

ESTABLISHMENT OF TYPICAL DOSE VALUE FOR RENAL SCANNING USING SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY (SPECT) IN HOSPITAL SULTAN ABDUL AZIZ SHAH (HSAAS), UNIVERSITI PUTRA MALAYSIA

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EXTENDED ABSTRACT

Renal imaging is a standard nuclear medicine procedure performed in hospitals. This imaging provides crucial diagnostic information, such as early detection of cancer cells, and serves as a preparatory step before treatment. Establishing Diagnostic Reference Levels (DRLs) is vital for optimizing protection against medical exposures, especially in nuclear medicine. A DRL is a standard value used as a benchmark to assess whether the dose administered is too high or too low. This study aims to determine the typical dose value or facility DRL, for the renal imaging protocol. The research was conducted using a retrospective study design, analyzing data from patients who underwent renal imaging at Hospital Sultan Abdul Aziz Shah (HSAAS) in 2023 and 2024. The radiopharmaceuticals examined in this study include Technetium-99m Diethylenetriaminepentaacetic acid (Tc-99m DTPA) and Technetium-99m Mercaptoacetyltriglycine (Tc-99m MAG3). To establish the typical dose values, a comparative method was used, where the third quartile of the administered activity was compared with the national DRLs in Malaysia. The median value was proposed as the typical dose value. The median values for the two radiopharmaceuticals were 190.30 MBq for Tc-99m DTPA and 189.83 MBq for Tc-99m MAG3, while the national DRL values were 365 MBq for DTPA and 219 MBq for MAG3. The results indicated that both the median and third quartile of the administered activity values obtained were lower than the national DRL values.

In conclusion, the proposed Typical Dose Values or Facility Diagnostic Reference Levels (DRLs) for dynamic renal scan protocols using a Single Photon Emission Computed Tomography (SPECT) scanner are 190.30 MBq for Tc-99m DTPA and 189.83 MBq for Tc-99m MAG3. Based on the study findings, these values can serve as a guideline for medical practitioners to optimize the radiation dose administered to patients. This recommendation not only contributes to minimizing patient radiation exposure but also ensures that the resulting image quality is adequate and clear for diagnostic purposes. Furthermore, the establishment of these typical dose values can serve as an important reference for improving clinical practices at medical centers in Malaysia, particularly in ensuring the standardization of protocols being implemented. This initiative also supports efforts to comply with international standards, in line with guidelines set by organizations such as the International Atomic Energy Agency (IAEA) and the International Commission on Radiological Protection (ICRP). Overall, the findings of this study underscore the importance of systematic dose monitoring and management to maintain a balance between patient safety and diagnostic effectiveness.

Keywords: Renal imaging, SPECT, diagnostic reference levels (DRL), typical dose value, administered activity

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