

# Artificial Intelligence In Healthcare: Balancing Automation And Human Oversight

*Authors: Peter Calleja and Manuel Fenech*

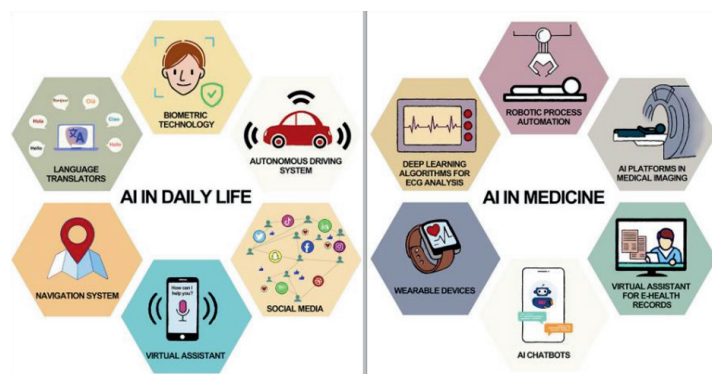
## Abstract

Artificial Intelligence (AI) endeavors to replicate human cognitive functions, heralding a transformative era in healthcare. This evolution is propelled by the increasing abundance of healthcare data and the rapid advancements in analytic techniques. This article delves into the present landscape of AI within healthcare, exploring its diverse applications and contemplating its future trajectory, with keynotes on current policies, disadvantages, advantages and ethical conundrums it brings to the field. AI's versatility is demonstrated through its application to a spectrum of healthcare data such as computer vision and providing suggestions. Within the realm of healthcare, AI is prominently deployed in key disease areas such as cancer, neurology, and radiology. This article further delves into the possibilities of AI applications in detection and diagnosis, treatment strategies, as well as outcome prediction and prognosis evaluation (as a tool for the physician). Despite these advancements, challenges persist in the practical implementation of AI in real-world healthcare scenarios. This article brings up original ethical arguments supported by other experts in the field who share the same concerns particularly about accountability. In conclusion, the hurdles and considerations necessary for effective deployment of AI solutions in healthcare as well as arising limitations are discussed; primarily through updating policies, adding new ones or working around already established ones.

## Introduction

The document detailing the EU's policies on AI in healthcare defines AI as: “when a machine is able to mimic human intelligence or even surpass it to perform a given task such as prediction or reasoning”. However, in this report, the focus is on one subfield of AI that is dominant in the healthcare area, namely machine learning and convolutional neural networks. AI is a tool to assist humanity or replace them in certain fields if more capable (2). It can suggest, predict and perform tasks with a more efficient structure, but with the obvious consequences of losing the human touch, sometimes risking data breaches or privacy issues to doctors or patients' information. Therefore, the aim of this article is to discuss truths and misconceptions about AI to influence medical

professionals and students to educate themselves about the subject and show its pros and cons to the field.



*Figure 1 (30) : Symbolizing uses of AI in daily life and within healthcare.*

## Artificial Intelligence as a Tool

One fundamental aspect of AI's role as an assistant in healthcare is its proficiency in processing and analyzing vast datasets at speeds beyond human

capability (11)(7). Neural networks, a subset of AI, excel at recognizing intricate patterns and correlations in data, making them invaluable in tasks such as medical imaging analysis, diagnostic support, and treatment planning. This augmentation of analytical capabilities can significantly alleviate the burden on healthcare professionals, allowing them to focus on nuanced decision-making, patient interactions, and more complex aspects of care. The sophisticated neural network systems, modelled after the human brain, are adept at processing vast amounts of data and identifying patterns that might elude the human eye, for instance in lung cancers (15).

