

maximise the students learning in a safe and robust manner. The purpose of this study is to highlight a best practice project that aimed to immerse the student in the clinical setting through virtual reality technologies. Outcomes from this project include an increased knowledgebase on the subject of intensive care imaging, understanding on roles and equipment within this area, imaging competence, as well as reducing apprehension towards working in this area. Embracing digital technologies in the clinical environment can support learning constructively. Although not designed to replace patient contact, digital technologies using XR can compliment the clinical curriculum. This study outlines experiences gained using XR technologies from a clinical placement provider. Proving the students openness to said sessions and it's effectiveness to reducing apprehension in a safe and constructive environment.



## Proffered papers: Service delivery and late-breaking

### J3.1 Development of a pan-London ST1 Pre-On-Call Assessment (SPOCA) and Training Modules

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**Background:** Online education and training is now an established part of Radiology training. Starting out of hours (OOH) work in Radiology is a challenging time for junior radiology trainees and the level of knowledge and skills and the preparation and assessment varies across London's radiology training schemes. A recently published national trainee on-call survey [1] demonstrated an appetite for a "formal on-call assessment prior to commencing on-call work" amongst trainees and that "introducing a standardised and validated examination per scheme would highlight and facilitate more targeted practice in areas of deficiency prior to commencing on-call work."

**Purpose:** To develop pan-London virtual teaching events and online training modules and pan-London ST1 pre-on-call assessment (SPOCA), with comparison to existing local assessments. This will cover the major acute pathologies and systems so that all trainees have common access to high-quality, acute radiology training and are assessed similarly across the region. This is a current work in progress (as of December 2021), with a planned delivery date of early May 2022.

**Summary:** Examples of the teaching events, online training modules and assessment, including a description of the design process. A presentation of the initial outcomes and feedback from the pilot teaching and training events and assessment (with delivery planned by early May 2022). Presentation of the comparison between pan-London SPOCA and local assessments.

1. Tofeig, M. et al. (2021) National radiology on-call survey: a cross-sectional survey investigating diagnostic radiology on-call provision by trainees out of hours. *Clin. Rad.* 76(2021), 918-923.

### J3.2 How will artificial intelligence change the practice of interventional oncology of the future?

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Artificial intelligence (AI) is the use of computational algorithms to mimic human cognitive abilities and perform tasks which normally require human intelligence. From robotic surgery to clinical simulation training, AI has had a significant impact on healthcare provision. Interventional oncology is a field that has vastly benefited from the significant amount of research in AI. This poster aims to introduce AI and define branches of AI and their underpinning principles, such as machine learning and deep learning. This is followed by a review of the potential applications of AI in interventional oncology. One example involves a technique that integrates pre-procedural images with patients' clinical information, allowing prediction of therapeutic outcomes in patients with hepatocellular carcinoma undergoing trans-arterial chemoembolisation. Further techniques, such as the use of augmented reality to create USS-CT fusion-images to improve precision in image-guided procedures, as well as the recreation of three-dimensional anatomical holograms from pre-programmed CT/MRI scans to visualise tumour characteristics and key structures during oncological interventions, are described and evaluated. AI has the potential to enhance efficiency, efficacy and safety in the practice of interventional oncology. However, it also comes with limitations including regulatory barriers, a lack of data for training machine learning algorithms, hurdles to computer-physician integrating workflow, patient data confidentiality and ethical challenges. Most studies on AIs are performed under a controlled, laboratory environment.

Nevertheless, with appropriate validation and correct translation into clinical practice, it could provide a growing impact to the field of interventional oncology and could mean a promising future for patients.

1. Abajian, A., Murali, N., Savic, L., Laage-Gaupp, F., Nezami, N., Duncan, J., Schlachter, T., Lin, M., Geschwind, J. and Chapiro, J., 2018. Predicting Treatment Response to Intra-arterial Therapies for Hepatocellular Carcinoma with the Use of Supervised Machine Learning—An Artificial Intelligence Concept. *Journal of Vascular and Interventional Radiology*, 29(6), pp.850-857.e1. 2. Abe, Y., Sato, S., Kato, K., Hyakumachi, T., Yanagibashi, Y., Ito, M. and Abumi, K., 2013. A novel 3D guidance system using augmented reality for percutaneous vertebroplasty. *Journal of Neurosurgery: Spine*, 19(4), pp.492-501. 3. Gurgitano, M., Angileri, S., Rodà, G., Liguori, A., Pandolfi, M., Ierardi, A., Wood, B. and Carrafiello, G., 2021. Interventional Radiology ex-machina: impact of Artificial Intelligence on practice. *La radiologia medica*, 126(7), pp.998-1006.

