always open to visiting radiographers. Marion was active in the British Institute of Radiology, the Osler Club of London and the British Society for the History of Radiology. She loved the Deutsches Röntgen Museum in Remscheid and took many students there for visits. Marion enjoyed life and her enthusiasm was contagious. Marion summed up herself by saying "I have never been a good radiographer, but I knew how to get out of trouble"! The regret of her final years was that she could not make that final visit to the museum in Remscheid that she loved so dearly.

Thomas, A.M.K. Global gathering celebrates life and career of Marion Frank (22 May 2012)
http://www.auntminnieeurope.com/index.aspx?sec=sup&sub=xra&pag=dis&ItemID=606626

SP2.4 Kathleen Clara Clark (1896-1968) and the need for standardisation

Adrian Thomas
Canterbury Christ Church University

The Society of Radiographers was set up 100 years ago in 1920, and in 1921 Miss Kathleen C Clark was one of 20 who passed the first examination of the new Society (the MSR). She had completed her training course at Guy's Hospital, initially working at the Princess Mary's Hospital, Margate, before moving to the Royal Northern Hospital in London. She founded a School of Radiography at the Royal Northern Hospital which became a model for schools elsewhere. She was President of the Society of Radiographers from 1935 to 1937. In 1935 she became co-founder and Principal of the Ilford Radiographic Department at Tavistock House, which conducterd instruction and research into radiography and medical photography. Under her guidance the department developed a world-wide reputation. The first edition of her book 'Positioning in Radiography' was published in 1939. The book became the standard work of reference for radiographers and has been through many editions. 'Positioning in Radiography' standardized the radiographic projections and so similar projections were made in all hospitals. Secondly, the book is very artistic. The illustrations do not come across as cold and entirely objective scientific images. She was awarded the MBE in

1945. She was committed to fostering co-operation and contact between radiographers throughout the world and was a driving spirit behind the formation of the ISRRT. Her contributions and lasting signifiaance in this centenary year of the Society of Radiographers will be reviewed and assessed.

Thomas, AMK., Banerjee, AK. (2013) The History of Radiology. Oxford: Oxford University Press.

SP3 Workforce development short paper presentations

SP3.1 Radiographer advanced practice in paediatric interventional radiology - is it beneficial for patients and radiology departments?

Emma Rose; Clare Simcock; Premal Amrishkumar Patel
Great Ormond Street Hospital for Children

Background: Advanced practice and extended roles for radiographers is increasingly being seen in Interventional Radiology (IR) departments around the country. However, paediatric patients are often thought to be too complex, or too difficult for radiographers. We hypothesise that following appropriate training and supervision, clinical specialist radiographers (CSR) can independently and safely perform a variety of procedures on a range of children and contribute to department productivity. The aim of this study is to assess if training radiographers to undertake paediatric IR procedures is feasible and does provide benefit to patients and the department.

Method: Retrospective review of the electronic patient record system and procedural logbook of one CSR between July 2018 and July 2019.

Results: 5 consultants, 2 fellows and a CSR in the IR department performed 3933 procedures of which 1716 were procedures which the CSR is trained to do. Of these the CSR performed 427 procedures. Median patient age was 6.3 years (range: 0 -- 18). Procedures included all types of central venous access and gastro-intestinal intervention. This accounts for 25% of procedures that they could have performed and 11% of whole departmental workload.

Conclusion: The data demonstrates that radiographer advanced practice in paediatric IR is feasible and can contribute significantly to the department productivity. CSRs can perform paediatric IR procedures, this reduces waiting time for patients, provides a cost-saving mechanism for the department and allows radiologists greater time to focus on more complex vascular and non-vascular work. It also provides a valuable career progression opportunity for radiographers.

SP3.2 Student radiographers - Current career aspirations

David Palmer; Pauline Reeves
Sheffield Hallam University

Background: "Over 45 million diagnostic imaging tests are performed every year (NHS England 2019), which is an increase of 18.7% over the last five years (NHS England 2018). This shows a clear need to expand the current radiology workforce. The Society of Radiographers (2018) estimate there is currently a vacancy rate of 9.1%; highlighting a gap in the workforce.

Method: Students from across the United Kingdom were asked to participate in an online survey comprising of fifteen open and closed questions. Questions examined the intentions of students post-qualification; identifying which areas of radiology appealed most. Question themes centred on student demographics, pre-course aspirations, modalities of interest, and location. Results were analysed using descriptive statistics and thematic analysis. According to the Society of Radiographers, there are currently 2135 registered students currently undertaking the undergraduate Diagnostic Radiography course. This study required a sample size of 326 with a 95% confidence level and 5% margin of error.

Results: This survey gained 360 unique responses, generating a response rate of 16.8%. When asked which three specialities most appealed to students, Plain Film (n=149), Ultrasound (n=147) and Computed Tomography (n=137) were most popular. 42.8% of women selected ultrasound as their top choice, with this being the 5th most popular choice for men (29.9%).

Conclusion: The student career aspirations revealed in this study could be used to predict potential future workforce gaps. They could also be utilised to advertise less popular areas within radiography.

1. NHS England (2019) Diagnostic Imaging Dataset Statistical Release, Leeds, UK. https://www.england.nhs.uk/statistics/wp-content/uploads/sites/2/2019/12/Provisional-Monthly-Diagnostic-Imaging-Dataset-Statistics-2019-12-19-1.pdf.
2. NHS England (2018) Diagnostic Imaging Dataset Annual Statistical Release 2017/18, Leeds, UK. https://www.england.nhs.uk/statistics/wp-content/uploads/sites/2/2018/11/Annual-Statistical-Release-2017-18-PDF-1.6MB-1.pdf.
3. The Society of Radiographers (2018) Diagnostic Radiography UK Workforce Census 2018, London, UK. https://www.sor.org/sites/default/files/document-versions/diagnostic_workforce_census_2018.pdf.

SP3.3 How do we define advanced practice roles a document analysis of UK job descriptions?