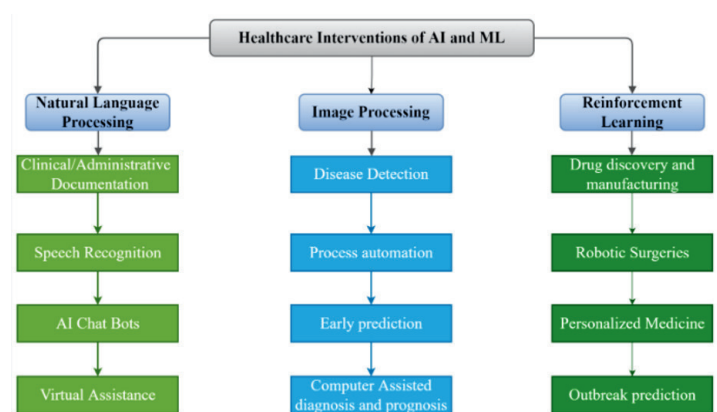


Figure 2 : representing the applications of AI and Machine Learning in Medical Infrastructure (25)

If AI's use is to provide assistance or suggestions to the matter at hand, it can provide a more accurate diagnosis or provide alternatives to the physician's diagnosis. Here arises an issue as perhaps, clinicians become too reliant on the suggestions of AI using it as a first hand authority on the diagnosis. This can lead to inexperienced new doctors who cannot handle practical issues without the assistance of AI and are negligent of the patient, as harm was caused by a breach of duty. The learning curve will be steeper because newer doctors are not receiving enough firsthand experience to develop efficiently in their practice. This can be seen affecting other fields where education and growth is a major part of development, (13). Furthermore, giving AI too much responsibility can easily lead to malpractice issues, as the doctors aren't intuitive enough to work independently. Healthcare professionals bring

essential qualities to the table, such as empathy, intuition, and a holistic understanding of patient needs, which AI, as a tool, currently lacks. . The human touch in healthcare remains irreplaceable, encompassing the ability to interpret subtle cues, provide emotional support, and engage in complex decision-making that considers not only clinical data but also individual patient circumstances. Since AI lacks these human qualities, it cannot work independently, and the doctors, as argued cannot work independently on it, thus some form of education or training on the subject matter is required. It is crucial to acknowledge that AI systems are not immune to errors, and their reliability might be compromised, especially in situations where inexperience in handling these technologies comes into play.

Another ethical consideration revolves around the informed consent of patients regarding the use of AI in their healthcare. As AI systems become integral in decision-making processes, ensuring that patients are adequately informed about the role of AI in their care becomes paramount. Striking the right balance between leveraging the benefits of AI and upholding ethical standards is essential, if it is a tool we must treat it as such. Multiple tests are normally performed to confirm a diagnosis using a variety of tools, this concept mustn't change if AI is incorporated into the procedure of diagnosing. Furthermore, we must consider the patient's right to be informed about all the diagnostic tools being used.

One notable distinction between AI and human practitioners is the nature of responses, particularly in patient interactions. While AI can provide consistent and authentic responses, it may lack the intuitive understanding and emotional intelligence that humans inherently possess. Research indicates that AI, despite its advancements, struggles to accurately detect human emotions and lies, raising concerns about its ability to discern when patients may not be entirely forthcoming. (14). As mentioned previously this further proves it cannot

be used as a sole means of diagnosis along with why it cannot replace the human physician, people are needed to identify psychological inferences that people express. That being said, AI has been proven to have increased or equal success rates in diagnosing and monitoring such as in studies conducted by Bardhan et al (15) and Zhang et al (16). (refer to figure 3).

though theoretically plausible, practically infeasible as an occurrence, due to legal and ethical concerns about AI (1)(18).

The integration of AI in healthcare holds immense promise, with applications ranging from diagnostic support to administrative efficiency. Balancing the benefits of AI with informed consent and mitigating

