radiographers felt poorly supported because trained professionals were too busy to pass on knowledge. Advanced CT radiographers felt they required more knowledge and applications training before they could manipulate exposure parameters, a feeling being cascaded through the workforce to pre-registration radiographers.

Conclusion: This study has shown that learning in the clinical environment is complex, there is an urgent requirement for professional education to keep pace with technological advances in CT scanning. Current training is not producing newly qualified radiographers competent in cross-sectional imaging.

1. Elliott, A. (2014) Committee on Medical Aspects of Radiation in the Environment (COMARE) 16th Report Patient radiation dose issues resulting from the use of CT in the UK. Department of Health (UK). 2. Joyce, S., O'Connor, O. J., Maher, M. M., & McEntee, M. F. (2020). Strategies for dose reduction with specific clinical indications during computed tomography. Radiography, 26, S62-S68.

Proffered papers: Digital technology

K10.1 Digital Transformation and Artificial Intelligence In (Operational) Radiology

Peter Strouhal[1]; Mariam Darwish[2]; Naeem Khan[2]; Brad Miles[3]; Chris Vallis[3]; Ann Heathcote[3]; James Berry[3]; Imran Farid[2]; Stefano Persichini[2]

[1]Alliance Medical; [2]GE HealthCare; [3]AML

Alliance Medical Ltd (AML) is a trusted partner of NHS, serving over 800,000 patients in England via a mix of 50+ mobiles (MRI, CT, PETCT), 41 static sites and 10 Community Diagnostic Centres. Hospitals could utilise Artificial Intelligence to improve operational decision-making in patient flows, scheduling, staffing and supply chain management. In 2022/23, AML pilot-tested GE HealthCare's Imaging360 solution, which enables enterprise-radiology organizations to standardize performance across multiple sites and scanners, enhancing imaging efficiency and resource allocation; and increasing patient choice for scanner selection. AML achieved greater, easier oversight of operations across the whole estate from single cloud-based platform including detailed overview of imaging operations via a combined integration of HL7, DICOM image transfer and management information CSV extracts. Imaging360 provides retrospective, real time and predictive views of scheduling: Enabling schedule optimisation, including flagging duplicate exams or multiple upcoming appointments; allows protocol libraries to be standardised, optimised, and delivered to scanners; allows patient appointment choice; and shortens appointments. For example, one site reduced scan times from 30 to 20 minutes so increased potential appointments by 35/week, akin to extra day's scanning; or one could give this time back to staff. Imaging360 can predict patient no-shows/cancellations, logic used to infer new data points in real time enables users to respond to alerts, to create more seamless patient and staff experiences. This bringing together of clinical, operational and scheduling data allows healthcare operators to improve outcomes, expand access to care and deliver care more cost effectively.

K10.2 Automating monitoring of radiology processes to aid oversight of radiology and reporting performance

Richard Szabranski

Worcestershire Acute NHS Trust

Radiology reporting backlogs are an acknowledged bottleneck in patient care currently, Worcestershire Acute Trust Radiology (WAHT), having successfully dealt with our backlog, have evolved robust process to monitor and maintain this level of service. This level of oversight nessecatates a high payload of staff time which is already at a premium in todays radiology department. To this end, Worcestershire Acute Trust Radiology department have developed in-house software to monitor and feedback on several key essential aspects of radiology and its reporting. These include: 1) Reporting time to verification and reporting is keeping to departmental KPI's 2) Is report auto-reported correctly and vice-versa 3) Vetting status of all modalities 4) Radiology imaging reject rates 5) Notify of Radiology appointments for deceased patients 6) Monitoring Radiology staff compliance governance documentation Most of these functions run unattended in the background and when required alert to correct staff any actions or result requiring further investigation such as notifying a Radiologist that a report is still outstanding. The system, RAD*i* , has been observed by the CQC and NHSe and commended as an example of "best practice" Presentation will be via PowerPoint demonstration

K10.3 Delivery of a National Optimal Stroke Imaging Pathway (NOSIP), including the use of Artificial Intelligence (AI) as a CT decision support tool, in England improves access to acute stroke imaging

David Hargroves[1]; Darrien Bold[2]; Deb Lowe[1]; Samanjit Hare[3]

