Bioethical Considerations of Artificial Intelligence in Healthcare Management

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Abstract: *Artificial intelligence (AI) is leading breakthroughs in various sectors of the world. The healthcare sector has also left no stone unturned in incorporating AI to intensify the healthcare delivery systems. Perennial innovations have brought healthcare to the wristbands of people while awakening the concerns regarding social, ethical and moral issues in the society because of variability in the information accessibility and protocols for the usage of AI at a global level. This commentary explores the ethical, legal, and moral implications of integrating AI into healthcare, particularly in dental practice. It discusses the potential benefits and challenges of AI/Black-boxes in healthcare delivery and patient care management, with a focus on data security, reliability, and accountability of AI-based decision tools. The article also suggests measures for refining AI implementation in healthcare.*

Keywords: Artificial Intelligence, Ethics, Healthcare Delivery, Black-boxes, Data Security, Reliability, Accountability

1. Introduction

Technology & digitization are bridging the realms of science-fiction and reality and has profoundly ramified the health care sector. Artificial intelligence (AI) is leading breakthroughs in various sectors of the world. The diversification in data science developing day by day is capable of solutions to almost all our questions whilst making us more contingent on AI than on humans. [1, 2] Researchers are training AI systems efficiently in the automated detection of diseases. [3] Perennial innovations have brought healthcare to the wristbands of people and are leading breakthroughs in various sectors of the world. AI is a man-made technology developed to fulfill and satisfy human needs in an accessible & faster way and extensively relies on digital data. While many are eager about the potential employment of AI, others point to the pragmatic difficulties. [4]

In an AI-based setup, the issue starts from the conception of reliably transcribing digital data or clinical records with interoperability and standardization, advanced record keeping, and information labelling. It also raises concerns about its transparency towards usage guidelines and privacy.[5] The second concern in this clinical setup is AI-based decision making for diagnosis & treatment planning which further broadens the ethical issues regarding reliability of AI-prediction and accountability of the treatment provided.[6] AI mimics human-intelligence well.[7] However, is this algorithm-based system well versed in our emotional quotient and socio-cultural values? Do they consider our legal, ethical and moral rights, our data privacy or are tacitly monitoring people with or without their choice? Can we trust them? Or they will still be considered as just "Black-boxes".[8] This variability in the accessibility and nature of information confines the capability of AI and raises many social, legal, and ethical issues for its implementation. [9]

The purpose of this article is to explore the ethical, legal, and moral implications of integrating AI-based tools into healthcare, with a focus on dental practice in terms of data security, reliability and accountability. The article also aims to suggest measures for refining AI implementation in healthcare.

Data security in AI-based healthcare system -
The availability of high and low-risk chatbots, Electronic medical records (EMRs) and data digitization provide benefits for analysing the data across dentists and technicians in a quick, accurate way. Various smile designing and orthodontic software, require uploading patients' photograph to devise a better treatment plan. Some software even facilitates patients to scan their teeth with phones and other simple tools.[4] Improved data access encourage patients to a healthy lifestyle, enhance cooperation, assist in precise diagnosis and boost the quality and safety of care to patients.[10] AI assists clinician render high-quality patient care with simplified protocols to provide an anticipated outcome. It helps in image enhancement and its interpretation. Deep learning networks (eg.GoogleLeNet Inception) are predictable to diagnose dental caries with dental radiology hence assisting clinicians in making a better diagnosis. [4,11]

Software utilizing computer vision helps predict treatment outcomes for few procedures like partial and full coverage restorations. Integrated software of 3D tomographic scans also helps in annotation and segmentation with other potential benefits and algorithmic pathological identification.[4] Other AI-based applications include intraoral scanning system, which is changing the world of digital dentistry with high precision accuracy, improved communication and patient motivation.[6,12]