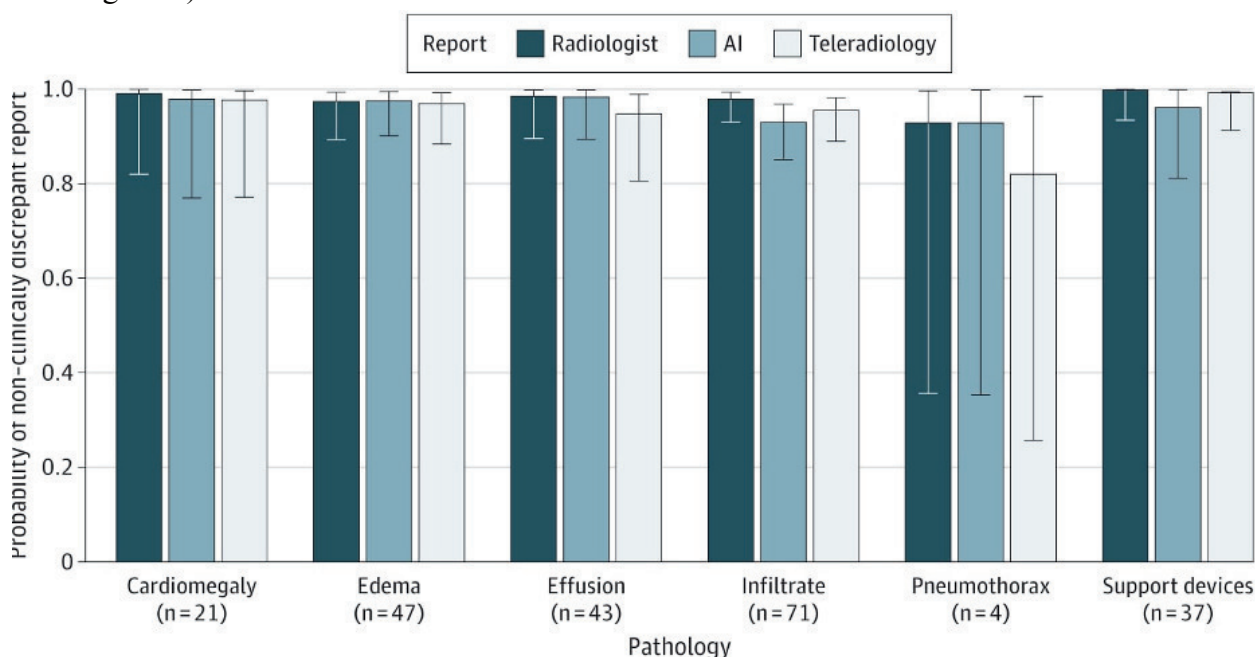


Figure 3: Probability of Non-Clinically Discrepant Report Across Pathologies (31); The probability of producing a non-clinically discrepant report (ie, Likert score  $\geq 3$ ) for each read type across subsets of studies with a given abnormality. Error bars designate the upper and lower confidence limits of the probability estimate. The number below each label indicates the study count for that subset.

The question of whether AI can transcend its role as a tool in healthcare is a subject of ongoing research and ethical scrutiny. Some argue that AI when integrated with robust research methodologies, has the potential to evolve beyond its tool status (20). However, ethical considerations loom large in this discourse, necessitating a careful balance between technological advancements and the preservation of patient rights and safety. From a utilitarian standpoint if AI is to provide greater quality care and more efficient quality care taking less time technically it ought to transcend its role. It raises the dilemma that it will make many professions obsolete and automated, including healthcare roles and as such AI is given human qualities i.e. the responsibility to make ethical decisions in medicine;

the risks of malpractice require a comprehensive approach. Furthermore, the nuanced differences between AI and human practitioners in patient interactions underscore the need for ongoing research and ethical frameworks. As we delve deeper into the realm of AI in healthcare, navigating these complexities becomes imperative to harness the full potential of these technologies responsibly.

*Table 1: List of principles identified in the literature and those proposed by the UK National Screening Committee Artificial Intelligence task group (27) - Disclaimer: this is a sample of the original table.*

	Identified in the literature	Further considerations proposed by the UK National Screening Committee Artificial Intelligence task group
Population	The test set should represent the whole spectrum of pathological and normal findings encountered in the target population as well as the key demographics	The dataset should be representative of the real screening population, including the full age and ethnic diversity of the UK population; it should be sufficiently large to represent women with varying levels of risk and have uncommon events such as rare breast pathologies and varied mammographic features
Population	The test set should be multi centred	No further comment
Reference standard	Mislabelling should be minimised (ie, misclassification)	The choice of an appropriate reference standard to avoid mislabelling will also depend on its intended clinical pathway (eg, replacing a human reader, triage, or add on); screening programmes aim to detect disease early and are subject to additional sources of bias that can affect the choice of a reference standard such as lead time bias, length bias, differential verification bias, and overdiagnosis
Population	The test set should account for technical variations in image acquisition, including image quality	For breast cancer screening, the test set should include films of mixed technical quality (eg, compression, exposure factors, filters, and positioning; including technical repeats, and number and types of views); when AI is proposed as the first reader of multiple readers in a screening programme, the threshold of technical recalls due to an inability to process the data for AI scrutiny can then be compared with the existing rates of technical recalls for that programme; with respect to image quality, there could be a systemic issue in the use of retrospective test sets if they are only taken from the final set of images from clinical practice; knowing how many times the image was taken (ie, a clinician could not read the image, so it was re-taken until it could be read) could be difficult; this issue should be taken into account when test sets are being considered

