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EDITORIAL

Imaging patients with obesity

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Obesity is one of the major global health issues today and is recognised by the World Health Organisation (WHO) as a global non-communicable disease.[1] The high prevalence of obesity is attributed to a multitude of factors including: physical inactivity, high-energy intake, genetic susceptibility, and socio-economic factors. It directly impacts health and is associated with comorbidities such as type II diabetes, cardiovascular disease, hypertension, and other diseases including cancer. As a result of these comorbidities, patients with obesity are more likely to present for health assessment than their normal weight peers and are more likely to require medical imaging. When imaging patients with obesity, their size brings challenges relating to the diagnostic quality of the image and this can lead to the requirement for repeated images and frustrations for radiographers when trying to achieve an image of sufficient quality to make a diagnosis.

The current evidence base covering imaging patients with obesity is low and the study by Seo et al in this issue of the Journal of Medical Radiation Sciences (JMRS) provides an important contribution.[2] With over two thirds of Australian adults being classed as overweight or obese and with other countries also having a high prevalence of patients with obesity, it is important that further research into improving imaging in these patients is undertaken.[2] While imaging patients with obesity creates challenges across all imaging modalities, this paper focuses on projection radiography, which remains the most common radiographic examination and requires a high level of expertise, skills, and decision making in the image acquisition and ensuring high-quality patient care.

Patients with obesity are frequently well aware of the negative health impact of their disease and generally have not made a purposeful choice to be obese. It is important that radiographers are not only able to provide compassionate care for patients with obesity throughout their imaging but also extend this to consider the additional requirements their body habitus necessitates. However, while every effort must be made to provide compassionate and high-quality care for patients with obesity, it remains a fact that their body habitus poses a challenge for radiographers who are needing to achieve diagnostic quality images. Understanding clinical decision making and the wider impact on patient care is therefore essential to understand how radiographers can improve experiences for patients with obesity undergoing imaging as well as optimising their imaging.

As Seo et al discuss in their paper, there is no safe limit of ionising radiation and it has been reported that patients with obesity experience a greater radiation burden for like-for-like radiographic imaging compared to their optimal weight counterparts.[3] This is primarily because body thickness is an important factor in X-ray attenuation. However, the issue of poor photon penetration is a well-recognised issue when imaging patients with obesity and this results in low receptor signals due to the high amount of X-ray photons being attenuated.[4] Many of the strategies for increasing exposure factors are derived from film-screen radiography, and with technological advances meaning that the large amounts of imaging are carried out using digital technology. Digital and computed radiography technologies have a wider exposure latitude than film-screen technology, and therefore the historical models based on film-screen radiography need revision.[5] Dose creep is reported as a phenomenon of increasing exposure factors to avoid underexposure and subsequent repeated radiographs. Dose creep has the potential to result in even greater doses in patients with obesity undergoing imaging if radiographers are not well trained in imaging this group of patients. The technical solutions for optimising imaging in patients with obesity lack a strong evidence base and are born from basic principles of radiography.[6] The challenges affecting image quality also include difficulty positioning patients and locating bony landmarks to centre the X-ray beam accurately. In addition to the positioning challenges, there may be difficulty achieving coverage of the anatomical area

of interest with one image receptor in patients with obesity due to their larger size.[7]

The experiences patients with obesity have when attending medical imaging departments should be equivalent to optimal weight patients in terms of the compassionate care they receive and the expectation of diagnostic quality images. This requires radiographers to be adept at managing to focus on the patient and provide compassionate care while they are being stressed by the enhanced clinical decision making required to achieve a diagnostic quality image in patients with obesity. Seo et al explore decision making in the acquisition of projection radiographs in their paper in this issue using the novel 'think-aloud' methodology, which was used to investigate the cognitive processes of radiographers undertaking projection radiography on a phantom with increasing size to mimic patients with obesity.

The research team touch on the issue that the majority of imaging protocols in projection radiography are based on average-sized patients and this means that radiographers need to draw on their expertise and experience to change their exposure factors and technique to achieve diagnostic images as patient size increases. The think-aloud method allowed the researchers to understand the clinical reasoning taking place at every step of the examination using a phantom with an increasing body mass index to simulate imaging normal weight patients through to patients with obesity. Seo et al identified 12 key concepts across three decision making stages, but reported an imbalance across these concepts, with the majority of verbalisations focussing on patient positioning and evaluation of the radiograph more than aspects relating to patient care. Seo et al. suggest that radiographers rely on intuitive decision making in a high pressure setting when imaging patients with obesity and there is a reliance on combining instinct with intelligent thinking. However, this makes strategies difficult to articulate and therefore difficult to teach to others because decisions are based on experience and are largely subjective.

There is evidence of radiographers being 'image focused' when imaging patients with obesity and some report frustration at the low diagnostic image quality they achieve in this group of patients.[8] Seo et al. report similar findings, with radiographers also altering their perception of image quality to accommodate for the patient size, but they also reported a lack of confidence during imaging the obese phantom.[2]

As outlined in this editorial, radiographers are facing challenges when imaging patients with obesity, from accurate positioning, through to selecting the appropriate exposure factors for the examination. These challenges need to be addressed with a more robust evidence base so that radiographers have clear guidance based on data which reflect how to optimise their practice in terms of both image quality and radiation dose.

With the rapid technological advances in medical imaging, further research is urgently required on how to optimise imaging for patients with obesity, particularly for those with the highest body mass indexes. Research into the most appropriate combination of exposure factors, alternative positioning points, which align with commonly used bony landmarks, the use of virtual grid technology to minimise dose, but without degradation of image quality all needs more research. In practice radiographers need evidence-based guidelines to ensure this group of the population can access diagnostic imaging. In addition to the research into technological solutions, further work is required to improve patient experience, so that radiographers as a profession can provide patient-centred compassionate care to this group of patients.

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