Beverly Snaith[1]; Martine Harris[2]; Helen Adamson[1]; Beverley Foster[1]; Nicholas Woznitza[3]
[1]University of Bradford; [2]Mid Yorkshire Hospitals NHS Trust; [3]Homerton University Hospital NHS Trust

Background: Despite the concept of skill mix in radiography being well established in policy[1,2] there remains concerns regarding the transferability and impact of roles, particularly at an advanced level. Job profiles[3] were last updated in 2006, and therefore may not reflect the multi-professional advanced clinical practitioner (ACP) framework, [4] This project sought to examine roles advertised at an advanced level for consistency and variation.

Method Roles advertised on UK NHS online job sites including the terms 'advance' or 'reporting' diagnostic radiographer were collated over a 6-month period. Content analysis of the job description (JD) and personal specification (PS) was undertaken evaluating role title, banding, role scope, modality and skill statements which were mapped to the national advanced clinical practitioner (ACP) framework. [3]

Results: A total of 42 roles were analysed across a range of modalities, the most common involved disciplines were projectional radiography (n=20) and breast imaging (n=8). There was inconsistency in role title, and subsequent banding (6-8b). Mapping to the HEE ACP framework confirmed that expert clinical practice and leadership are universal whereas a marked variation in the inclusion of research and education competencies was evident.

Conclusion: There remains a lack of consistency in the application of advanced practice in radiography. Many roles purporting to be at this level not reflecting the recent national ACP framework. A review of national job profiles is needed to reflect contemporary practice.

1. Department of Health. Radiography skills mix: a report on the four-tier service delivery model. London: Department of Health; 2003.
2. Society of Radiographers. Diagnostic radiography: A survey of the scope of radiographic practice 2015. 2017.
3. NHS Employers. National profiles for diagnostic and therapeutic radiography. https://www.nhsemployers.org/-/media/Employers/Documents/Pay-and-reward/Diagnostic_and_Therapeutic_Radiography.pdf?la=en&hash=F999E0C2BDA2255B4361C7EB299D93CF55AE2DF4.
4. Health Education England. Multi-professional framework for England. https://www.hee.nhs.uk/our-work/advanced-clinical-practice.

SP3.4 Establishing the value of a supported return to training course for radiology trainees

Samira Rostampour[1]; Jennie Wakefield[2]; Kate Hawtin[3]; Jane Young[4]
[1]Imperial College NHS Foundation Trust; [2]Oxford University Hospitals NHS Trust; [3]University College London Hospital NHS Trust; [4]Whittington Hospital NHS Trust

Introduction: On the basis of Health Education England's recently published Supported Return To Training (SuppoRTT) guidance, London School of Radiology has established a SuppoRTT Course for Radiology Trainees. Our course has been designed to help trainees returning to work after a period of absence and includes refresher lectures, practical simulation and interactive cases.

Method: A pre- and post-course survey was performed to measure the trainees' confidence, anxiety and overall excitement about returning to work. Analysis was performed using GraphPad Prism 5 using Wilcoxon Signed Rank Test. A total of12 delegates attended the most recent course. 11/12 completed the post- course questionnaire. Paired data was obtained in six cases where trainees were willing to be identified.

Results: 91% (11/12) of delegates were returning after a period of maternity leave. The delegates were asked to rate their levels of confidence, anxiety and the extent to which they were looking forward to returning to work, on a scale from 1-5 (low-high). Anxiety levels about returning to work were reported to have reduced significantly after the course (P 0.03). Candidates also described improved levels of confidence, but this did not reach statistical significance (P 0.054). All delegates reported that they found the course useful and 100% would recommend the course to colleagues.

Conclusion: We have shown that attending a well-structured SuppoRTT Course prior to returning to training can reduce trainees' anxiety and improve confidence.

SP3.5 The personal impact of work-related musculoskeletal disorders (WRMSD) on sonographers

Gareth Bolton; Lisa Booth; Paul Miller
University of Cumbria

Background: Since 2005, the UK government's Migration Advisory Committee has listed sonography as an official 'shortage specialty' (Migration Advisory Committee, 2019). Work-related musculoskeletal disorder (WRMSD), already widespread among sonographers, is increasing due to the additional physical stresses of working in understaffed environments (Harrison & Harris, 2015). While contemporary research has described the broad picture regarding WRMSD in ultrasound (Bolton & Cox, 2015), none has, to date, extensively explored its personal and professional impacts.

Method: Extended semi-structured interviews with N=9 experienced sonographers working in the UK were conducted and analysed using Interpretative Phenomenological Analysis (Miller, et al, 2017). Core thematic areas that emphasised personal impacts of WRMSD were then further examined to highlight how participants specifically made sense of them.

Results: The key ideological tensions evident in the findings pertained to those between individuality and collectivity, and freedom and necessity. Evidence indicated that the participants held a range of perspectives highlighted in the following themes: (1) acknowledgement, or denial, in terms of experiencing symptoms of WRMSD (2) recognition of own vulnerability, (3)

'spinning plates' against emotional investment, (4) metaphorically 'jumping through hoops' and (5) total denial of the phenomenon.

Conclusions: Participants acknowledged their role as professionals, and also their own commitment to a broader altruistic model that reinforced their identities as good healthcare professionals. The 'personal self' provides a useful analytic framework for understanding some of the everyday feelings of sonographers towards the phenomenon of WRMSD. Further exploration of the conceptual facility thereof is recommended.

1. Bolton, G.C. & Cox, D.L. (2015) 'Survey of UK sonographers on the prevention of work related muscular-skeletal disorder (WRMSD)', Journal of Clinical Ultrasound, 43 (3), pp.145-152.
2. Migration Advisory Committee. (2019) Full review of the Shortage Occupation List Migration Advisory Committee. London: Migration Advisory Committee.
3. Miller, P.K., Woods, A.L., Sloane, C. & Booth, L. (2017) 'Obesity, heuristic reasoning and the organisation of communicative embarrassment in diagnostic radiography', Radiography, 23 (2), pp.130-134.
4. Parker, P.C. & Harrison, G. (2015) 'Educating the future sonographic workforce: membership survey report from the British Medical Ultrasound Society', Ultrasound, 23 (4), pp.231-241.