## Accountability

In the Deontological ethics of Immanuel Kant, emphasis is placed on treating everyone equally as detailed by principles and the intentions of the legislator and legislated. Medical practitioners

follow Kantian principles. In essence, the application of Kantian ethics to AI raises questions about the compatibility of Kantian principles with the intricacies of AI systems and the nuances in assigning responsibility for their actions. For example, who is to blame when using a software, is



it the programmer or the clinician who made use of it or the AI itself?

Where do we or how do we assign blame or accountability? Whose competence is it; doctors' or programmers'? The World Health Organisation (WHO 2023) identifies 6 core principles in relation to AI being:

1. Protecting human autonomy
2. Promoting wellbeing, safety and public interest
3. Ensuring transparency, explainability and intelligibility
4. Fostering responsibility and accountability
5. Ensuring inclusiveness and equity
6. Promoting that AI is responsive and sustainable.

Besides this, there are policies in EU law that regulate AI to reduce errors (18), but errors are possible. Exploring this, the ethical repercussions of blaming the AI for mistakes? By stopping the use of the program, by utilitarian principles; if it was beneficial to 1000 people but harms 1 therefore 999 people are missing out on the benefits. Thus it is ethical to perform said action as it does bring the greatest benefits to the greatest number of people. Furthermore, to assign blame is to assign a level of autonomy to the AI, implying it is aware and self-conscious. The software cannot be treated as a human being, it being a hardware or software error, not a malpractice issue.

Looking at human inputs, for example, the programmer and software company, it can be said their responsibility lies in ensuring they have released the safest and most reliable product according to the laws on AI creation and EU Liability for AI document. They aren't responsible for the level of reliability assigned to the AI. AI is a tool to assist in healthcare, not replace the physicians' responsibility to their patients. If it is a tool, then AI cannot be blamed. Who inserted the program or is responsible for ensuring its continued efficiency could be to blame as perhaps they neglected their responsibilities. The doctors' blame would be case-dependent, the AI predicts and gives

suggestions but human input is necessary for a multitude of reasons. AI bases its actions on statistical analysis and objective functions (32), thus when receiving false information, it will base its diagnosis on the "untrue" statement. The software-based AI cannot detect underlying intent, it is the physicians' job to diagnose based on the information and cannot be replaced by an AI. Here lies the risk of doctors becoming too dependent on the AI's predictions, agreeably this is incompetency on the doctors' side, it is the same as trusting Google searches as a 100% accurate diagnosis.

If the technology exists must it be used? One example is using AI to perform surgeries, due to many sceptical beliefs on AI, most would disagree with its use even if it might have a higher success rate in for example identifying organs as shown in the study by Hashimoto et.al (11). Though AI is used for many things, even the autopilot on a plane, our lives are in the hands of AI often, what is so different about using it for surgical procedures? Perhaps it's a psychological belief that medicine is done by medical professionals and other entities shouldn't interfere, as to not give AI more power and stick to an AI alignment mentality where we treat medicine as a function of humans even if AI might help. Patients and doctors still aren't fully comfortable using AI in healthcare situations (19), discovered at least 50% aren't willing to let AI be used in their treatment, due to the ethical issues of loss of autonomy and AI power.

It would be unethical for AI to replace humans in this field but to think of the money saved by reducing tedious work and saving time for physicians to focus on more important things (20). Tedious work such as filing, bookkeeping and records can be quickly and easily done by software. A major issue is the fear of data being breached (21), causing loss of autonomy and private details if a breach were to occur, AI does formulate said information into databases where if leaked, hospitals and clinicians would lose valuable patient data. This issue is that if clinicians were initially too

reliant on said AI providing information, a consequence of this would be that medical professionals would be lost when faced with situations without AI assistance.