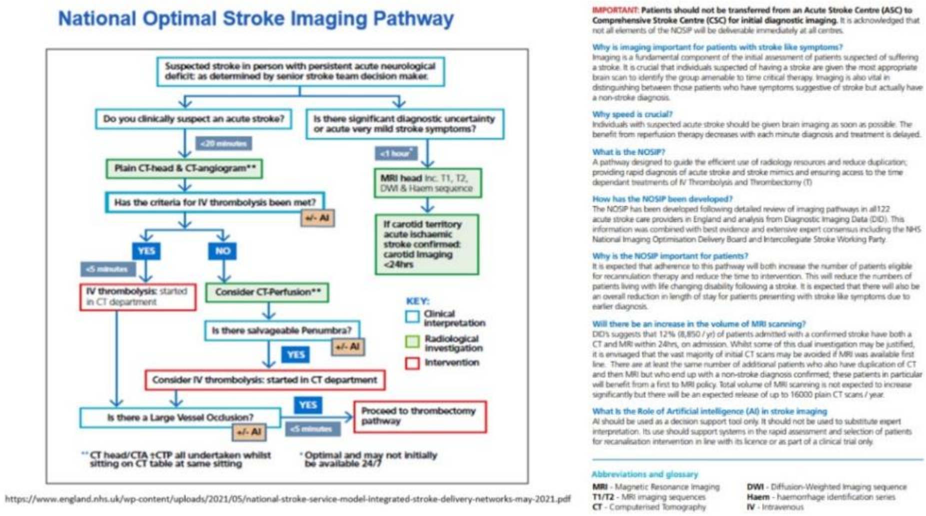
[1]National Stroke Programme and GIRFT, NHSE; [2]National Stroke Programme, NHSE; [3]NHS England

Background and aims: GIRFT data (2019) reveled IV thrombolysis (<12%) and mechanical thrombectomy (MT<2%) rates were low with limited access to CTA, prolonged time spent before transfer for MT (door in door out times >2hrs 22 mins) and inefficiency in access to first line MRI (<2%); 5% of units were using AI with 12% of patients receiving both CT and MRI within 24 hrs of admission. Recommendations were made to improve acute stroke imaging in the national stroke GIRFT report (ref 1). In 2021, following extensive consultation, the NOSIP (ref 2, image 1) was published including use of CT AI, aiming to improve volume and speed of access to recanalisation therapy, reducing radiological inefficiencies and inpatient bed occupancy. We undertook an assessment of adherence to the NOSIP in 2022.

Methods: Each of the 107 acutely admitting stroke centres in England completed a RightCare self-assessment (image 2) of adherence to the various elements of the NOSIP.

Method: 80% of stroke units now report use of AI, the remaining expect to <6/12. 60% undertake CT and CTA at same initial sitting. 50% routinely use AI for all patients having a CT or CTA. 15% report day time Mon-Friday access to first line MRI for patients with minor stroke or of diagnostic uncertainty.

Conclusions: Since the publication of the NOSIP: most stroke units in England now have access to AI with all units planned to have access by Dec 2023. Improvements in access to CT, CTA, CTP and first line MRI is reported. A nationally adopted care pathway for stroke imaging is associated with improvements in access to acute stroke imaging and is likely to translate into improved patient outcomes and financial savings.



NHS

Section 4.4 – Rapid access to appropriate imaging

4.4.1	Have you undertaken a gap analysis regarding access to acute stroke imaging, in line with the National Optimal Stroke Imaging Pathway (NOSIP)?
4.4.2	Is there a networked plan in place regarding progression to delivery of the NOSIP?
4.4.3	Do you routinely undertake CT & CTA (aligned with the NOSIP) for appropriate patients at the same sitting 24/7?
4.4.4	Do you routinely undertake CT, CTA & CTP (aligned with the NOSIP) for appropriate patients at the same sitting 24/7?
4.4.5	Do your stroke physicians routinely (for majority of patients) use Artificial intelligence decision support software (AI) to interpret plain CT brain scans?
4.4.6	Do your stroke physicians routinely (for majority of patients) use Artificial intelligence decision support software (AI) to interpret CTA brain scans?
4.4.7	Do your stroke physicians routinely (for majority of patients) use Artificial intelligence decision support software (AI) to interpret CTP brain scans?
4.4.8	Do you routinely undertake first line MRI (aligned with the NOSIP) for appropriate patients 9-5pm: Mon-Friday?
4.4.9	Do you routinely undertake first line MRI (aligned with the NOSIP) for appropriate patients for extended hours (at least 10hrs / day): Mon-Friday?
4.4.10	Do you routinely undertake first line MRI (aligned with the NOSIP) for appropriate patients Saturday and Sundays?