SP4 Radiotherapy treatments short paper presentations

SP4.1 Building research capability and capacity of therapeutic radiographers in a small radiotherapy department

Kirsty Farnan; Gareth Hill
NHS Tayside

Background: The Society and College of Radiographers(SCoR 2015) research strategy aims to embed research at all levels of Radiographic practice and education, although this can present a challenge to smaller radiotherapy departments with limited resources dedicated to research generation (Probst et al., 2015). Recognising that research is everyone's responsibility and local commitment to implementing college policy and strategy, it was necessary to ensure all staff contributed to audit and service evaluation activities to build research capacity.

Methods: A comprehensive review highlighted the need to carry out 15 service evaluations and audits to provide a more evidenced-based approach to service delivery. In an attempt to grow capacity, 15 teams comprising of experienced and inexperienced staff were formed, supervised by an advanced practitioner. Each team conducted data collection and analysis, resulting in evidence that reflected or changed practice. A mixed method survey monkey questionnaire was used to evaluate staff experience and attitudes towards this change of practice.

Results: Twenty-four respondents indicated a confidence level of over 60% when undertaking service evaluation; staff qualified the longest displayed lower confidence levels. Potential involvement in service evaluation and audit was indicated positively by 73%. Barriers identified by staff included time, opportunity and hierarchy. Twenty-three staff indicated being involved helped enhance their skills with 58% feeling this would benefit their future career.

Conclusion: Staff inclusion in audit and service evaluation within the department has overall been shown as positive. Resolutions to barriers identified will further build upon existing research capability and capacity within the department.

1. Society and College of Radiographers. (2015). *Society and College of Radiographers Strategy [2015-2017]*. London: SCoR.
2. Probst, H., Harris, R., McNair, H., Baker, A., Miles, E.A. and Beardmore, C. (2015). Research from therapeutic radiographers: An audit of research capacity within the UK. *Radiography*, 21(2), pp.112-118.

SP4.2 Improving patient pathways - 17 days from referral to radiotherapy treatment at Addenbrooke's Hospital

Nicola Twyman; Katie Bradshaw; Lynn Bridgehouse; Hannah Chantler; Jemma Chapman; Nick Early; Joanna Gemmill; Deborah Gregory; Andrew Hoole; Gail Horan; Katie Hutchinson; Rashmi Jadon; Sarah Knight; Simon Thomas; Mitch Wooding
Cambridge University Hospitals NHS Foundation Trust

In April 2019, staff in Addenbrookes' radiotherapy department resolved to improve their compliance with the NHS England's Service Specification that category 1 patients be treated within seventeen days from the decision to treat. Representatives from clerical staff, oncologists, radiographers, dosimetrists and physicists were brought together to review and improve our patients' pathways. The task appeared ominous. Methodologies, loosely based upon "The Theories of Constraints" (1) initially lent structure to the investigation; helping clarify and focus the work. The pathways were broken into chronological parts and the groups highlighted various issues causing delays. In-depth discussions involving the staff who actually encountered the issues, lead to ideas for routes forward and on to real changes. Following generalised discussions, the group reformed to concentrate on the Head and Neck patients' pathways and, subsequently, another specialised group worked with the cervix pathway. It has not been easy. Some improvements are staff and site specific, requiring continual interventions to maintain the results. However, other ideas are departmental wide and should positively impact on all patients' pathways. To date we have monitored 2898 patients' pathways. Analysis of the 141 head and neck patients' pathways show, in the first quarter of 2019, only 6.1% were treated within 17 days of referral. However data for October and November, showed compliance had increased to 23.2% along with significant improvements to the median waiting time. Similarly cervix pathways (32 patients in total) improved from 33.3% to 80% compliance. We can share details on our pathway improvements, pitfalls and future plans

1. Cox, J. and Goldratt, E.M. (1986) The Goal: A process of ongoing improvement. Croton-on-Hudson, New York: North River Press.

SP4.3 Robust optimisation for SABR lung planning

Zoe Walker[1]; Jane Rogers[1]; Gareth Baugh[1]; Robert Chuter[2]
[1]University Hospital Coventry; [2]The Christie

Background: Robust optimisation offers a solution to the inaccuracies using planning target volumes (PTVs) for lung planning, by including a full range of gross tumour volume (GTV) positions. The aim of this research is to evaluate the difference between methods of robust optimisation for SABR lung planning using 4DCT. The research extends existing work in this area as the methods will be evaluated using realistic breathing traces from patients rather than simplistic models.
Method: Fifteen VMAT lung SABR patients were planned in Raystation using a margin based PTV method, robust optimisation on a 3D scan and robust optimisation over ten 4D phases. Clinical goals were compared and robustness assessed by perturbing the dose. An in-house moving phantom was programmed with patient breathing traces obtained from 4DCT and on-treatment 4DXVi scans. Plans were delivered to the phantom to assess the dosimetry.
Results: The plan comparison results show that the robust optimisation on the 3D scan gives the same target coverage and similar doses to the organs at risk. The perturbed doses show that both plans have a comparable level of robustness with a dose to 99% of the PTV of 92.4% for robust plans compared to 92.1% for margin-based plans. Dosimetry results using patient traces from 4DCT and 4DXVi will be also be presented.
Conclusions: Results suggest that robust optimisation for lung SABR planning is comparable to margin-based planning. The clinical viability of using robust optimisation for photon lung planning will also be assessed.

SP5 Therapeutic radiography service improvement short paper presentations

SP5.1 Values versus evidence-based practice: Part 2 - Should the art of communication become a continuous training requirement of a competent therapeutic radiographer?