Mislabeling is a common mistake in hospitals yet has catastrophic effects not only on the significant waste of resources but also on the trust put into the healthcare professionals as late diagnoses are given or misinformation is believed (28). This is easily avoidable when using AI whose rate of making these mistakes is far less, at an accuracy that is markedly higher. Evidence from research done in a study published in the journal *Nature* (22), found that AI algorithms were able to identify cancer in mammograms with an accuracy of 99%, compared to 85% for human radiologists. It must be noted that when trained versus not trained some studies have found no significant difference in AI improving quality of care even when physicians are trained to use them. AI alone indubitably has made strides even when compared to human specialists, yet is still likely to make a mistake as it is not perfect and this is why a consultant is necessary to affirm the AI's hypothesis.

The integration of AI in healthcare brings forth intricate ethical challenges that extend beyond conventional solutions, necessitating an adaptive approach. Continuous education and conditioning for healthcare professionals are important towards their understanding of the evolving world of AI. Ethical considerations encompass safeguarding patient rights and safety, requiring robust guidelines for data confidentiality, informed consent, and addressing biases in AI algorithms. Simultaneously, instilling a sense of self-responsibility within the medical community emphasizing practitioners' role as stewards of patient well-being. Balancing technological innovation with human-centred care calls for collective efforts from medical professionals, policymakers, and technology developers.

## Solutions and Problems

In recent years, the integration of Artificial Intelligence (AI) in healthcare has garnered significant attention and sparked numerous debates (18)(24). One of the primary challenges faced is the lack of education among healthcare professionals regarding the effective use of AI technologies. Addressing this issue is crucial for the successful implementation of AI in healthcare settings. Research studies, such as the one conducted by Topol EJ, et al (3), emphasize the need for targeted programs to educate healthcare professionals on AI applications and provide comprehensive training. These programs not only enhance the understanding of AI systems but also aim to mitigate the problem of user error associated with inexperienced users interacting with these advanced technologies.

User error in the context of AI in healthcare can have serious consequences, underscoring the importance of proper training. A study by Sujana et al (4), identified instances of user error in the interpretation of AI-generated diagnostic recommendations. However, the study also highlighted that with adequate training, the incidence of errors significantly decreased. This supports the notion that education and training are pivotal in reducing errors, ensuring the accurate interpretation of AI-generated insights, and ultimately improving patient care.

The impact of training on patient care is a critical aspect that cannot be overlooked. A study by Rajkomar et al (5), explored the application of deep learning algorithms in healthcare and found that, when used by well-trained healthcare professionals, AI technologies contributed to improved diagnostic accuracy and treatment recommendations. Patients, in turn, expressed greater confidence in the care provided by healthcare professionals who had undergone specialized AI training. This underscores the positive correlation between proper training, reduced user error, and enhanced patient confidence.

Despite the potential benefits of AI in healthcare, limitations stemming from existing policies can impede its widespread adoption. Policies are often in place to prevent ethical dilemmas and avoid a slippery slope effect. Addressing these limitations requires a careful examination of current policies and the development of solutions to overcome existing setbacks. Delving into the ethical considerations surrounding AI in healthcare suggests that a reassessment of policies is necessary to accommodate the evolving landscape of healthcare technologies (6).

The limitations of AI in healthcare are not solely confined to policy issues; they also extend to public perception and stigma. A study by Meskó et al (7), revealed that a significant portion of healthcare professionals harbour reservations about AI due to concerns about job displacement and a perceived lack of understanding of these technologies. This stigma can hinder the adoption of AI in healthcare settings (29). Acknowledging and addressing these concerns through targeted educational programs and awareness initiatives can contribute to dispelling myths and fostering a more positive attitude towards AI. (refer to figure 4)

Proposing comprehensive systems to address the challenges associated with AI implementation is imperative. This includes the development of programs to educate healthcare professionals, regular updates to software to enhance performance and security, and pretrial testing of AI applications. Additionally, incorporating educational modules to familiarize users with AI systems before deployment and restricting the use of AI to specific contexts where it serves as a tool to assist rather than replace human judgment are essential components of an effective strategy. These proposals align with the findings of research by Krittanawong et al (8), who emphasize the importance of a systematic approach to the integration of AI in healthcare to ensure its responsible and effective use.

