Optimisation in Radiography: A Skill Taken for Granted

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A fundamental principle of radiography is optimisation, which in this context, means finding the best compromise between conflicting requirements. Since common procedures such as X-rays and computed tomography (CT) scans involve using radiation, optimisation is essential to ensure that the patient receives the safest and lowest levels of radiation exposure without sacrificing the clarity of the diagnostic images.

Optimisation requires the radiographer to be skilled in manipulating different parameters in the scanning devices, such as voltage and current. These parameters determine not only the amount of radiation emitted but also the resultant image quality, which needs to be sufficient for the reporting radiologist to form a diagnosis. Therefore, an appropriate balance between image quality and patient exposure is needed.

Innovative methods of optimisation are consistently and competitively being researched worldwide. It is an area of specialisation that requires creativity to discover new strategies. Lumbar spine X-rays were the first I researched, since this procedure is very commonly performed locally for patients suffering from back pain or arthritis. By developing an optimisation technique that manipulated different parameters, a 72% radiation dose reduction was achieved, with no significant impact on image quality.

In another study, I researched optimisation for CT of the pulmonary arteries, a scan commonly performed to detect blood clots. After establishing the optimisation technique, a clinical study was performed to compare the old (not-optimised) protocol and the new (optimised) protocol. The radiation dose was reduced by 50% with no significant change to image quality. This technique has now been applied locally at Mater Dei Hospital, which means that all patients referred for this CT scan are now being scanned with a 50% reduction in radiation dose. This was a significant achievement, as 3,000 CT scans of pulmonary arteries are performed each year locally, including on radiosensitive patients such as pregnant women.

Last year, a new CT scanner was installed in the Mater Dei Accident & Emergency Department. This scanner uses technology that is new to our practice, meaning there are innovative optimisations waiting to be discovered. This will be the next step in my doctoral studies as I endeavour to optimise CT scanning in the emergency setting.

Optimisation in practice makes for an 'optimised' radiographer, one who feels fulfilled in knowing that their skills reduce the dose of radiation exposure to patients while still obtaining good image quality.

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Further Reading

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