Joanne Mitchell; Donna Burns-Pollock; Lindsay White; Ana Azevedo; Joanne Mathieson; Linda Goodall; Eden Simpson; Josie Cameron
Edinburgh Cancer Centre

Introduction In 2018 a survey was undertaken examining the need for ongoing education, training and support allowing therapeutic radiographers (TR) to communicate effectively with patients in their care. Emotional resilience, due to the highly emotive nature of the role was also examined. Results highlighted effective communication skills are still regarded as being as important as technical skills. A significant number of staff however did not feel equipped to discuss issues concerning depression and anxiety, incontinence or sexual issues. A high level of respondents reported that they had experienced stress, low mood or anxiety as a result of a work related incident. The following supportive measures have since been implemented: * Communication Document (CD); * Values based reflective practice sessions; * Counsellor drop-in sessions.
Methods and Materials A follow up survey received 45 completed responses.
Results Whilst CD has improved general knowledge in advice to patients, stress levels have remained high. Comments received via the 2nd survey highlight new areas to be addressed. Regular positive peer review, more training/CPD time and mindfulness sessions have been suggested to support the emotional burden on staff.
Conclusion As a department we intend to use this evidence to continue in the creation of not only an evidence but values based workplace. In answer to the original question -Should the art of communication become a continuous training requirement of a competent therapeutic radiographer? Yes, but the communication needs to be not only with patients but amongst ourselves.

1. Bolderston A, Lewis D, Chai M.J.. The Concept of Caring: Perceptions of radiation therapists. Radiography 2010 16: pp198-208.
2. Probst H, Griffiths S. Retaining therapy radiographers: Whats so special about us? Journal of Radiotherapy in Practice 2007 6: pp 21-32.
3. Paterson M, Kelly E. Values -Based Reflective Practice. Practical Theology 2013 6: pp 51-68.

SP5.2 Developing a robust local framework for the development of advanced practice

Denyse Hodgson
Sheffield Teaching Hospitals

Since the vision for the development of the therapeutic radiographer workforce was first published, we have seen the growth of advanced and consultant practice roles. In particular, the advanced practice (AP) roles have developed as a response to service needs and focused mainly on tasks previously undertaken by the oncologist. Whilst the profession has been good at sharing practice, developments have varied between institutions. The success of roles is often down to the hard work and determination of individuals rather than a career structure that is recognised within organisations. This presentation focuses on the framework development in one department who were late in adopting the AP roles. The importance of support from the multi-disciplinary team and a shared vision were paramount to developing roles and ensuring appropriate training and support was in place. The challenges faced are explored, such as: territorialism, line management issues, professional recognition and funding. The benefit to patient outcomes and experience are discussed, along with improvements in service delivery, the impact for the profession and more effective inter-disciplinary working. It is important to recognise that recruiting individuals with the

right values and skills is the first step in the process and they require guidance and support to achieve their potential. Another vital aspect of the developing role is to demonstrate AP skill set and the impact upon on the service in terms of finance, work flow and patient experience. An evaluation strategy will be presented and results from work completed will be shared.

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4. Quality Health (2017) National Cancer Patient Experience Survey.
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SP5.3 Therapeutic radiographer-led sexual care clinic

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Oxford University Hospitals NHS Foundation Trust

Introduction: By 2034, 3 in 4 patients in England diagnosed with cancer will survive at least 10 years and they should be fully supported and the long-term consequences of treatment managed[1]. High levels of unmet needs related to sexuality have been found at baseline and follow-up in patients who have had radiotherapy[2]. Sexuality is a basic part of a person's identity and is closely linked with emotional and physical wellbeing. A cancer diagnosis and treatment can affect sexual self-concept as well as sexual functioning[3]. Numerous women suffer for decades from the consequences of cervical cancer without accessing treatment that might improve their quality of life[4]. In a 2006 survey of prostate cancer patients, 43% of respondents said that their sex life suffered[5].

Method: Our Sexual Care after Radiotherapy service provides education, information and support patients with the sexual effects of radiotherapy treatment. It supports patients holistically providing advice, treatment and signposting for the management of sexual effects. The clinic is run by Therapeutic Radiographers trained in psychosexual support using the Ex-PLISSIT model6. We provide leaflets and sign-post to resources/services as well as providing specific suggestions and interventions.

Results: Five patients have self-referred and five have been referred by their consultant. A friends and family questionnaire was completed by all patients attending. All of the patients said they would be "extremely likely" to recommend the service.

Conclusion: Our Sexual Care after Radiotherapy service offers an opportunity for support and advice to help improve our patients' quality of life.

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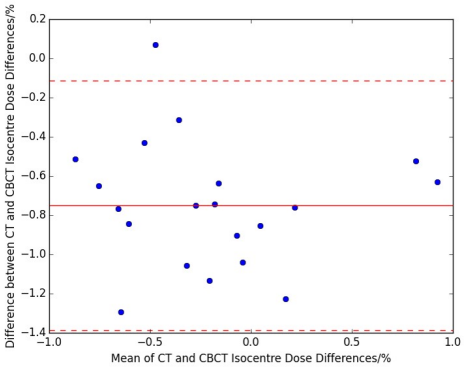
SP5.4 Using CBCT for dosimetric quality assurance of MR-only radiotherapy

Jonathan Wyatt; Rachel Pearson; Christopher Walker; Karen Pilling; Rachel Brooks; Hazel McCallum
Northern Centre for Cancer Care, Newcastle upon Tyne Hospitals NHS Foundation Trust

Introduction: Magnetic Resonance (MR)-only prostate radiotherapy using synthetic Computed Tomography (sCT) algorithms with high dosimetric accuracy have been clinically implemented[1]. MR images can suffer from geometric distortions so dosimetric Quality Assurance (QA) using an independent image is required. The first-fraction Cone Beam CT (CBCT) has been proposed[2], but has not been evaluated clinically. This study evaluated the clinical use of CBCT for dosimetric QA of MR-only radiotherapy.

Method: 34 patients treated with MR-only prostate radiotherapy were divided into two cohorts. The first (20 patients) received a back-up CT, whilst the second did not. All patients were planned using a sCT from MriPlanner (Spectronic Medical) and received daily CBCT imaging (Varian Medical Systems) with MR-CBCT soft-tissue matching[3].



The treatment plan was recalculated on the first-fraction CBCT using the soft-tissue match in RayStation (RaySearch Laboratories) and the doses compared. For cohort 1 the sCT was also rigidly registered to the back-up CT, the plan recalculated and the doses compared.