1. Hargroves, D. and Lowe, D. on behalf of all acute stroke care providers in England (2022). GIRFT Stroke Programme National Specialty Report. https://gettingitrightfirsttime.co.uk/medical_specialties/stroke/ 2. Hargroves, D., Lowe, D., Fisher, R., Powell, J. on behalf of National Stroke programme, NHSE (2021). National Stroke Service Model. https://www.england.nhs.uk/wp-content/uploads/2021/05/stroke-service-model-may-2021.pdf

K10.4 Artificial Intelligence based breast thermography using radiomic feature extraction versus conventional manual interpretation of breast thermograms in the prediction of breast cancer: A multi-reader study

Geetha Manjunath; SivaTeja Kakileti; Sathiakar Collison

Niramai Health Analytix Pvt Ltd, India

Objective: Artificial intelligence-enhanced breast thermography is increasingly being evaluated as an ancillary modality in the evaluation of breast disease (Hakim and Awale, 2020). This study evaluates the performance of Thermalytix, a CE-marked system that analyses thermal images using advanced thermal radiomics against unaided manual interpretation of thermographic images by trained thermologists.

Methods: In this retrospective, multi-reader study, thermal imaging data of 258 women who participated in a previously published clinical trial were used. These images were read manually by 3 thermologists independant of each other, using the scoring system of the American Association of Thermologists . The images were then evaluated by the Thermalytix system that automatically extracts hotspot, areolar and nipple radiomic parameters and a total of 64 individual radiomic features are analysed using 3 random forest classifiers configured for 200 decision trees generating a score predictive of the presence of breast cancer in the region of interest (Kakileti et al., 2020). The manual interpretation and Thermalytix interpretation were compared for sensitivity, specificity, positive predictive value, and negative predictive value and reciever operating characteristic curves were created to estimate prediction accuracy.

Method: Automated Thermalytix had sensitivity and specificity of 95.2% and 66.7% respectively while AUROC of 0.85 (13.7% greater) than manual interpretation. Hotspot and vascular scores derived in the automated Thermalytix are the strongest predictors of breast cancer lesions (AUROC: 0.84 and 0.83, respectively).

Conclusions: Automated AI-based Thermalytix has higher accuracy than manual interpretation of breast thermal images, in the prediction of breast cancer lesions

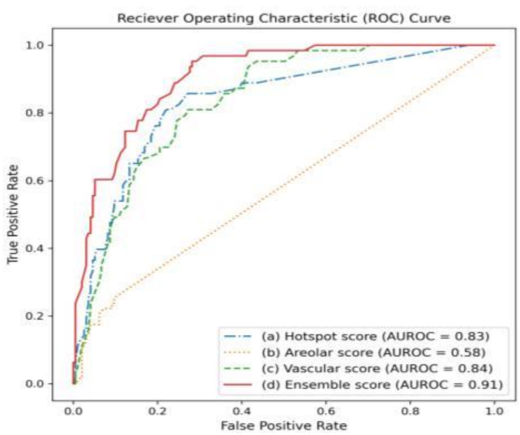


Figure A. ROC curve illustrating the individual classifier AUC performance using hotspot score, vascular score and areolar score and the calculated Ensemble score.

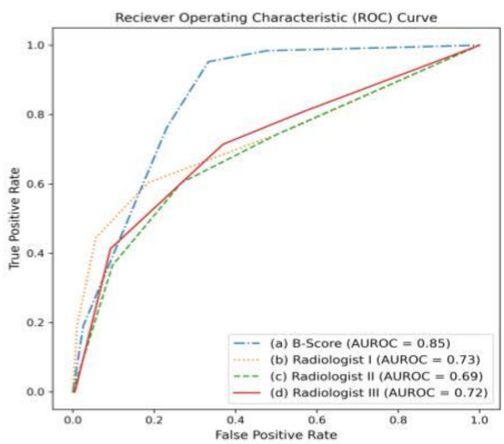


Figure B. ROC curve demonstrating the separation in performance between Thermalytix and manual interpretation of thermography

1. Hakim, A. and Awale, R.N. (2020). Thermal Imaging - An Emerging Modality for Breast Cancer Detection: A Comprehensive Review. Journal of Medical Systems, 44(8). doi:10.1007/s10916-020-01581-y. 2. Kakileti, S.T., Madhu, H.J., Manjunath, G., Wee, L., Dekker, A. and Sampangi, S. (2020). Personalized risk prediction for breast cancer pre-screening using artificial intelligence and thermal radiomics. Artificial Intelligence in Medicine, 105, p.101854. doi:10.1016/j.artmed.2020.101854.

