Student Conference ePosters

Film-screen, computed and digital radiography image reject analysis: a systematic review
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Reject and repeat analysis is an integral aspect of quality assurance programs for medical imaging departments across the globe as it guides staff training, equipment set-up and department workflow. Rejected and repeated images represent unnecessary patient radiation exposure, inadequate imaging techniques and an increase in departmental expenses.\(^1,2\) The approach to reject analysis has significantly changed as technologies have improved but reject rates and their reasoning have not always reflected the technological advances. With students and junior radiographers entering a predominantly digital workplace it is crucial that attention is brought to the need to reduce reject and repeat rates with DR. All radiographers should be aware of image quality standards, the benefits of post-processing, understand the need to continuously assess exposure index values, and adhere to the 'As Low As Reasonably Achievable' (ALARA) principal.\(^2,3\) This systematic review of evidence-based research articles aims to compare and critically evaluate the methodologies and results of general x-ray reject analysis of conventional film-screen, computed and digital radiography, in order to determine the most effective approach of reject analysis and the effect that digital radiography has had on reject rates.

References
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It's the country life for me
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The Rural and Remote Practitioners Panel (RRPAP) would like to Reach Out to students of Medical Radiations Technologies (MRT) to highlight opportunities that await them by working in a rural setting. By Reaching Within themselves, students may realise that planning not just a career but a way of life in the country can lead to immense job satisfaction with professional growth. Thinking outside the box is necessary if one is to Reach Beyond one’s comfort zone when presented with practice challenges often found in small departments. Listen to first hand experiences of radiographers working on the front line in these small tight knit communities throughout Australia.

A special category of MRT – The Rural and Remote Practitioner will Reach Across to you offering the interesting stories and unique situations that rural radiographer’s find themselves in during the course of daily life.

The benefits of experience, responsibility and working closely with other health professionals as well as networking in the community need to be emphasised.
Preparing indigenous students to enter health science professions
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Indigenous students are underrepresented in health science professions, including radiography. Strategies are utilized in schools to reduce the disparity, while the result is insignificant. The aim of this literature review is to analyse the literature related to supporting indigenous students to enter and complete health science education programs. A review of the literature from Australia was conducted to identify the barriers that prevent indigenous students entering health professions and to consider enabling pedagogy and other supports to address these barriers. The barriers include insufficient academic preparation, cultural diversity, financial difficulty and insufficient information on health science profession pathways. Universities in Australia have supports to address some of these barriers including the use of student support centers, indigenous scholarships and student tutorials. One of the recommendations for teaching methodology is the application of the “both ways” approach. However, further widespread training is required for all educators in Australia to utilize this approach effectively. Other teaching methods include using six broad principles, online delivery lectures and the use of culturally diverse instructional material. The findings of this literature review indicate that current indigenous pedagogy is inconsistent throughout Australia. The review also confirms that there is limited evaluation for the efficiency of the existing teaching methods. Problems such as inconsistent pedagogy and insufficient training for all educators in Australia are still present. Greater research is required to demonstrate the best pedagogy to employ with indigenous students in Australia to enable them to enter educational programs in the health sciences including radiography.

Cyberknife: a review of treatment doses and toxicities found in lung cancer patients
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Current radiation therapy techniques capture verification images prior to treatment to confirm the patient is in the correct position. However, there is a lack of information of the patients’ positioning during the course of treatment.1 In particular for treatments that take a long period of time, and have a higher risk of intrafractional movements.1 Radiosurgery techniques such as cyberknife, aims to reduce intrafractional movement by taking numerous x-ray images and monitoring the patient’s breathing during treatment and adjusting the treatment arm position in real time to compensate for the tumour movement.2 This helps to improve treatment accuracy and allows for tighter treatment margins to be used, as well as prescribing higher doses per fraction.3 This will result in less healthy tissue being irradiated and less dose to the nearby critical structures.3 This presentation aims to assess the current available evidence for the use of cyberknife in the treatment of lung cancer compared to conventional techniques. In particular, comparing the rates of local tumour control and side effect profile for each technique.

References
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Just another routine chest x-ray
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This reflective case study aims to emphasise the importance of analysing diagnostic images in the workplace and alerting supervisors to abnormalities that may seem insignificant, but have a huge impact on subsequent patient care. Most importantly, to remind radiographers that it is within their professional scope to notice such abnormalities and act accordingly, deciding whether further complementary views are required to demonstrate the pathology better. Critical analysis and higher thinking are not skills developed by students early on during placements and are important skills for radiographers to acquire and continue to improve on. The discussion will highlight this importance through an analysis of a short chest imaging case study, as well as introduce some methods and strategies to analyse future chest x-rays, which will assist the development of critical analysis.

Justifying the Use of 3D-Printed Accessories in Radiation Therapy
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Objectives: This report identifies the current stance of 3D printing in bolus and immobilisation fabrication and aims to determine whether this rapidly evolving and increasingly accessible method can be justified in radiation therapy practices.