Results: Mean sCT-CBCT dose differences across both cohorts were -0.7 ± 0.1% (sem, range -2.3%, 0.6%). The CBCT underestimated the sCT dose in 30/34 patients. The mean gamma pass rate was (1%/1mm) 85 ± 1% (75%, 94%) and (2%/2mm) 95.6 ± 0.6% (85.4%, 99.7%).For cohort 1, sCT-CBCT dose differences correlated with sCT-CT differences (Pearson's r=0.79, p<0.001), with sCT-CBCT differences on average 0.7% larger and agreeing within ± 0.6%.

Conclusion: CBCT appears a promising method of dosimetric QA for MR-only radiotherapy, with dose differences and gamma pass rates showing good agreement with CT.

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SP5.5 Can CT-Cone Beam Computed Tomography (CT-CBCT) matching skills be transferred to Magnetic Resonance-CBCT (MR-CBCT) matching for MR-only prostate radiotherapy?

Rachel Brooks; Hazel McCallum; Rachel Pearson; Karen Pilling; Jonathan Wyatt
Newcastle upon Tyne Hospitals NHS Foundation Trust

Background: Research to date has used online fiducial matching with an MR-only pathway[2], yet in the UK, 66% of centres use CBCT soft-tissue matching for verification purposes[1]. We have previously demonstrated MR-CBCT soft-tissue matching has minimal differences to CT-CBCT matching[3]. This research assesses the transferability of radiographer skills and training needs for MR-CBCT prostate soft-tissue matching.
Method: Twenty-three radiographers with 3 months - 5 years' experience of online daily CT-CBCT soft-tissue matching prostate cancer patients participated in the repeated measures study between February and July 2019. Each participant completed 10 CT-CBCT prostate soft-tissue matches offline as a baseline for inter-user variability, followed by 10 MR-CBCT prostate soft-tissue matches. A MRI anatomy training intervention was delivered and the 10 MR-CBCT prostate soft-tissue matching exercise was repeated. Inter-observer error was calculated as the standard deviation of the matches across all observers per patient.
Results: Mean (± standard deviation) of the inter-observer error at CT-CBCT baseline were 1.4 (±0.8), 1.2 (±0.7), 0.4 (±0.1), MR-CBCT matches prior to training were 1.5 (±0.7), 1.5 (±0.4), 0.6 (±0.4) and after the training intervention 0.9 (±0.3), 1.2 (±0.4), 0.5 (±0.1) (vertical, longitudinal, lateral). Results demonstrated inter-user variability reduced following the training intervention.
Conclusion: Therapeutic radiographers require minimal additional training to use MRI as reference data for online soft-tissue image matching for prostate patients despite having no prior experience of MRI. This suggests site-specific CT-CBCT analysis skills are transferrable to MR-CBCT and enables MR-only radiotherapy to be extended to other tumour sites without fiducial markers.

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SP5.6 Non-invasive cardiac radioablation for ventricular tachycardia -treatment delivery experiences from three centres

Karen Pilling[1]; Rachel Brooks[1]; Alison Blower[2]; Claire Huntley[2]; Debbie Gill[3]; Mattew Walsh[3]
[1]Newcastle Upon Tyne Hospitals NHS Foundation Trust; [2]South Tees Hospitals NHS Foundation Trust; [3]Sheffield Teaching Hospitals NHS Foundation Trust

Introduction: Using SABR to treat Ventricular Tachycardia (VT) represents a novel treatment alternative for cardiac patients in whom conventional therapies, including invasive cardiac catheter ablation, have failed. This is the first completely non-invasive therapy for cardiac arrhythmias and could reduce procedure times for patients from up to 8 hours down to around 45 minutes, without risk of general anaesthesia or invasive ablation procedures.
Method: Radiographer training was initiated by all 3 centres using previous images from patients with implantable devices as a guide. This helped to determine accuracy of cardiac matching and familiarisation of anatomy. All patients will have implantable defibrillator wires close to PTV and the artefacts from these make CBCT matching difficult. As a result, individual CBCT parameters were developed to optimise image quality in preparation for treatment delivery using a combination of 3D and 4D CBCT, dose optimisation and scan speeds. Protocols were also developed to look at utilising both IV and oral contrast and the use of compression was assessed in all 3 centres. Surface guided monitoring was also utilised in 1 centre.
Results: Total doses of between 20Gy and 25Gy were delivered in a single procedure ranging from 6 mins to 25 minutes. A combination of 3D and 4D Pre and post treatment CBCT's were acquired and mid CBCT acquired to monitor intra-fraction motion.
Conclusion: This collaborative approach has enabled the implementation of non-invasive cardiac radioablation for ventricular tachycardia in all 3 centres, each of whom have treated 1 patient to date.

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SP6 Innovation and communication short paper presentations

SP6.1 RoboRad - a real-time system for monitoring and analysis of PACS reporting room occupancy and workstation utilisation

Bahman Kasmai; Hilmar Spohr; Martin Doddington; Ben Simpson
Norfolk and Norwich University Hospitals NHS Trust

Background: Planning and managing an efficient and cost effective radiology reporting activity requires real-time and cumulative reporting rooms occupancy and workstations utilisation data. We have developed an in-house system that provides users and managers with real-time information on availability and locations of PACS workstations.
Method: The system consists of a server application running on a standard PC that emulates a user's mouse and keyboard actions to obtain the basic reporting session data from PACS, without the need to interface to the PACS application. Using this method of interfacing allows the institution to avoid the complexity and the cost associated with classic programmatic methods of interfacing to PACS. In addition, the live workstation availability is pushed to an IoT web service (ThingSpeak, provided by The MathWorks). A Matlab script then converts the data into readable messages and sends an instantaneous Twitter message to registered users.
Results: The PACS workstation utilisation data has allowed the institution to get a better view of the frequency and occupancy of the diagnostic reporting rooms, resulting in better utilisation of the reporting resources. Initial trials with the Twitter-based messaging have resulted in very positive feedback as to its impact on reducing time to locate free workstations. The Tweets contain live information about availability of workstations in the relevant reporting rooms.
Conclusion: A PACS workstation utilisation and reporting room occupancy information system is a useful tool for resource management in a radiology institution.

