



P171 A proposed model for standardisation of the ultrasound report

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Aim: To propose a model for standardising ultrasound reports.

Content of poster: Variation in writing style; content; format; and terminology in ultrasound reporting impact on the value of the report. Studies undertaken to address these limitations advocate the use of structured reporting systems (Bell, Greenes and Doubilet, 1992; Kuhn et al., 1993). A recent survey of Radiologists however identified some limitations to using structured systems (Powell and Silberzweig 2014) because of their inflexibility. Incomplete documentation relating to abdominal ultrasound reports has also been reported in as many as 20% of cases (Duszak, Nossal et al. 2012), which in turn has implications towards patient management and decision making. Structured reporting with the support of ontology as its knowledge base has been offered as a solution to improving the quality of reports (Kahn et al., 2009), however these systems offer limited adaptability.

We present a model for the standardisation of ultrasound reports using structured reporting with ontology as its knowledge base but with emphasis on human adaptability within the system.

Impact: This proposed model will recognise human attributes and use Natural Language Processing techniques to convert free text reports into the proposed model structure.

Outcomes: This model is unique as it allows for the system to adapt to reporter's preferences rather than forcing practitioners to adapt to the system.

Discussion: We argue that other than structured reporting and ontology, human adaptability is an important factor in successful standardisation of an ultrasound reporting system.

P172 Neuroradiology orange alerted reports

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Aims/objectives: We aimed to measure local compliance with the standard that every 'orange' alerted neuroradiology report should be read by the relevant clinicians with evidence of discussion or relevant course of action documented in the patient's case notes. Our objectives were;

- 1) To measure compliance rates with the above standard
- 2) to make improvements to the service if compliance is below expected and
- 3) to report findings to our directorate and trust.

Content: The sampling criteria we used was adults undergoing neurological imaging within our neurosciences directorate between October 2013 to March 2014. The method of sample selection was simple random analysis. Data collection was via an existing (CRIS) database and case note review.

Relevance: A Safer Practice Notice from the National Patient Safety Agency in 2007 highlighted the need for early identification of any failure to act on radiological imaging reports.

Outcomes: 75% of patients had their Orange alerted report checked and verified within 24 hours of dictation. 68% of reports were e-mailed/telephoned within one working day. 85% of alerts were acknowledged in the case notes. The majority of patients (35/44, 80%) were outpatients. For inpatients/A+E patients 78% of reports were verified within 24 hours of dictation; 67% of reports were e-mailed in one working day.

Discussion: To ensure zero harm we should aim for 100% compliance with time to verification and informing clinicians. We could rethink communication pathways with clinical teams and aim to re-audit within the next 9-12 months.



P173 Cervical spine trauma imaging: Justification for additional swimmers projection of the cervico-thoracic junction

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NICE Head and Cervical Spine Guidelines (2007) advocate three-view Plain Radiography over CT for the initial assessment of cervical spine trauma. However, they provide no indication of what protocol should be utilised when the cervico-thoracic junction is not visualised by the first attempt. This study aimed to evaluate current practice.

A retrospective audit of trauma patients was performed over a two month period (N=107).

The results demonstrated that whilst all patients received the standard AP, AP open mouth and lateral projections, 74% of cases failed to demonstrate the cervico-thoracic junction. 67% of this population received an additional Swimmers View with a 74% success rate.

The research findings highlight the practical limitations of the plain radiography technique. Whilst further training could perhaps reduce the non-visualisation rate of the cervico-thoracic junction, radiographers could in most cases predict the need for the additional swimmers projection and likelihood of success as part of the justification process. Whilst acknowledging the increase in thyroid dose by utilising CT, direct referral is perhaps justified in these cases, particularly if the patient presents with the clinical symptoms of cervical spine trauma.

P174 An ultrasound based protocol for vascular assessment of the diabetic lower limb in Zimbabwe

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Aim: The aim of the poster is to present an ultrasound based protocol for vascular assessment of the diabetic lower limb.

Content: Diabetes is a highly prevalent medical condition globally. There were 600,670 cases of diabetes in Zimbabwe in 2013 (IDF, 2014). Diabetes manifests as peripheral arterial disease in the lower limb, and is the main cause of lower limb amputation (Sun et al, 2013).

There are no published guidelines for the care of the diabetic lower limb in Zimbabwe and patients especially with type II diabetes often present late with severe consequences. Doppler ultrasound has been shown to be highly sensitive in the assessment of the diabetic lower limb (Park et al, 2012). Currently in Zimbabwe, ultrasound is not offered routinely during the management of the diabetes, but only in symptomatic patients.

An ultrasound based protocol that includes Ankle Brachial Pulsatility Index and Toe Pressure Index for vascular assessment of the lower limb will be presented with pilot study results.

Impact: If vascular assessment could be considered during low risk foot care in Zimbabwe, this could potentially improve the prognosis, and allow for early preventive measures in diabetic patients.

Outcomes: Early diagnosis and monitoring for peripheral arterial vascular disease in diabetic patients, could lead to fewer high risk cases.

Discussion: Ultrasound is cheap and readily available to the majority of the Zimbabwean population when compared to other modalities. This ultrasound based protocol provides the opportunity for ultrasound to be offered in rural clinics in Zimbabwe providing improved care for diabetic patients.

P175 MRI STIR imaging for tuberculosis spine

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Tuberculosis is a very rare disease in western countries but very common in densely populated countries like Asia and Africa. In our centre we scan patients from diverse backgrounds, but this disease is not very common in the UK. For any initial query of tuberculosis, sagittal and coronal stir imaging is helpful to aid diagnosis.

Having worked in India and South Africa, we scanned Tuberculosis patients daily and performed STIR sequence. It has demonstrated the pathology well thus been appreciated by our referrers and radiologists to aid diagnosis.

