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Artificial Intelligence in Healthcare: Transforming Medical Practice

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Abstract - Artificial intelligence (AI), a powerful and cutting-edge area of computer science, has the potential to significantly change medical practice and healthcare delivery. In this review paper, we discuss recent developments in the use of AI in healthcare, examine the possible future direction of AI-augmented healthcare systems, and offer a road map for creating effective, reliable, and secure AI systems. Practice

KEYWORDS: AI, digital health

1.INTRODUCTION

Health care prices are rising globally, governments, payers, regulators, and providers are under pressure to innovate and alter healthcare delivery practices. Furthermore, given the present global pandemic, healthcare systems are under pressure to "perform" (provide effective, high-quality treatment) and "transform" care at scale by directly integrating real-world data-driven insights into patient care. The epidemic has also highlighted shortages in healthcare.

It is also accelerating drug discovery, improving hospital workflow management, and expanding access to care through tools such as virtual assistants and telemedicine platforms. Although challenges like data privacy, ethical use, and integration with existing systems remain, the continued advancement of AI promises a future where healthcare is more proactive, precise, and patient-centered.The workforce and inequities in the access to care, previously articulated by The King's Fund and the World Health Organization.

The application of technology and artificial intelligence (AI) in healthcare has the potential to address some of these supply- and-demand challenges. The increasing availability of multi- modal data (genomics, economic, demographic a moment of convergence between healthcare and technology to fundamentally transform models of healthcare delivery through AI-augmented healthcare systems.

In particular, cloud computing is enabling the transition of effective and safe AI systems into mainstream healthcare delivery. Cloud computing is providing the computing capacity for the analysis of considerably large amounts of data, at higher speeds and lower costs compared with historic 'on premises' infrastructure of healthcare organisations. Indeed, we observe that many technology providers are increasingly seeking to partner with healthcare organisations to drive AI-driven medical innovation enabled by cloud computing and technology-related transformation. While offering immense potential for improved patient outcomes, AI adoption requires navigating challenges such as algorithmic bias, data privacy, and the need for seamless integration into existing workflows. Artificial Intelligence (AI) is fundamentally transforming medical practices by shifting healthcare from a reactive model to a proactive, data-driven approach. Through the integration of machine learning and deep learning, AI is enhancing diagnostic accuracy, personalizing treatment plans, and streamlining administrative workflows to improve overall patient outcomes.

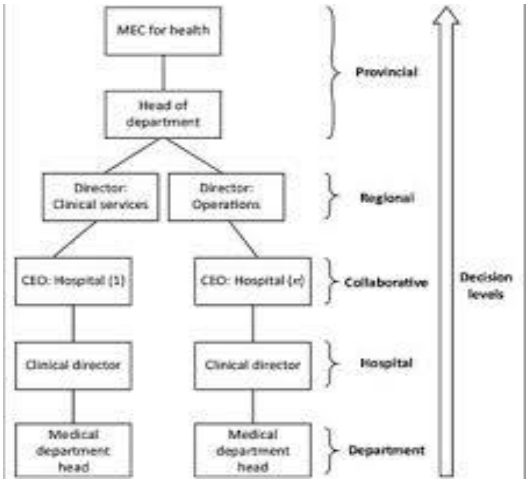

Fig 1. Multi-step, iterative approach to build effective and reliable AI-augmented systems in healthcare.

Artificial intelligence: what is it?

In a nutshell, artificial intelligence (AI) is the science and engineering of creating intelligent robots that replicate human cognitive processes like learning and problem solving by using algorithms or a set of rules.AI systems can act in a purposeful, intelligent, and adaptive way because

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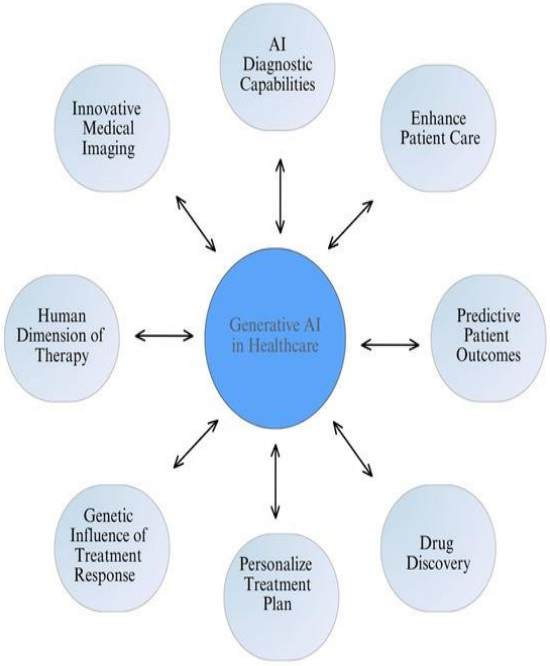
they have the capacity to foresee problems or address them as they arise. Ten The power of AI lies in its capacity to learn and identify patterns and connections from enormous multidimensional and multimodal datasets; AI systems might, for instance, convert a patient's complete medical record into a single figure that indicates a probable diagnosis. Additionally, AI systems are autonomous and dynamic, learning and changing as new data becomes available..