Methods: A systematic review of PubMed, Embase and Medline using keywords located relevant and recent articles. As limited research exists on these specific topics, the snowball technique uncovered further literature.

Results: The literature review revealed that 3D printed bolus could be justified for clinical use based on comparable or improved findings in quality of dosimetry, time management, workflow, and costs, when compared to current methods. The process of converting CT data to a printable format and then physically creating an immobilisation mask appears feasible as a proof-of-concept, however large discrepancies in the worse-case gap tolerances on modelled and physical masks demonstrate the need for further development of the product and research before this technology can be ethically and clinically trialled.

Conclusion: The emerging technology of 3D printed accessories offers an alternative to the current methods that can be time-consuming, expensive, ineffective and inefficient. The end result justifies the viability of 3D printed immobilisation accessories in radiation therapy; and confirms the ability of 3D printed bolus to improve workflow, patient and treatment outcomes where bolus accessories are required. 3D printed bolus can be progressed to large scale, prospective clinical trials.
The role of immunotherapy in treating metastatic melanoma
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Melanoma is the third most common cancer in Australia with incidence rates rising. The survival rates are high if the primary lesion is surgically removed at an early stage. However, at least 10% of melanoma cases have metastasized; significantly decreasing the 5 years overall survival rates. The current standard for metastatic melanoma is chemotherapy; which, yields a 7–9 months overall survival. Recent research into immunotherapy has shown its potential to combine with other modalities such as radiation and chemotherapy, substantially improve survival rates up to 2 years post treatment. Immunotherapy stimulates the T-cell response to target disease by attaching antibodies to the melanoma itself. In the context of combined therapies, radiation and chemotherapy have been used to deplete the suppressor genes inherent of the melanoma cells thus making them susceptible to T-cell attack. This literature review aims to explore the efficacy and toxicity of immunotherapy as a monotherapy and in combination with radiotherapy or chemotherapy. Current findings suggest that immunotherapy is more beneficial to the patient in terms of overall survival rates and toxicity during and post treatment. Overall survival rates in immunotherapy as both a monotherapy and a combination therapy has yielded promising results of 11–40 months’ survival post treatment. Additionally, the toxicity of treatment is well tolerated by the patients with talks of dose escalation in radiotherapy; thus, suggesting that there is potential for more radical treatments. These factors highlight the growing potential of immunotherapy as an emerging modality for the care of metastatic melanoma.

Radiotherapy planning and ventilation/perfusion PET/CT: the potential for avoiding functional lung and preserving respiratory performance
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Current lung radiation therapy planning techniques aim to irradiate a tumour volume and limit irradiation to structures surrounding this volume. Inevitably though, these structures will receive some exposure either through exiting beams or internal scatter. Radiation induced toxicities such fibrosis can occur when healthy lung tissue is irradiated and the resulting damage may lead to decreased respiratory function for patients. Currently there are no techniques used to identify the level of functionality of tissues in different areas of the lung before radiotherapy planning commences. If areas of healthy lung could be outlined on a planning CT scan based on their diagnosed functional performance, then beam arrangements that compliment this information could be used. Beam angles could be chosen to minimise irradiation to areas of lung that are highly functional and for those areas that may anatomically appear healthy on a CT scan but physiologically are not functioning at maximum capacity, then beams could be directed through and sparing functioning tissue could be prioritised. VQ PET/CT scans are a novel imaging modality that can identify functional lung tissue. These scans could potentially be fused with planning CT scans and beam arrangement chosen based on this information.
Step by step to establish diagnostic reference level (DRL) for general radiography examination
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The radiation dose received by patients undergoing certain radiographic examinations might vary among practices due to the difference of energy, filtrations and techniques. Therefore, the Diagnostic Reference Level (DRL) was then introduced as a national guideline to reduce this variety in order to implement good practice within diagnostic radiography activities. DRL is a radiation dose reference in generally speaking must be at or below the level, in medical diagnostic practice for certain types of examination for standard-sized patients in a country. Along with justification and optimisation, DRL underpins the ALARA principle. Australia has established a national DRL. However, there is only DRL for MDCT currently existing, because Australia prioritizes the modality which delivers higher dose. Therefore, while waiting for the DRLs of other examinations, paper based survey for local facility reference level is highly recommended. Considering its importance as a part of radiation protection, everybody needs to be involved and works together to establish local facility reference level (FRL) to support NDRL. The purpose of this article is to explore the current literature regarding to DRL, beginning with the definition, the currently existing DRL in several countries, the reasons why each country should establish their own DRL, and step by step to establish DRL for general radiography examination. It is expected that this review will provide radiographers and student radiographers with a useful guide of DRL establishment, and ultimately boost their motivation to be involved in the establishment of DRL in Australia.

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