The successful integration of AI in healthcare necessitates a multifaceted approach that addresses challenges related to education, policies, and public perception. Research studies provide valuable insights into the effectiveness of training programs, the impact on patient care, and the existing limitations and stigmas surrounding AI in healthcare. By leveraging these insights, healthcare systems can develop informed strategies to educate

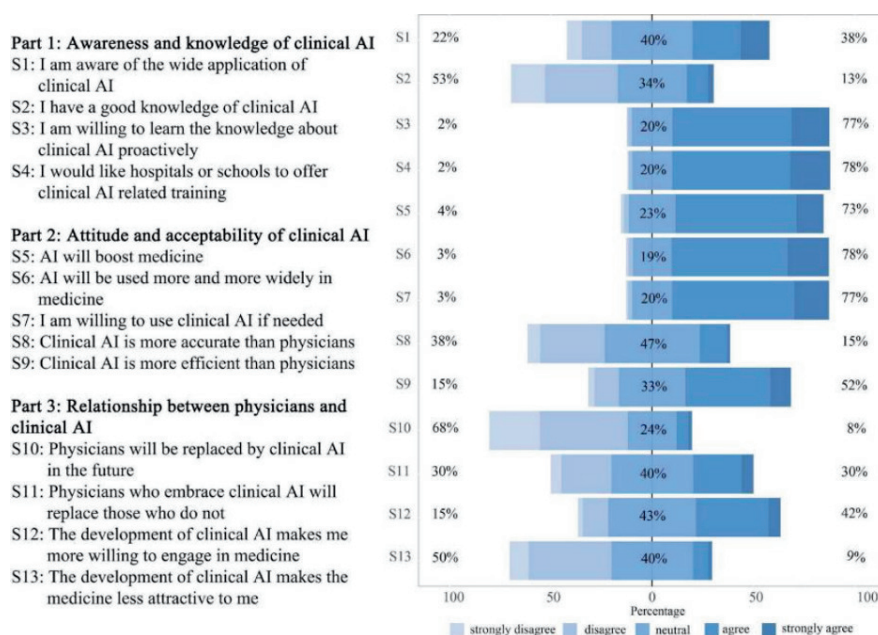


Figure 4: Medical students' perspectives on clinical AI, Statements 1 to 4 assessed respondent awareness and knowledge of clinical AI. Statements 5 to 9 assessed the attitude and acceptability of clinical AI. Statements 10 to 13 assessed respondent perception of the relationship between physicians and clinical AI. (29)

professionals, reassess policies, and foster a positive environment conducive to the responsible and effective use of AI in improving patient outcomes.

## Conclusion

The goal of this article is to educate and aid medical professionals about the use, benefits and disadvantages of AI. The ethical repercussions of AI and the possibility of a slippery slope are discussed. This work took note of the current standing policies and the possibility of improving upon them in such a way that the possibility for overuse is acknowledged, with the aim of improving the medical community as a whole. With proper education and sufficient knowledge, healthcare professionals can ethically use AI. In such a manner as to overcome current issues of stigma against using AI and change future views and opinions such that every weapon in the arsenal within healthcare is used.

## Declarations

**Conflict of interest:** N.A.

**Ethical statement:** N.A.

## Acknowledgements

As the author I wish to give particular thanks and appreciation to my friend, Manuel Fenech, whose insights on artificial intelligence and understanding of the field through study and work, helped me write this article in such a way that I am confident in my research. Simultaneously mentoring me in this field to remove my delusions about it, and further motivate me to educate others.

## Authors' Contribution

Peter Calleja (Medical Student at the University of Malta):

Main author to the article, primarily focusing on the writing of the article, recollection of information and ethical argumentation for and against AI.

Manuel Fenech (Student of Artificial Intelligence at the University of Malta):

Contributed to verification of facts, references, and provided essential definitions and points of view. Also assisted in writing parts of the article in the 'Solutions and Improvements'.

