The Power of Artificial Intelligence in Reforming Medicine

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Artificial intelligence (AI) is the epitome of technological advancements in medicine and has touched every aspect of medicine in the modern era. While technology is omnipresent in all aspects of medicine, including cardiovascular medicine, AI can process and respond to a vast amount of data in a very short amount of time, thus helping provide better and more efficient care.

AI techniques are being applied in order to formulate newer screening tools, especially in cardiovascular medicine, where risk modification is of paramount importance. Several newer screening tools to identify at-risk individuals for various cardiovascular diseases such as left ventricular dysfunction, atherosclerotic cardiovascular disease, and myocardial infarction, as well as evaluating risk of stroke, take advantage of AI-assisted techniques in different settings.

AI is utilized to augment the medical knowledge and clinical skills of a physician. It brings together a large amount of data, and can create newer models not just for risk stratification, but also for performing procedures and imaging studies, as well as offering a reference guide for the same.

AI-guided vascular access and robotic navigation of the interventional device to the lesion site are some of the potential reforms in cardiovascular interventions. Benefits include minimizing interventional team and patient exposure to ionizing radiation.

There are several areas of opportunity for AI in the field of medicine. Technological advancements can allow us to analyze a large amount of data faster with higher accuracy, in a way that can improve decision-making, diagnosis, and treatment in a particular patient dataset. AI techniques may be advanced to detect arrhythmias or for risk stratification for adverse events, within technology that may be compatible with smartphones or portable electronic devices. Current AI technology has the potential to transform portable devices such as ultrasounds or echocardiograms to improve image quality and data transfer, and provide immediate, basic analysis of images based on a comprehensive database of images worldwide. This would allow for improved patient care in critical settings with limited resources and potentially eliminate redundancies in the current practice of care. The acquisition of echocardiograms and their interpretation is also operator-dependent, making it limited for widespread use. If such imaging modalities become independent, at least for image acquisition and with limited interpretation purposes, it may positively impact care in various ways. We have AI algorithms in nuclear cardiology in several aspects of single photon emission computed tomography (SPECT) myocardial perfusion imaging, for things such as image processing, motion correction, quantification, and image reconstruction.

Pacemakers and automated implantable cardioverter defibrillator devices are some of the implantable cardiac devices in current practice. There is a tremendous potential for advancements with the help of AI in cardiac device programming, interrogations, and therapy delivery. We are now able to remotely interrogate these devices and interpret the data. These processes have the potential to be made quicker with fewer human errors by incorporating newer AI techniques to minimize redundancies.

Artificial intelligence is augmenting human intelligence. It must be remembered that AI can never replace human intelligence nor the bedside clinician.

We now have robots that can vacuum and mop floors, which could potentially be expanded to cover deep and terminal cleaning in the hospital areas with highly infectious diseases, on initial clean screens that would otherwise expose a human to the highly infectious agents. We could minimize the human exposure to highly infectious agents by utilizing these robotics effectively for deep cleaning of such hospital areas, delivering food, etc., and thus curtail the transmission of highly communicable diseases. It must be made relatively easier, faster, and importantly, cost effective, for robotics to be utilized in a practical setting. This has the potential to be a practical aspect of our daily lives in the near future.

AI has significant potential in invasive cardiovascular medicine. AI-guided vascular access and robotic navigation of the interventional device to the lesion site are some of the potential reforms in cardiovascular interventions. Benefits include minimizing interventional team and patient exposure to ionizing radiation. Complications related to vascular access could also be minimized to a great extent with robotic-guided vascular access. AI techniques in monitoring mechanical circulatory support devices with real-time monitoring, interpretation, and guidance to therapy will further aid in enhanced care.

AI applications in medicine do need to be made simpler, eliminating redundancies that are otherwise time-consuming, but ultimately, the use of AI in medicine will revolutionize patient care, taking healthcare delivery to an entirely new level. Physicians need not be afraid of AI, because a bedside clinician will never be replaced by a machine or robotics. AI will only enhance care, and make universal healthcare delivery and access possible. Its ability to increase the efficiencies of healthcare delivery will allow access by even the most remote and resourceless areas of the world, often those most in need of timely care. ■

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