K10.5 Radiographer/radiologist education and learning in artificial intelligence (REAL-AI)

Geraldine Doherty[1]; Laura McLaughlin[1]; Claire Rainey[1]; Ciara Hughes[1]; Raymond Bond[1]; Jonathan McConnell[2]; Sonyia McFadden[1]

[1]University of Ulster; [2]Leeds Teaching Hospitals NHS Trust

Background: Artificial intelligence (AI) is incipient in radiography, and whilst there are many studies investigating its potential in the clinical environment, there is a paucity of research investigating the needs of clinical staff. Further research is required to identify what training and preparation is required for a new AI-powered work environment, or indeed what AI education is available at undergraduate and postgraduate levels.

Method: This CoRIPS funded study included two electronic surveys (i) one was performed amongst radiographers and radiologists investigating their baseline AI knowledge, identifying what training they desire and preferred method of delivery. (ii) the second survey was for academics and educators in Higher Education Institutions to identify educational provision of AI in the radiography curriculum across the UK and Europe.

Method: Data collection and analysis are underway and will be completed at the European Congress of Radiology in Vienna, March 2023. Participant feedback will determine perceptions of clinical staff and identify topics for inclusion in postgraduate/undergraduate programmes.

Method: will inform the next phase of the study which will incorporate focus groups with staff to explore adaptation of the curricula to enable incorporation of AI into clinical practice.

Conclusion: Radiographers, radiologists and Higher Education Institutions have been surveyed to ascertain current knowledge and needs for AI training. Collaboration and symbiosis between academia, clinical and industry partners is possible, to pioneer AI education tailored to medical imaging staff. The impact of this research has the potential to be of significant value across disciplines within the wider healthcare sector.

Proffered papers: Patients needs

L4.1 The patient's voice is the master key in a clinician's toolbox

Margot McBride

University of Dundee

Introduction: Until you are a patient yourself, you don't always acknowledge the importance of a patient's voice which can turn the key in a clinician's decision-making during a diagnostic work-up. Today's challenges have increased the likely hood of spending less time on patient-centred care. Clinicians, including radiology staff are busy trying to find solutions to the growing pressures from rising referral lists and workforce shortages which have led to many patients not having basic care leading in some cases to death. My Doctor of Philosophy study of Cushing syndrome highlighted that the fundamental challenge for clinicians was time to listen to their patients. Being a Cushing's patient and a diagnostic radiographer was the driving force behind my desire to find out if other patients had similar negative experiences. This paper concentrates on a section of the disease-specific health-related quality of life questionnaire used in my study, which focuses on the clinicians' abilities to listen to their patients' voices.

Method: 86 patients participated. All felt that most clinicians have little time to listen. 61.6% of them relied on their support groups and helplines to share their experiences and seek advice. Feelings of frustration, dismay were experienced by 43.3%, expressing that their appointments were, "rushed," with very little information and what to expect regarding the long-term effects.

Conclusion: As new chapters of medicine open, the lessons learned are that we should listen and not just consider patients as a patient with a medical condition, but a human life with needs beyond her or his medical condition.

1. McBride M. (2023). Patient-centred care when diagnosed with a Sarcoma and Cushing syndrome. Radiography; Jan; 10.1016/iradi.2022.12.005 2. McBride M et al. (2021). Quality of Life in Cushing's syndrome. Best Practice & Research Clinical Endocrinology & Metabolism, Elsevier; Jan; 35 (1): 101505. 3. McBride M. (2020). Cushing syndrome and disease: Why does it take so long to diagnose? Is the interdisciplinary medical team aware of the signs and symptoms? What are the consequences? Bioscientific; Sept. 22nd Endocrine Abstracts, Pituitary and Neuroendocrinology.

L4.2 From student radiographer to breast cancer patient and back again: What can we learn?

Kirsty Mounsey

University of Leeds

Background: In the UK alone in 2020/21 there were 423,838 referrals to the two week wait pathway in regards to breast cancer, in which 25,202 then went on to have cancer treatment after diagnosis via this route. Patient centred care (PCC) informs, educates and engages patients in their care planning and treatment. The quality of PCC given along the breast cancer pathway has the potential to impact both a patient's and their relatives wellbeing and empowerment throughout the pathway and has strong links with improved treatment adherence, reduced anxiety and mortality.