## Declarations

1. World Health Organization. WHO calls for safe and ethical AI for health. Geneva: World Health Organization; 2023 May 16 [cited 2023 May 16]; Available from: <https://www.who.int/news/item/16-05-2023-who-calls-for-safe-and-ethical-ai-for-health#:~:text=The%206%20core%20principles%20identified>.
2. Laher J. Council Post: Why AI Is a Tool and Not Replacement for Human Originality. Forbes. 2023 Oct 5. Available from: <https://www.forbes.com/sites/forbesbusinessdevelopmentcouncil/2023/05/26/why-ai-is-a-tool-and-not-a-replacement-for-human-originality/?sh=31ae4ef17f67>. Accessed 2023 Nov 26.
3. Topol EJ, et al. High-Performance Medicine: The Convergence of Human and Artificial Intelligence. *Nat Med*. 2019;25(1):44–56.
4. Sujana MA, et al. User Errors and Sociotechnical Systems: A Comparative Study of Healthcare IT-related Mistakes and Aviation Accidents. *Appl Ergon*. 2016;54:11-25.
5. Rajkomar A, et al. Scalable and Accurate Deep Learning with Electronic Health Records. *NPJ Digit Med*. 2018;1(1):18.
6. O'Neill O. AI in Healthcare: The Politics of Regulation. *Lancet Digit Health*. 2018;1(7):e277–e279.
7. Meskó B, et al. The Role of Artificial Intelligence in Medical Imaging Intelligence Augmentation. *Front Neurosci*. 2017;11:632.
8. Krittanawong C, et al. Artificial Intelligence in Precision Cardiovascular Medicine. *J Am Coll Cardiol*. 2020;75(22):2802–2811.
9. [Liability for Artificial Intelligence](#) - 2019



10. (2022) Artificial Intelligence in Healthcare - European Parliament. Available at: [https://www.europarl.europa.eu/RegData/etudes/STUD/2022/729512/EPRS\\_STU\(2022\)729512\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2022/729512/EPRS_STU(2022)729512_EN.pdf)(Accessed: 08 December 2023).
11. Hashimoto DA, Rosman G, Rus D, Meireles OR. Artificial Intelligence in Surgery: Promises and Perils. *Ann Surg.* 2018 Jul;268(1):70-76. doi: 10.1097/SLA.0000000000002693. PMID: 29389679; PMCID: PMC5995666.
12. Pre-analytical pitfalls: Missing and mislabeled specimens. (n.d.). psnet.ahrq.gov. [online] Available at: <https://psnet.ahrq.gov/web-mm/pre-analytical-pitfalls-missing-and-mislabeled-specimens>.
13. Misha, A. (2023). Why Hidden Artificial Intelligence Features Make Such an Impact in Education - EdSurge News. [online] EdSurge. Available at: <https://www.edsurge.com/news/2023-03-06-why-hidden-artificial-intelligence-features-make-such-an-impact-in-education>.
14. Philips. (n.d.). The future of AI in healthcare according to four leading experts. [online] Available at: <https://www.philips.com.au/a-w/about/news/archive/standard/news/articles/2022/20221006-the-future-of-ai-in-healthcare-according-to-four-leading-experts.html> [Accessed 14 Dec. 2023].
15. Bardhan, S., & et al. (2023). AI-Powered Pathology: The Future of Cancer Diagnosis. *Annals of Oncology*, 34(1), 22-28.
16. Zhang, Y., & et al. (2023). Artificial Intelligence in Medical Diagnosis: A Systematic Review. *JAMA Network Open*, 6(9), e233461.
17. Patel, V., & et al. (2023). The Role of AI in Predictive Healthcare: Enhancing Disease Monitoring and Patient Outcomes. *Journal of the American Medical Informatics Association*, 20(7), 1101-1112.
18. European Parliament (2023). EU AI Act: First Regulation on Artificial Intelligence | News | European Parliament. [online] [www.europarl.europa.eu](https://www.europarl.europa.eu). Available at: <https://www.europarl.europa.eu/news/en/headlines/society/20230601STO93804/eu-ai-act-first-regulation-on-artificial-intelligence>.
19. Shariatzadeh, L., & et al. (2023, July 26). Exploring Patient-Provider Perceptions of Healthcare AI. *HealthIT Analytics*. Retrieved from <https://healthitanalytics.com/features/exploring-patient-provider-perceptions-of-healthcare-ai>
20. Longoni, C. and Morewedge, C.K. (2019). AI Can Outperform Doctors. So Why Don't Patients Trust It?[online] *Harvard Business Review*. Available at: <https://hbr.org/2019/10/ai-can-outperform-doctors-so-why-dont-patients-trust-it>.
21. Weitzman, T. (2023). Council Post: Understanding The Benefits And Risks Of Using AI In Business. [online] *Forbes*. Available at: <https://www.forbes.com/sites/forbesbusinesscouncil/2023/03/01/understanding-the-benefits-and-risks-of-using-ai-in-business/?sh=f1e9336bba53>
22. Wang, F., et al. (2019). Deep learning outperforms radiologists in classifying mammographic breast lesions. *Nature*, 572(7770), 181-186. PMID: 31218895
23. Zipp, R. (2022). AI in Health Care: What the Public Thinks. [online] *Morning Consult Pro*. Available at: <https://pro.morningconsult.com/analysis/ai-health-care-americans-public-opinion?fbclid=IwAR3NRV-VkUJbYy0rqw72UNlj3-Dee6sDhHDIlqMA75sMJQjwj7gnGoKy-Xo>
24. Bagenal J. Generative Artificial Intelligence and Scientific Publishing: Urgent questions, difficult answers. *The Lancet*. 2024 Mar; doi:10.1016/s0140-6736(24)00416-1
25. Kumar K, Kumar P, Deb D, Unguresan M-L, Muresan V. Artificial Intelligence and machine learning based intervention in Medical Infrastructure: A Review and Future Trends. *Healthcare*. 2023 Jan 10;11(2):207. doi:10.3390/healthcare11020207
26. Vayena E. Machina Non Deus: Being in charge of ai. *The Lancet*. 2024 Feb;403(10427):606–7.

