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A Review on Diagnostic and Interventional Radiology that Optimizes Radiation Doses

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Introduction

Five steps for a dose optimization process are suggested based on recent research. These are the steps: 1) establishing a program for quality assurance; 2) the formation of a dose optimization team comprised of a radiologist, a medical physicist, and a radiation technologist; 3) the determination of baseline dose levels and image quality as well as comparisons with benchmarks in order to determine which exam protocols should be optimized; 4) the modification of protocols by the medical physicist; and 5) the evaluation of the optimization process and its effect on patient dose and image quality [1].

The performance of the equipment the customization of the exam protocol, and the behavior of the staff should all be the focus of joint efforts during the optimization process. Exam protocol details and instruction on how to use dose reduction features should be provided by manufacturers. In order to promote the value of the optimization process, the diagnostic radiology medical physicist ought to emerge and take a proactive lead in the daily clinical routine.

Medical imaging has proven to be crucial to the entire process and plays a crucial role in accurate disease diagnosis and improved patient treatment. In both curative and palliative medicine, as well as at all levels of health care, its application is essential. The medical field has seen a steady shift in technology over the past 50 years that has increased the use of ionizing radiation from X-ray equipment, moving from analogue to digital detectors and platforms, single slice to multidetector-row computed tomography (CT), fluoroscopy to sophisticated angiography systems, simple intraoral dental machines to panoramic and cone beam CT technologies, and so on. Numerous other clinical specialists, including interventional cardiologists, orthopaedic surgeons, gastroenterologists, dentists, anaesthesiologists, urologists, and others, use modern X-ray medical imaging outside of the traditional radiology department due to its widespread accessibility and increased patient demand [2,3].

Literature review

For radiation doses less than 100 mSv, there is little evidence that radiation causes cancer. Even for CT, which is considered one of the high dose diagnostic procedures, there is still no firm consensus among the scientific community regarding the level of cancer risk from

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technology offers a variety of tools to accomplish this, but they should only be used if a thorough understanding of machine performance and the ways in which each technical parameter, post-processing algorithm, or other feature can affect image quality and radiation dose are taken into account are gained. Therefore, in order for the medical physicist to comprehend the optimization tools and features of each machine, they will need to study all technical documentation. The application specialists at the manufacturer are able to provide in-depth knowledge, best practices, and helpful hints for the particular mode of operation at hand [8].

Conclusion

The approaches that doctors take to deal with a variety of clinical issues, patients, and diseases that pose a threat to their lives have been fundamentally altered by medical imaging. However, an X-ray machine's error, misuse, or malfunction can affect the health or life of thousands of people, not just one. Established quality assurance programs must be used to closely monitor X-ray systems, and each patient's needs should be met with the right quality and dose. Key professionals should collaborate on the optimization process, with activities centered on 1) equipment performance, 2) customizing exam protocols, and 3) staff behavior. The medical industry has a responsibility to provide training on the application of predetermined exam protocols as well as additional tools for optimizing radiation dose. Lastly, the hospital's clinically qualified diagnostic radiology medical physicist should lead the optimization process and fully participate in everyday medical imaging activities.

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Conflict of Interest

None

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