### J3.3 A systematic review of reproducibility studies of Diffusion Tensor Imaging of cervical spinal cord

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**Purpose:** Diffusion tensor imaging (DTI) technique is a potential diagnostic tool for the evaluation of cervical spinal cord (CSC) diseases. This systematic review aims to evaluate studies that examined reproducibility of DTI when investigating the CSC.

**Methods and materials:** A search in the PubMed, Scopus, Web of science and MEDLINE (Ovid) database between January 1990 and February 2022 was conducted for articles related to the reproducibility of DTI in evaluating the CSC. DTI studies that presented full statistical analysis of reproducibility tests of CSC in peer-reviewed full-text articles written in English were included. Articles that include at least one of the search terms supplied in the search keywords (in their titles or abstracts) were identified.

**Results:** Six studies fulfilled the search criteria and are included in this review (n=104 subjects). Studies were assessed for different characteristics, including sample size (334), re-test time interval up to 3 months, test-retest reliability scores and acquisition method. Six studies reported reproducibility of fractional anisotropy (FA) and was poor (ICC 0.37) in one study, fair to moderate reproducibility (ICC 0.420.75) in two studies, moderate to good reproducibility (ICC 0.750.90) in two studies, and good to excellent reproducibility (ICC 0.910.99) in one study.

**Conclusion:** DTI and its related measures have the potential to be a very useful clinical technique in evaluating CSC changes. However, reproducibility results are varied and illustrate the technical challenges associated with CSC assessments.

1. Mohamed, F.B., et al.,(2011) Diffusion tensor imaging of the pediatric spinal cord at 1.5 T: preliminary results. 2. Barakat, N., et al., (2012) Diffusion tensor imaging of the normal pediatric spinal cord using an inner field of view echo-planar imaging sequence. 3. Mulcahey, M., et al.,(2012) Diffusion tensor imaging in pediatric spinal cord injury: preliminary examination of reliability and clinical correlation. 4. Barakat, N., et al.,(2015) Inter-and intra-rater reliability of diffusion tensor imaging parameters in the normal pediatric spinal cord. 5. Peterson, D., et al., (2017) Test-Retest and Interreader reproducibility of semiautomated atlas-based analysis of diffusion tensor imaging data in acute cervical spine trauma in adult patients. 6. Lee, E., et al., (2020) Reliability of pre-operative diffusion tensor imaging parameter measurements of the cervical spine in patients with cervical spondylotic myelopathy.

### J3.4 Is mean diffusivity of Diffusion Tensor Imaging in assessment the cervical spinal cord reproducible?

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**Purpose:** Diffusion tensor imaging (DTI) is a technique that can be used to diagnose disorders of the cervical spinal cord (CSC). The aim of this systematic review is to assess studies that looked at the reproducibility of Mean Diffusivity (MD) when evaluating the CSC.

**Methods and materials:** Between January 1990 and February 2022, literature on the repeatability of DTI in evaluating the CSC were searched in PubMed, Scopus, Web of Science, and MEDLINE (Ovid). Studies that have extensive statistical analysis of CSC reproducibility tests in peer-reviewed journals written in English were involved. Articles containing at least one of the search criteria (in titles or abstracts) were identified.

**Results:** Six studies (n=104 subjects) met the search criteria. The study's sample size (3-34), re-test time interval (1-3 months), test-retest reliability scores, and acquisition method were all evaluated. In the included studies, the reproducibility of MD was low (ICC 0.37) in one, fair to moderate (ICC 0.42-0.75) in two, moderate to good (ICC 0.75-0.90) in two, and good to excellent (ICC 0.91-0.99) in one.