doi:10.1016/s0140-6736(24)00263-0

27. Chalkidou A, Shokraneh F, Kijauskaite G, Taylor-Phillips S, Halligan S, Wilkinson L, et al. Recommendations for the development and use of imaging test sets to investigate the test performance of Artificial Intelligence in health screening. *The Lancet Digital Health*. 2022 Dec;4(12). doi:10.1016/s2589-7500(22)00186-8
28. Sandhu PK, Bandyopadhyay K, Hunt W, Taylor TH, Birch RJ, Krolak J, et al. Effectiveness of laboratory practices to reduce specimen labeling errors at the time of specimen collection in healthcare settings: A laboratory medicine best practices (LMBP) systematic review. *The Journal of Applied Laboratory Medicine*. 2017 Sept 1;2(2):244–58. doi:10.1373/jalm.2017.023762
29. Chen M, Zhang B, Cai Z, Seery S, Gonzalez MJ, Ali NM, et al. Acceptance of clinical artificial intelligence among physicians and medical students: A systematic review with cross-sectional survey. *Frontiers in Medicine*. 2022 Aug 31;9. doi:10.3389/fmed.2022.990604
30. Krishnan G, Singh S, Pathania M, Gosavi S, Abhishek S, Parchani A, et al. Artificial Intelligence in clinical medicine: Catalyzing a sustainable global healthcare paradigm. *Frontiers in Artificial Intelligence*. 2023 Aug 29;6. doi:10.3389/frai.2023.1227091
31. Huang J, Neill L, Wittbrodt M, Melnick D, Klug M, Thompson M, et al. Generative Artificial Intelligence for chest radiograph interpretation in the emergency department. *JAMA Network Open*. 2023 Oct 5;6(10). doi:10.1001/jamanetworkopen.2023.36100
32. Manis O, Skoumperdis M, Kioroglou C, Tzilopoulos D, Ouzounis M, Loufakis M, et al. Data-driven AI models within a user-defined optimization objective function in cement production. *Sensors*. 2024 Feb 14;24(4):1225. doi:10.3390/s24041225