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Artificial Intelligence in Nuclear Medicine: Enhancing Efficiency and Patient Care

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Artificial intelligence (AI) is revolutionizing every field and nuclear medicine is no exception to this revolution [1]. AI has the potential to boost productivity in nuclear medicine facilities by automating administrative processes, improving image quality, reducing noise, and enhancing lesion detection.

Image reconstruction, quantitative analysis, dosage optimization, predictive analytics, automation of quality control, decision support, personalized treatment planning, and research and drug development are potential areas where AI can impart technological revolutionization, thereby, leading to workflow optimization [2].

In fact, AI will transform the medical profession and medical imaging in the near future, and automation of labor-intensive but cognitively undemanding tasks, such as image segmentation or finding prior examinations across different Picture Archiving and Communication Systems (PACS) repositories would be a great relief and a strong stimulus for the further development of the profession rather being fear of AI replacing physicians. As Chan and Siegel [3] and others have stated, physicians will not be replaced by AI, but physicians who opt out of AI will be replaced by others who embrace it.

Although artificial neuronal networks are becoming ever more common in nuclear medicine, task-specific algorithms are being developed that can be installed on an individual basis rather than uploading multisite data to a communal database [4]. Research software platforms such as Slicer Image Guided Therapy (IGT) and Nvidia AI-assisted segmentation [5] are beneficial for lesion segmentation. The NHS USA has funded 3D Slicer [6], a large software project for viewing and analyzing 3D meshes and images from various domains. It supports

image segmentation, surfaces, annotations, transformations, and other commonly used data sets in 2D, 3D, and 4D [5].

By integrating AI into the nuclear medicine department, healthcare providers can improve patient care, streamline operations, reduce costs, and stay at the forefront of medical advancements. However, it is important to ensure that AI implementation complies with regulatory and ethical standards to maintain patient safety and data privacy.

To enable medical doctors to master AI and utilize it to improve healthcare services, the following steps can be taken:

- Incorporate AI in medical education by integrating AI-related coursework into medical school and residency programs.
- Develop specific AI and machine learning modules to educate medical professionals on the basics and applications.
- Continuous medical education and workshops that focus on AI in healthcare.
- Encourage medical professionals to pursue AI-related certifications and training.
- Collaborative training to promote collaboration between medical schools and computer science or engineering departments to foster interdisciplinary learning.
- Facilitate partnerships with AI experts and organizations for knowledge sharing.
- AI tool familiarization through platforms accessible to medical professionals, allowing them to experiment and familiarize themselves with AI applications.
- Clinical rotations or experiences in healthcare settings where AI is being used, so doctors can observe and participate in AI-driven healthcare.

- Ethical and regulatory training including modules on AI ethics, data privacy, and regulatory compliance in medical education to ensure responsible AI use.
- Establishment of AI mentorship programs where experienced AI practitioners can guide medical professionals in AI implementation.
- Encourage medical professionals to engage in AI-related research to contribute to the field and stay up-to-date with the latest developments.
- Provide access to online resources, courses, and webinars on AI in healthcare for doctors looking to expand their knowledge independently.
- Demonstration of showcase real-world AI use cases and success stories within healthcare to illustrate the benefits and inspire adoption.
- Establish feedback mechanisms to gather input from medical professionals on AI tools and systems, allowing for improvements and customization to their needs.
- Foster a culture within healthcare systems that encourages experimentation and implementation of AI solutions, and provides resources for training and support.
- Collaborate with regulatory bodies to develop clear guidelines for AI use in healthcare, ensuring patient safety, and quality of care.
- Educate patients about the use of AI in their healthcare and address any concerns they may have, promoting trust and transparency.

By implementing these steps, medical doctors can develop the necessary AI skills and knowledge to leverage AI effectively in healthcare, ultimately improving services and patient outcomes.

Conflict of interests

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