

Quality Control Assessment of X-Ray Equipment in Hospitals of Katsina State, Nigeria

Authors : Aminu Yakubu Umar

Abstract : X-ray is the major contributor to the effective dose of both the patient and the personnel. Because of the radiological risks involved, it is usually recommended that dose to patient from X-ray be kept as low as reasonably achievable (ALARA) with adequate image quality. The implementation of quality assurance in diagnostic radiology can help greatly in achieving that, as it is a technique designed to reduce X-ray doses to patients undergoing radiological examination. In this study, quality control was carried out in six hospitals, which involved KVp test, evaluation of total filtration, test for constancy of radiation output, and check for mA linearity. Equipment used include KVp meter, Rad-check meter, aluminum sheets (0.1-1.0 mm) etc. The results of this study indicate that, the age of the X-ray machines in the hospitals ranges from 3-13 years, GHI and GH2 being the oldest and FMC being the newest. In the evaluation of total filtration, the HVL of the X-ray machines in the hospitals varied, ranging from 2.3-5.2 mm. The HVL was found to be highest in AHC (5.2 mm), while it was lowest in GH3 (2.3 mm). All HVL measurements were done at 80 KVp. The variation in voltage accuracy in the hospitals ranges from 0.3%-127.5%. It was only in GH1 that the % variation was below the allowed limit. The test for constancy of radiation output showed that, the coefficient of variation ranges from 0.005-0.550. In GH3, FMC and AHC, the coefficient of linearity were less than the allowed limit, while in GH1, GH2 and GH4 the coefficient of linearity had exceeded the allowed limit. As regard to mA linearity, FMC and AHC had their coefficients of linearity as 0.12 and 0.10 respectively, which were within the accepted limit, while GH1, GH3 and GH4 had their coefficients as 0.16, 0.69 and 0.98 respectively, which exceeded the allowed limit.

Keywords : radiation, X-ray output, quality control, half-value layer, mA linearity, KVp variation

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