SP6.2 Automated calculation of the RV:LV ratio in acute pulmonary embolism - a real-world feasibility and clinical impact study

Robert Foley; Sophie Glenn-Cox; Ben Hudson; Jay Suntharalingam; Rob Mackenzie Ross; Graham Robinson; Jonathan Rodrigues
Royal United Hospital, Bath

Introduction: The right ventricle to left ventricle (RV:LV) ratio >1 on CT pulmonary angiography (CTPA) is the most important predictor of adverse outcomes in acute pulmonary embolism[1] (PE). The 2019 National Confidential Enquiry into Patient Outcome and Death for PE demonstrates that this metric is poorly reported. We assess the feasibility of an entirely automated RV:LV analysis and determine its clinical impact in a real-world setting.
Methods: 50 consecutive patients with CTPA-proven acute PE (June 2019 to August 2019), identified via a Radiology Information System systematic search, were retrospectively analysed with automated post-processing software (Imbio, USA). RV and LV volumes were segmented on 1.5mm contrast-enhanced axial slices and maximal ventricular diameters were derived for RV:LV ratio. Mean attenuation values within RV and LV cavities were measured. Clinical reports were reviewed for mention of right heart strain. The automated RV:LV ratio was compared with clinical reports to determine how this would have altered practice if it has been available at the time of the report.
Results: Entirely automated RV:LV analysis was feasible in 86% (n=43). Where analysis failed, intra-ventricular LV attenuation was <100HU. RV:LV ratios ranged from 0.85-2.09, with 60% (n=30) >1.0. Where RV:LV was >1.0, right heart strain was mentioned in 37% (n=11/30) clinical reports. Automated RV:LV ratio would have added important prognostic information in 63% (n=19/30).
Conclusion: In a real-word setting of acute PE, automated RV:LV analysis is reliable when LV intraventricular attenuation >100HU. Applied routinely, this technology would improve risk stratification in the majority.

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SP6.3 Preparing patients for MRI with a free and easily accessible virtual reality experience

Jonathan Ashmore[1]; Regina Cremin[2]; Kirstie Still[2]; Paula Kennedy[2]; Adam Scotson[2]; Cormac McGrath[3]; Jerome Di Pietro[4]
[1]Raigmore Hospital; [2]NHS Highland; [3]The Belfast Trust; [4]King's College London

We have developed a virtual reality experience to prepare paediatric and adult patients for their MRI which is a freely downloadable app for mobile phones. The app, used with inexpensive google cardboard headsets, allows the patient to experience the entire journey of having an MRI from arriving at reception to having a scan. We use the resource in three ways; (1) we post out cardboard VR headsets for patients to use it at home, (2) it is used in the radiology department prior to the patient's MRI (3) it is used by play specialists on the children's ward. The resource was trialled on 44 children (4-12yrs) across two institutions booked for a head or spine MRI but with no previous experience of awake MRI. Parents and children completed a questionnaire regarding the VR MRI experience. We found our VR resource improves both patient and parent experience. Feedback scores were 9 out of 10 for fun, ease of use and for making both parent and child feel more positive about attending. All children recommended its use by others attending for MRI. We found the resource reduced anxiety associated with MRI and had potential to avoid the need for GA. Based on this success it is now implemented for routine clinical use at 4 UK hospitals. We hope to the report the results of a randomised controlled trial currently underway which will assess the benefit of the resource to increase scan compliance, avoid general anaesthetic and reduce patient anxiety.

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SP6.4 Clinician and patient perspectives on the requirements for independent patient image access: a qualitative analysis

William AS Cox[1]; Penelope Cavenagh[2]; Fernando Bello[3]
[1]University of Portsmouth; [2]The University of Suffolk; [3]Imperial College London

Introduction: Advancing technologies offer novel opportunities to share diagnostic radiological images with patients (Imperial College Healthcare NHS Trust 2019). This sharing may occur within the clinical environment under the supervision of a clinician, or may involve remote, unsupervised access (Sectra 2019). A survey with over 500 respondents established the case for face-to-face image sharing with patients (Cox, Cavenagh & Bello 2019b). This paper analyses the follow up interviews to that survey to consider in depth the requirements for safe and effective remote image sharing (Cox, Cavenagh & Bello 2019b).
Methods: Semi-structured interviews were undertaken with clinical imaging experts and patients in order to explore respondent attitudes towards requirements for image sharing. Data were analysed using thematic analysis. The results are reported below.
Results: Salient issues raised included that: not all people may want to view their images, some may find this upsetting and different people may react differently to image sharing; the appropriateness of sharing depends on image type as some modalities and their findings, e.g. X-ray & fractures, are easier to understand than others; resources required to facilitate this, such as time and equipment, are a concern; sharing should be only after discussion with a clinician; there is a requirement for additional supporting information such as labels, flags, a simplified report, trusted pathology information and an element of interactivity or a contact mechanism.
Conclusion: Participants identified several requirements for enabling safe and effective patient access to imaging. There is a need, therefore, for further work to identify strategies for image sharing which meet the identified requirements.

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SP7 Prostate/Renal/MSK short paper presentations

SP7.1 Dynamic contrast-enhanced MRI (DCE-MRI) of the prostate: Limiting the acquisition duration

Eric Nduka Onwuharine; Alexander James Clark
University Hospitals of North Midlands

Background: DCE-MRI is useful in prostate assessment and prostate cancer (PCa) diagnosis. The parameters of DCE-MRI acquisition, including total acquisition duration, vary greatly across centres. It takes an average of 5 minutes to acquire DCE-MRI in many centres in the UK. However, the understanding of how to use DCE-MRI, when acquired as part of a multiparametric MRI (mpMRI) of the prostate, has evolved significantly in the last few years. Detailed enhancement curve analysis is now no longer recommended and the greatest values to be gained from DCE-MRI stem from the likelihood that significant PCa will have focal and usually early abnormal enhancement.
Purpose: To identify biopsy proven clinically significant PCa on mpMRI. To measure the time after injection of MRI contrast to the time when these foci of PCa are most conspicuous, quantified as a lesion to normal ratio (LNR). Use this data to streamline our DCE-MRI protocol.
Summary: From 150 pre-biopsy mpMRI studies of the prostate we identified 52 histologically proven significant cancers. The average time to PCa maximum LNR was 36 seconds, with a range from 22 seconds to 100 seconds. As a result, we have reduced our DCE-MRI scan time to 2 minutes 30 seconds. In our Trust, approximately 1500 DCE-MRI scans are performed per year. This means 62.5 hours scanner time saved.