holes ie find healthcare problems to apply AI solutions to without due consideration to local context (such as clinical workflows, user needs, trust, safety and ethical implications).We hold the view that AI amplifies and augments, rather than replaces, human intelligence. Hence, when building AI systems in healthcare, it is key to not replace the important elements of the human interaction in medicine but to focus it, and improve the efficiency and effectiveness of that interaction. Moreover, AI
innovations in healthcare will come through an in-depth, human-centred understanding of the complexity of patient journeys and care pathways. In Fig 1, we describe a problem-driven, human-centred approach, adapted from frameworks by Wiens et al, Care and Sendak to building effective and reliable AI-augmented healthcare systems.

Create and develop

The first stage is to design and develop AI solutions for the right problems using a human-centred AI and experimentation approach and engaging appropriate stakeholders, especially the healthcare users themselves.

Participation of stakeholders and joint creation

Build a multidisciplinary team including computer and social scientists, operational and research leadership, and clinical stakeholders (physician, caregivers and patients) and subject experts (eg for biomedical scientists) that would include authorisers, motivators, financiers, conveners, connectors, implementers and champions.26 A multi-stakeholder team brings the technical, strategic, operational expertise to define problems, goals, success metrics

HUMAN-CENTRED AI

A human-centred AI approach combines an ethnographic understanding of health systems, with AI. Through user-designed research, first understand the key problems (we suggest using a qualitative study design to understand ‘what is the problem’, ‘why is it a problem’, ‘to whom does it matter’, ‘why has it not been addressed before’ and ‘why is it not getting attention’) including the needs, constraints and workflows in healthcare organisations, and the facilitators and barriers to the integration of AI within the clinical context. After defining key problems, the next step is to identify which problems are appropriate for AI to solve, whether there is availability of applicable datasets to build and later evaluate AI. By contextualising algorithms in an existing workflow, AI systems would operate within existing norms and practices. HCAI emphasizes principles such as transparency, fairness, privacy, usability, and accountability. It encourages collaboration between humans and machines, where AI acts as a partner rather than a replacement. This means building systems that people can understand, control, and rely on—whether in healthcare, education, business, or daily life. By prioritizing human dignity and social responsibility, Human-Centered AI aims to create technology that benefits not only individuals but also communities and the broader world, ensuring that innovation leads to positive and inclusive outcomes.

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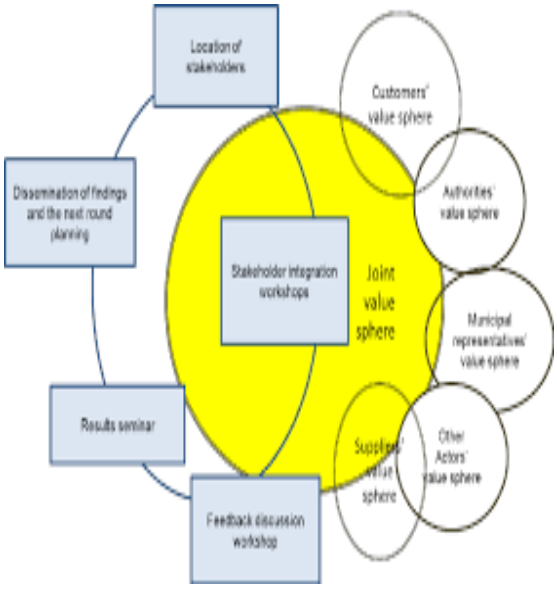

AI's ability to improve, automate, and change healthcare.

AI in the present and the near future

As of right now, AI systems cannot reason in the same way as human doctors, who can rely on "clinical intuition and experience" or "common sense."Twelve Rather, AI translates patterns from datasets like a signal translator. Healthcare organizations are starting to use AI technologies to automate repetitive, high-volume, time-consuming processes. Furthermore, there has been significant advancement in the application of AI in precision diagnostics (such as radiotherapy planning and diabetic retinopathy).