We currently work in a team of 9 radiographers and share good practice and scan techniques. We often include and discuss case studies for our CPD. When scanning tuberculosis patients we have shared and implemented this technique as standard. Short time Inversion Recovery (STIR) is a very useful sequence for this type of pathology and we have tracked feedback and case studies that supported our findings.

Following research, team discussions and feedback from radiologists and clinicians, we have found evidence that MRI detects early bone marrow changes and any infiltration to adjacent structures/psoas involvement and posterior elements. MRI imaging is mostly useful in delineating paravertebral bodies, epidural and intra osseous abscesses from Tuberculosis and to visualise cord compression.

We are planning to share further evidence of this based on clinical history, symptoms and origin of patients. In our presentation and poster we want to highlight STIR imaging as an important element within the patient pathway.

P176 Multi-site liver tumour ADC reproducibility at 1.5T MRI

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Apparent Diffusion Coefficient is a potential biomarker of cellular response to treatment. This study aimed to establish multi site mean ADC reproducibility (Liver). We used patient data to develop a model for measurement error, which quantifies the important predictable sources of variability. We could then predict more accurately, the expected reproducibility for an individual tumour, based on its characteristics.

Data from 19 patients from 4 sites and 3 different 1.5T vendors were used. 3D whole tumour and 2D ROIs were manually drawn. ADC maps were calculated using mono-exponential fits from 3 b-value images (b-100, 500 and 900 s/mm²). Overall Coefficient of variance (CoV) was 7.5%. Standard analysis suggested 3D ROIs were more reproducible and 1 site was less reproducible than the others. Using our error model to estimate the level of uncertainty for each measurement, a minimum size ROI can improve reproducibility up to 4 times, whether 2D or 3D ROI. When the data is adjusted to fit within the model of expected errors (i.e. factoring out differences in ADC due to predicted errors), the reproducibility measurements are quantitatively well predicted (95% within 2% change between baselines). Outliers were identified as having motion artifact. Reproducibility across sites and vendors were otherwise comparable.

Reproducibility of less than 4% is achievable but currently only for larger ROIs. Therefore, use of ROIs with a minimum number of voxels should be considered. Use of motion correction methods should make measurement of smaller ROIs (and smaller tumours) more viable.

P177 Investigating the use of an anti-scatter grid in chest radiography with a Computed Radiography imaging system

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Aims/objectives: The aim of this study was to investigate via simulation a proposed change to clinical practice for chest radiography. The validity of using an anti-scatter grid across the diagnostic energy range (60 - 125 kVp), in conjunction with appropriate tube current-time product (mAs) for imaging with a Computed Radiography (CR) system was investigated.

Content: A digitally reconstructed radiograph algorithm was used which was capable of simulating CR chest radiographs with various tube voltages, receptor doses and scatter rejection methods. Four experienced image



evaluators graded images with a grid ($n = 80$) at tube voltages across the diagnostic energy range and varying detector air kermas. These were scored against corresponding images reconstructed without a grid, as per current clinical protocol.

Outcome: For all patients, diagnostic image quality improved with the use of a grid, without the need to increase tube mAs (and therefore patient dose), irrespective of tube voltage used. Increasing tube mAs by an amount determined by the Bucky factor made little difference to image quality.

Discussion: A virtual clinical trial has been performed with simulated chest CR images. Results indicate the use of a grid improves diagnostic image quality for average adults, without the need to increase tube mAs, even at low tube voltages.

Relevance/impact: Validated with images containing realistic anatomical noise, it is possible to improve image quality by utilising grids for chest radiography with CR systems without increasing patient exposure. Increasing tube mAs by an amount determined by the Bucky factor is not justified.

Patient dose measurement and management

P178 X-ray internal dose audit using diagnostic reference levels

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Routine dose analysis is a key driver in radiation protection, IR(ME)R regulations require an employer to set up diagnostic reference levels. The aim of this dose audit was to establish local diagnostic reference levels (LDRL) and to compare these to the national diagnostic reference levels (NDRL's) and the recommended DRL's from IRS. The most common diagnostic procedures dose levels were collected. If possible the data was collected directly from the room console/PC, CRIS was used if the console data was not accessible. 14 examination doses of each of the common diagnostic procedures outlined on the template (REF IRM016) were noted and an average obtained. The examinations with the 2 highest and 2 lowest DAP readings were excluded from the results.

Exposure factors collated were: kV, mAs & DAP readings, each individual piece of equipment had their own individual data sets. Compared to last year's audit we have seen the majority of our doses decrease by significant levels. The large majority of our doses are well below the national levels and the levels set out by IRS.

Standardisation of exposures across the digital rooms was put into progress after last year's audit and there has been more correlation between the results of similar rooms. Understandably there is significantly less doses between our digital and CR equipment, including Portable machines. I found the need to review staff training on technical factors during portable chest examinations as these were the examinations with the highest doses, due to Radiographer technique and positioning.

P179 Epidermolysis Bullosa: A retrospective analysis of radiation exposure and fluoroscopic techniques

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Epidermolysis Bullosa (EB) is an inherited connective tissue disorder with a UK incidence of 1 in 17,000 live births. It is characterised by blistering of the skin and mucous membranes in response to mechanical trauma. Those that present with dysphagia and malnutrition secondary to gastro-intestinal mucosal involvement, tend to have Dystrophic Epidermolysis Bullosa (DEB).

Guys and St Thomas' Hospital is one of two national centres for the diagnosis and clinical care of patients with EB. We performed a retrospective analysis of all diagnostic and interventional fluoroscopic procedures undertaken in DEB patients, within our radiology department, from 2012 to 2014. 22 patients with DEB were identified, who had undergone a total of 93 contrast swallows and 47 balloon dilatations of the oesophagus, with a mean number of 4