SP7.2 Pictorial review of the shifting pattern of advanced metastatic prostate cancer in the era of multimodality imaging

Andra Curcean[1]; Sebastian Curcean[1]; Khobe Chandran[1]; Juliet Carmichael[1]; Maria Dolores Fenor de la Maza[1]; Pasquale Rescigno[1]; Alison Reid[2]; Julia Murray[2]; Siraj Yusuf[2]; Katja de Paepe[2]; Aslam Sohaib[2]; Dow-Mu Koh[1]; Nina Tunariu[1]; Joshua Shur[2]
[1]The Royal Marsden Hospital/The Institute of Cancer Research, London, United Kingdom; [2]The Royal Marsden Hospital, London, United Kingdom

Background: The pattern of metastatic disease in advanced prostate cancer (APC) is changing. Increased use of imaging, newer imaging techniques with higher sensitivity for disease detection and patients receiving multiple lines of novel therapies with increased life expectancy are likely to be contributory. When biopsied, APC metastases may show characteristics of poorly differentiated adenocarcinoma and clones may not secrete PSA which can cause diagnostic uncertainty. Increased awareness of less common disease sites in APC is important to avoid unnecessary biopsies, imaging and for initiation of appropriate therapy.
Purpose: Illustrate the changing patterns of metastatic disease in APC and why this is clinically important. Highlight the utility and pitfalls when using novel and traditional imaging techniques such as CT, Bone Scan, whole-body MRI (WBMRI) and PSMA-PET in assessing APC, and how to incorporate this into clinical practice.
Summary: Educational pictorial review of changing and unusual presentations of APC. Cases include atypical lymphadenopathy (mediastinal, inguinal, porto-caval only), nodal morphology (infiltrative versus well-defined), predominantly lytic bone metastases and visceral metastases (liver, pleura, peritoneum or brain). Why is it important to recognise lytic metastases and infiltrative lymphadenopathy patterns? Discussion of the implications for clinical care and what to look for. Why is PSA trend not enough in APC? Cases illustrating radiological disease progression in the absence of PSA rise and in PSA non-secretors. Emerging role of PSMA-PET and WBMRI in APC. Cases illustrating the use of novel imaging techniques and how to overcome the challenge of prostate cancer heterogeneity.

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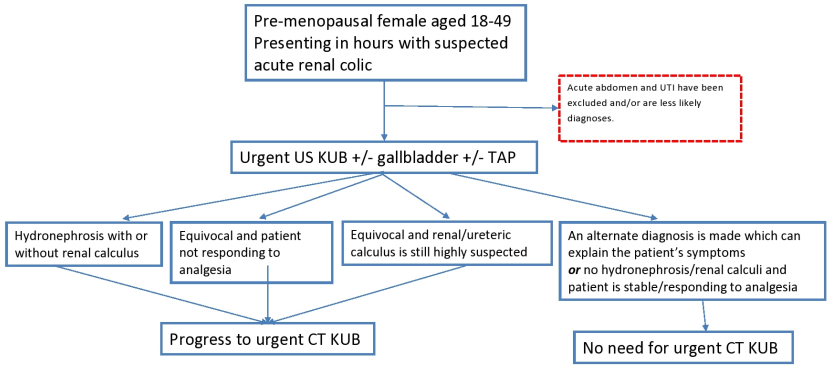
SP7.3 Initial experience of a new emergency referral pathway for pre-menopausal females presenting with acute renal colic

Mahdi Saleh; Soha Kadhim; Gerard Doyle
Countess of Chester Hospital

Background: NICE guidelines state that an urgent unenhanced CT should be performed first when investigating acute renal colic[1]. It is already known that the alternative diagnosis rate and effective dose from ionising radiation is higher in pre-menopausal females. An emergency referral pathway was implemented at our institution to reduce unnecessary ionising radiation exposure in this group of patients.
Method: This is a single institution retrospective study involving pre-menopausal females who presented consecutively to A&E with acute renal colic. We present our findings comparing our previous practice of using CT first to our current practice of using ultrasound first using the new pathway.

Results: There was a total of 61 and 85 consecutive patients over a 5 month period each in the pre-pathway (CT first) group vs post-pathway (US first) group, respectively. There was a significant difference in ionising radiation exposure between the two groups: CT first 61/61 (100%) vs US first 15/85 patients (17%), $p < 0.05$. In the US first group, CT provided a diagnosis in only 3/8 (37%) patients with an initial non-diagnostic US. The remaining 7/15 (47%) patients who underwent a subsequent CT did so as per the pathway and after initial US demonstrated hydronephrosis. 20/85 (24%) patients who had an US only demonstrated a range of alternate diagnoses.



Note: Patients who are septic, haemodynamically unstable, or have only one kidney are excluded from this pathway.
Patients who require subsequent CT should have it immediately. TAP = Trans-abdominal pelvis.
Note: All patients with suspected acute renal colic should have bloods and urine dipstick performed first before referral onto this pathway.

Conclusion: The new pathway successfully reduced the number of patients undergoing unnecessary ionising radiation exposure. The use of CT was limited to patients with proven hydronephrosis on US where emergent intervention and stone characterisation was required.