Medium-term AI (the next five to ten years)

We predict that in the medium term, there will be substantial advancements in the creation of strong algorithms that can combine disparate structured and unstructured data, such as imaging, electronic health data, multi-omic, behavioral, and pharmacological data, and are efficient (i.e., require less data to train). Furthermore, medical practices and healthcare organizations will transition from being AI platform adopters to co-innovators with technology partners in the creation of innovative

Intelligent and ambient care

- We also observe the advent of ambient sensing that doesn't require any accessories.
- Faculty and researchers at the Massachusetts Institute of Technology invented Emerald (www.emeraldinno.com), a wireless, touchless sensor and machine learning platform for remote monitoring of respiration, behavior, and sleep.
- Google Nest claims to use motion and sound sensors to monitor sleep, including sleep disruptions like coughing.32 > A new paper investigating the possibility of contactlessly monitoring cardiac rhythms with smart speakers

AI systems for precision therapies.

Long-term IAI (>10 years)

AI healthcare systems will eventually reach a state of precision medicine through AI-augmented healthcare and connected care as AI systems grow more clever. A preventative, personalized, data-driven illness management paradigm that improves patient outcomes (better patient and clinical experiences of care) in a more economical delivery system will replace the conventional one-size-fits-all approach to healthcare.

AI could be applied to the remote monitoring of patients (eg intelligent telehealth through wearables/sensors) to identify and provide timely care of patients at risk of deterioration. In the long term, we expect that healthcare clinics, hospitals, social care services, patients and caregivers to be all connected to a single, interoperable digital infrastructure using passive sensors in combination with ambient intelligence.31 Following are two AI applications in connected care.

VIRTUAL ASSISTANTS AND AI CHATBOTS

AI chatbots (such as those used in Babylon (www.babylonhealth. com) and Ada (https://ada.com)) are being used by patients to identify symptoms and recommend further actions in community and primary care settings. AI chatbots can be integrated with wearable devices such as smartwatches to provide insights to both patients and caregivers in improving their behaviour, sleep and general wellness.

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Automation and ambient clinical intelligence: Artificial intelligence (AI) systems that use natural language processing (NLP) technology can automate administrative tasks like recording patient visits in electronic health records, streamlining clinical workflow, and freeing up more time for clinicians to care for patients (e.g., Nuance Dragon Ambient eXperience (www.nuance.com/healthcare/ambient-clinical-intelligence.html)).

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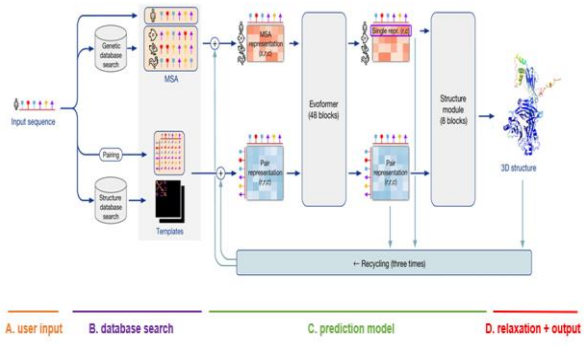
Accurate diagnoses Increasing accuracy and cutting down on wait times for radiation planning

Helping clinicians with picture processing and planning duties for radiation cancer treatment is a significant application of AI. Currently, an oncologist must manually segment the photos using specifically created software to draw contours around the regions of concern, which is a tedious and time-consuming process. Wait periods for beginning potentially life-saving radiotherapy treatment can be significantly shortened by up to 90% thanks to the AI-based Inner Eye open-source solution for head and neck and prostate cancer.

Fig 3. An overview of the main neural network model architecture for AlphaFold.[49] MSA = multiple sequence alignment



AI empowers healthcare professionals
In the long run, healthcare professionals will be able to provide safer, more standardized, and more efficient care at the highest level of their licensure by utilizing AI. To "test" the effectiveness, safety, and experience of an intervention (such as a cancer medication) in a digital setting before giving it to a patient in the real world, doctors could, for example, use a "AI digital consult" to examine "digital twin" models of their patients—a truly "digital and biomedical" version of a patient.

Challenges

We recognize that there are several challenges associated with the wider adoption and application of AI in healthcare systems. These issues include, but are not limited to, data quality and access, technical infrastructure, organizational competence, and ethical and responsible behaviors in addition to aspects related to safety and regulation. Although some of these subjects have been covered, others are outside the scope of this piece.

CONCLUSION

Final thoughts and important suggestions

AI developments could revolutionize several facets of healthcare, opening the door to a more individualized, accurate, predictive, and portable future. It's unknown if new technologies will be adopted gradually or drastically, but given their effect and the digital revolution they offer, health systems must think about how best to adjust to the shifting environment.