**Conclusion:** MD may be highly effective in assessing CSC changes. However, the results of reproducibility demonstrate the technical constraints of CSC examinations.

1. Mohamed, F.B., et al.,(2011) Diffusion tensor imaging of the pediatric spinal cord at 1.5 T: preliminary results. 2. Barakat, N., et al., (2012) Diffusion tensor imaging of the normal pediatric spinal cord using an inner field of view echo-planar imaging sequence. 3. Mulcahey, M., et al., (2012) Diffusion tensor imaging in pediatric spinal cord injury: preliminary examination of reliability and clinical correlation. 4. Barakat, N., et al., (2015) Inter-and intra-rater reliability of diffusion tensor imaging parameters in the normal pediatric spinal cord. 5. Peterson, D., et al., (2017) Test-Retest and Interreader reproducibility of semiautomated atlas-based analysis of diffusion tensor imaging data in acute cervical spine trauma in adult patients. 6. Lee, E., et al., (2020) Reliability of pre-operative diffusion tensor imaging parameter measurements of the cervical spine in patients with cervical spondylotic myelopathy.

### J3.5 Impact of immediate AI enabled patient triage to chest CT on the lung cancer pathway (LungIMPACT) - a study protocol

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**Background:** Chest X-rays (CXRs) are a high-volume test, performed for many reasons including the investigation of lung cancer. The National Optimal Lung Cancer Pathway (NOLCP) emphasises the importance of rapid diagnostics(1). Best case implementation of NOLCP has all imaging investigations performed as a single diagnostic episode, with immediate CXR reporting and same day CT chest where appropriate. Previous work found shorter time to diagnosis of lung cancer with immediate reporting but a low lung cancer prevalence(2). qXR is a class II CE approved medical device that detects and localises the presence of lung nodules on a CXR. qXR is intended to support consultant radiologists and reporting radiographers for clinical decision making. The aim of the study is to determine if artificial intelligence triage of CXRs can shorten the time to diagnosis of lung cancer.

**Methods:** The study will be a multi-centre, prospective, randomised controlled trial, with block randomisation of radiology sessions to those with and without AI triage. Seven centres will participate with 150,000 CXRs. Primary outcomes are difference in time (in days) to lung cancer diagnosis and agreement between reporting practitioner (radiologist or reporting radiographer) and qXR with independent expert arbitration between discordant decisions. Secondary outcomes include proportion of urgent 2WW lung cancer referrals with a non-cancer diagnosis and a health economic evaluation. The study is powered ( $p=0.05$ , power=0.90) to detect a small difference (1 day) in median time to diagnosis of lung cancer and a difference in reporter/qXR agreement of 0.01 with a prevalence of diagnosis of 0.006.

1. NHS England. National Optimal Lung Cancer Pathway For suspected and confirmed lung cancer: Referral to treatment: NHS England, 2020. 2. Woznitza N, Devaraj A, Janes S, et al. Impact of radiographer immediate reporting of chest x-rays from general practice on the lung cancer pathway (radioX). Lung Cancer 2019;127:S13. doi: 10.1016/s0169-5002(19)30073-x



## Proffered papers: Research

### K7.1 A five-year impact evaluation of an established medical radiation sciences Twitter journal club

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**Introduction:** Twitter journal clubs are a relatively new adaptation of an established continuing professional development (CPD) activity within healthcare (Stoneman and Hiremath, 2020). The medical radiation science (MRS) journal club (MRJC) was founded in March 2015 by a group of academics, researchers, and clinicians as an international forum for the discussion of peer-reviewed papers. To investigate the reach and impact of MRJC, a five-year analysis was conducted.

**Methods:** Tweetchat data (number of participants, tweets and impressions) for the first five years of MRJC were extracted and chat topics organized into themes. Fifth birthday MRJC chat tweets were analysed and examples of academic and professional outputs were collated.

**Results:** A total of 59 chats have been held over five years with a mean of 41 participants and 483,000 impressions per hour-long synchronous chat. Ten different tweetchat themes were identified, with student engagement/preceptorship the most popular. Eight posters or oral presentations at conferences, one social media