AI technology also helps gathering a large amount of precise data from a population to derive and analyse risk prediction models for various diseases.[13] However, this data could be considered potentially sensitive and private whilst highlighting the concept of data privacy & security in the AI domain.[6,14,15] Hence, It is the moral & ethical duty of both the care provider and the receiver to analyze all the

possible outcomes that can safeguard them from ethical & legal mishaps. Both the parties should always focus on how the AI will assess the data, third party involvements, data security through encryption, and other tools imperative for safeguarding the data. [14,15]

Reliability & Accountability of AI-based decision tool –
The chief concern for the usage of any groundbreaking innovation is its reliability and safety in action. AI in dentistry could assist in controlling hardware, diagnose dental caries or other diseases, devise a treatment plan and predict its prognosis. Sometimes it is beyond the scope of patients and physicians to interpret the logic by which AI will determine the solution to their questions,[16] which creates doubts and makes them less reliable to the so-called black boxes. [4, 8, 9]

To avoid the violation of patients right regarding information and choice, The European Union (EU) in May 2018 implemented an updated General Data Protection Regulation (GDPR),[17] which is concerned with the legislation of data protection and cyber security. As GDPR widened its scope of data rights, it acts as an effective tool to control AI misusage. Besides GDPR, the EU has also implemented the Cyber security Directive, which mandate several requirements for EU member states to intercept and control cyber attacks identity thefts and curb their consequences. [17]

Besides data protection and cyber security, another big ethical concern is the "Accountability". Who will be responsible if AI commits a mistake? AI is quick and accurate; the decisions are algorithm-based and may be contingent to error.[18]

The Health Insurance Portability and Accountability Act (HIPAA) followed in the United States is a compliance focus for health information issues. This act delineates rules requiring the formulation of policies and setup of training systems for those having access to sensitive data. Moreover, it does not impede the acts of individual states where it further preserves the right of an individual to privacy.[19] However, The primary concern is "to avoid the mistake" rather than proving an AI or a human being accountable. Variation of rules in diverse federal systems instigates unsettled questions, especially in the globalized AI sectors where a model may be trained on data from one nation but marketed in another continent altogether.[14,20] There is a strong need for a global framework to work on international agreements for its safe usage.[21]

Measures to implement -

Machine learning requires a large amount of data to work better. The diverse amount of data collected from medical and insurance records, pharmaceutical and other tools, it is easier to trace the patient or people concerned (intentionally or unintentionally) and defeat the goals of privacy.[20,21,22] These systems can also incorporate and propagate biases from the datasets used to train them, affecting the patient-clinician relationship.[23] Hence, it is the need of an hour to consider bioethics at a global level for the usage of AI in the healthcare system.

Close monitoring is necessary during data processing and decision making with transparency by which AI will predict the result. [21, 23] Emphasis on informed consent regarding data usage, encryption and other AI-assisted functions for lawful processing can reliably provide quality care if persistent efforts are made to update the tools and datasets incorporated for correct decision making and optimizing care. AI systems can consider every potential data that may be missed-out by humans. It cannot replace clinicians but assists them with several tasks that can reduce the cognitive burden and enhance decision making.[22]

AI eventually reduces the manual workforce with predictable integrated software and hardware assistance. Improvement and up-gradation are still required as AI-based dentistry lags behind medicine for several years.[23] Concerns about data curation, sharing, processing and validation are still in question.[15, 24]

If incorporated properly with professional rules, AI can give promising results in the future of healthcare. There is a difference between "data analysis" and "decision making" where the latter should be mostly evidence-based with high-quality research data and meta-analysis, guidelines from federal and medical societies, integrated with empathy towards patients' preferences, values and clinical expertise while making it a trusted tool for both patients and clinicians.

2. Conclusion

AI-based tools offer numerous opportunities for improving healthcare from both patients and clinicians'perspectives. However, proper measures are essential at both clinical and federal levels to ensure safe and effective deployment of AI based systems while maintaining accuracy and reliability in healthcare delivery, and avoid potential risks and harms.

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