AI has the potential to be a crucial instrument for enhancing global health equity. As much as the last ten years have focused on digitizing health records for efficiency (and, in some healthcare systems, billing/reimbursement), the next ten years will focus on the value and insight that society can obtain from these digital assets, how these can be translated into improving clinical outcomes with AI's help, and the ensuing development of new data assets and tools.
In terms of the convergence of technology and medical practice, it is evident that we are at a turning point. While there are many opportunities, there are also significant obstacles that must be overcome with regard to the real world and the scope of such innovation's implementation. Expanding translational research in the area of artificial intelligence applications in healthcare will be crucial to realizing this aim.
Alongside this, we need investment into the upskilling future leaders and the healthcare staff to be digitally capable and to recognize and welcome the promise of an AI-augmented healthcare system rather than be scared of it. When preparing to use AI for health, healthcare executives should at least take these factors into account:
procedures for appropriate and ethical data access: medical data is extremely sensitive, inconsistent, fragmented, and underoptimized.

- access to past information and domain expertise to make sense of and develop some of the rules that must be applied to the datasets (to get the necessary insight)
- With the introduction of cloud computing, access to enough processing capacity to make choices in real time is rapidly changing.
- Research into implementation: In order to develop "trusted" AI algorithms that are integrated into suitable workflows, we must rigorously examine, investigate, and study the problems that arise when you take the algorithm and place it in the real world.

REFERENCES

[1]. Berwick DM, Nolan TW, Whittington J. The Triple Aim: Care, health, and cost. Health Affairs 2008;27:759–69.
[2]. Bodenheimer T, Sinsky C. From triple to quadruple aim: care of the patient requires care of the provider. Ann Fam Med 2014;12: 573–6.
[3]. Feeley D. The Triple Aim or the Quadruple Aim? Four Points to Help Set Your Strategy. Institute for Healthcare Improvement, 2017. www.ihi.org/communities/blogs/the-triple-aim-or-the-quadruple-aim-four-points-to-help-set-your-strategy.
[4]. The Health Foundation, Nuffield Trust, The King's Fund. The health care workforce in England: make or break? The King's Fund, 2018.
[5]. World Health Organization. Working for health and growth: Investing in the health workforce. WHO, 2016. http://apps.who.int/iris/bitstream/10665/250047/1/9789241511308-eng.pdf [Accessed 31 January 2020].
[6]. Satya Nadella announces strategic collaboration with Novartis. You Tube, 2019. www.youtube.com/watch?v=wMfsQE-D2q4
[7]. Lashinsky A. Tim Cook on how Apple champions the environment, education, and health care. Fortune, 2017.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
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[8]. Wiens J, Saria S, Sendak M et al. Do no harm: a roadmap for responsible machine learning for health care. Nat Med 2019;25:1337–40.
[9]. United States Government Accountability Office. Artificial intel- ligence in health care: Benefits and challenges of technologies to augment patient care. GAO, 2020.
[10]. Sendak MP, D'Arcy J, Kashyap S et al. A path for translation of machine learning products into healthcare delivery. EMJ Innov 2020;10:19-00172.
[11]. Quinn TP, Senadeera M, Jacobs S, Coghlan S, Le V. Trust and medical AI: the challenges we face and the expertise needed to overcome them. J Am Med Inform Assoc 2021;28:890–4.
[12]. Binns R, Gallo V. Trade-offs. Information Commissioner's Office, 2019. https://ico.org.uk/about-the-ico/news-and-events/ai-blog- trade-offs
[13]. Mitchell T. Machine learning. McGraw Hill, 1997. www.cs.cmu.edu/ afs/cs.cmu.edu/user/mitchell/ftp/mlbook.html
[14]. Reardon S. Rise of robot radiologists. Nature 2019;576:S54–8.
[15]. Lasko TA, Denny JC, Levy MA. Computational phenotype discovery using unsupervised feature learning over noisy, sparse, and irreg- ular clinical data. PLoS One 2013;8:e66341.
[16]. The Royal Society. Machine learning: the power and promise of computers that learn by example. The Royal Society, 2017.
[17]. LeCun Y, Bengio Y, Hinton G. Deep learning. Nature 2015;521: 436–44.
[18]. Topol EJ. High-performance medicine: the convergence of human and artificial intelligence. Nat Med 2019;25:44–56.
[19]. Kelly CJ, Karthikesalingam A, Suleyman M, Corrado G, King D. Key challenges for delivering clinical impact with artificial intelligence. BMC Medicine 2019;17:195.
[20]. Panch T, Mattie H, Celi LA. The 'inconvenient truth' about AI in healthcare. NPJ Digit Med 2019;2:77.
[21]. NHSX. Artificial intelligence: How to get it right. NHS, 2019.