1. Renal and ureteric stones: assessment and management. NICE 2018.

SP7.4 Opportunistic screening for osteoporosis by abdominal CT in a British population

Sonam Vadera; Timothy Osborne; Vikas Shah; James Stephenson
University Hospitals of Leicester

Background: It has previously been shown that CT scans performed for other indications can be used to identify patients with osteoporosis. This has not yet been tested in a British population. We sought to evaluate the use of vertebral CT attenuation measures for predicting osteoporosis in a British cohort, using dual-energy X-ray absorptiometry (DEXA) as a reference standard.
Method: Patients who underwent an abdominal CT in 2018, and concomitantly underwent DEXA within a six-month interval, were retrospectively included. CT attenuation values in Hounsfield units (HU) were measured on the sagittal reconstruction by placement of a region-of-interest at the central portion of the L1 vertebral body, and then compared to their corresponding DEXA score. Receiver operating characteristic (ROC) curves were generated to determine sensitivity and specificity thresholds.
Results: 536 patients (394 females, mean age 65.8) were included, of which 174 had DEXA-defined osteoporosis. L1 attenuation measures were significantly different ($p<0.01$) between the three DEXA-defined groups of osteoporosis (118HU), osteopenia (143HU) and normal bone density (178HU). The area under the ROC curve was 0.74 (95% CI 0.69 — 0.78). A threshold of 169HU was 90% sensitive and a threshold of 104HU was 90% specific for diagnosing osteoporosis.
Conclusion: Routine abdominal CT can be used to opportunistically screen for osteoporosis without additional cost or radiation exposure. The thresholds identified in this study are comparable with previous studies in other populations. We recommend radiologists engage with primary care and rheumatology providers to determine appropriate cut-off values for further investigation.

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SP7.5 Popliteal fossa ultrasounds - When are they clinically indicated?

Emily Mayo; Gareth Herdman
Princess of Wales Hospital

Introduction: Posterior knee swellings are frequently investigated via ultrasounds to confirm presence of a popliteal cyst or exclude other sinister pathology. A popliteal (or Baker's) cyst represents a communication between gastrocnemius-semimembranosus bursa and the knee joint. Usually these are self-limiting, secondary to underlying joint disease and warrant conservative treatment. Rupture is the main complication; usually managed conservatively. NICE Guidelines recommend adult ultrasound is performed only to exclude DVT, popliteal aneurysm or sarcoma. Surgical options typically involve closure or enlargement of the communication or management of underlying joint disease. We sought to review both incidence of popliteal cysts versus significant non-popliteal cyst pathology diagnosed via ultrasound and clinical indications on referral. We aimed to develop a more clinically relevant local referral pathway to promote effective use of resources, reduce unnecessary examinations and waiting times for musculoskeletal ultrasounds.

Methods: All ultrasounds of popliteal fossas were collected retrospectively between 01/05/2018 - 30/04/2019. Exclusion criteria were age <18 and investigations of tendon injury, bursae or as part of a Doppler study. Patients were sub-divided into groups based on the referred clinical information and NICE sarcoma guidelines: lump >5cm, pain, swelling or miscellaneous (e.g. query abscess).
Results: 68 inclusions. Age range 22-99 (mean 62 years). 40 (59%) uncomplicated popliteal cysts. 3 ruptured cysts. 17 NAD. 8 referred for further imaging with final diagnosis of 6 cysts, 1 myoliposarcoma, 1 AVM.
Conclusion: Only 2 clinically significant findings. We recommend that for patients above 18 years: referral pathway should follow NHS guidelines including investigating popliteal fossa mass lesions >5cm, or if an aneurysm or abscess is felt likely. This would open up the annual equivalent of 5 extra musculoskeletal ultrasound clinics to accomodate other referrals.

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SP7.6 Occluded colorectal anastomosis - A novel combined radiological and endoscopic technique to avoid further surgery and permanent stoma formation

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Background: Occlusion rates of strictured post-operative colorectal anastomoses can be as high as 30%[1] and are usually a sequalae of inflammation or ischaemia. Patients then either require technically challenging surgical revision or remain de-functioned via a stoma. Restoring luminal continuity is challenging; from visualising the anastomosis to recanalizing without causing penetration injury. Few case reports exist. We present two cases of imaging assisted sharp recanalisation and covered stent insertion to allow tract formation through a completely occluded anastomosis.
Method: Case 1: 52 year old male underwent a total colectomy and ileorectal anastomosis with a defunctioning loop ileostomy (DLI) for synchronous colorectal cancers. Case 2: 57 year old male developed an anastomotic leak post anterior resection for rectal cancer requiring a DLI. Contrast-enema and sigmoidoscopy confirmed anastomotic occlusion, with no pinhole to allow standard guidewire passage and dilatation. Combined trans-stomal endoscopy and transrectal ultrasound were used to safely identify the centre of the anastomotic staple ring, allowing sharp recanalisation using a chiba needle through which a guidewire was placed into the proximal lumen. Small calibre balloon dilation allowed deployment of a 24mm diameter retrievable colonic stent to remain in-situ for 6 weeks to allow tract dilation and maturation.
Results: Both patients did not suffer any complications. Case 1: Asymptomatic, awaiting elective stoma reversal. Case 2: Successful ileostomy reversal. His anastomosis has remained patent to date (4 years).
Conclusion: We present two cases that illustrate a novel multimodality technique that allows safe restoration of luminal continuity in patients with occluded colorectal anastomoses.

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SP8 Breast short paper presentation

SP8.1 The role of imaging for a male breast lump

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Introduction: Gynaecomastia is known to be more common than breast cancer amongst male patients presenting to the breast clinic. Furthermore, gynaecomastia is not a risk factor for developing cancer. Thus most patients need only a careful history and physical examination. The purpose of this study was to analyse whether mammography and ultrasound should be performed as part of the workup for men referred to the breast care unit with a lump or pain that is thought to be benign by the clinician.
Method: Patients who presented with a palpable breast lump or pain were included. Patients underwent radiological imaging either in the form of a mammogram or ultrasound depending on their age. We recorded the P grade on examination and the M/U value on imaging.
Results: 304 male patients were included in the study. 229 cases (75%) of radiological findings were gynaecomastia, 5 cases (1.6%) were malignancy (2 cases were CT detected). Other findings were lipoma (23), abscess (3), normal chest wall tissue (23), fat necrosis (1) and sebaceous cyst (3). 136 patients (45%) had a mammogram as the imaging method, 97 patients (32%) had only an ultrasound and 70 patients (23%) had both imaging modalities. A biopsy was performed in 13 cases and showed 5 cases of malignancy. The remaining biopsies were either normal breast tissue, infected cyst, fat necrosis or pseudo gynaecomastia.
Conclusion: We observed 100 % concordance between clinical diagnosis and imaging result. Therefore, in the case of clinical suspicion for gynaecomastia, further imaging is not indicated.