Individuals Analysis and Critical Reflection on the Use of Digital Technologies in Healthcare

Introduction

Digital technologies have the potential to totally change the medical industry, including radiology and by introducing them to the medical industry, this progress could be accomplished (Buck, Hennrich, and Lina Kauffmann, 2021). The majority of processes are becoming automated now a days, which benefits the healthcare industry in a variety of ways, including increasing patient access to care to overall service efficiency (Buck, Hennrich, and Lina Kauffmann, 2021). However, there is still much room for improvement. This can assist hospitals in reducing the overall workload of jobs that are simple to automate so that healthcare personnel can concentrate on duties that require a lot of attention. However, in order to successfully utilise digital technology in healthcare, a few issues must first be resolved. Before utilising AI technologies, it is important to rigorously assess the challenges that fall under ethical, governmental, and regulatory considerations.

To define ethics in the context of digital technology, the technologies implemented in any industry are taking into account that no one or any community receives an unfair advantage from technology, that no one is harmed directly or indirectly, and that there is no potential for bias against any particular ethnicity, gender, or religion (CS5705 Week 5 Teaching Materials, 2022). To employ AI in a transparent, responsible, and fair manner, policies, processes, and protocols must be developed and put into place. This process is known as governance. The creation of frameworks and decision-making procedures may also be a part of it. Regulation is the process of using laws and regulations to govern the creation, implementation, and use of AI which can entail establishing regulatory agencies to supervise the development and use of AI, developing legal frameworks to control its usage, and enacting sanctions for breaking rules. It is their duty to ensure that individuals or organizations uphold moral standards, encourage transparency, and defend the rights of individuals or society.

The primary goal of the article is to critically analyse and assess the variety of ethical and governance issues that could develop when deploying digital technology, particularly in the healthcare sector.

Literature review

Artificial intelligence (AI) will provide digital technologies the strength through which the radiology sector may completely transform from how it currently operates. The medical needs of the expanding population can be met with the aid of these technologies. One obstacle to effectively treating depression in China, according to Yan & Xu (2021), is a lack of qualified healthcare professionals. Despite the projected 54 million individuals suffering from depression in 2015, there were only 27,733 licenced psychiatrists and 900,000 psychotherapists in the nation in 2017, considerably below the minimal threshold. The majority of the healthcare sector needed to be digitalized as a result. However, the use of AI in healthcare can create several ethical and governance concerns that must be addressed.

While implementing AI in several sectors of the healthcare industry, a number of ethical difficulties have been discovered. One of the biggest obstacles to using digital technology is resistance from stakeholders like as doctors, hospital administration, and patients. Buck, Hennrich, and Lina Kauffmann (2021) conducted medical imaging professionals' interviews. According to the findings, the respondents indicated four AI application opportunities: enhanced diagnostic accuracy, quicker processes, objective decision assistance, and burden reduction. They did, however, express five ethical and governance concerns: loss of control, more work, job loss, loss of autonomy, and unclear responsibilities. These issues make more difficult for stakeholders to accept AI. The worries include the danger of too relying on AI programmes and failing to recognise their errors, which can have severe repercussions for patient safety. Medical imaging experts may also be worried about the extra work needed to verify the conclusions reached by AI applications as well as the possible financial investment required to apply these technologies (Buck, Hennrich, and Lina Kaufmann, 2021).

Additionally, a substantial amount of data, including information on various ethnicities, faiths, castes, and other demographic characteristics that may influence final conclusions, is required to increase the accuracy of AI decisions. Also, there is a potential of receiving inaccurate data. Based on that, if the model is trained on the erroneous data set, it may also produce inaccurate predictions (Caruana et al., 2015).

However, gathering this much data can lead to moral issues including privacy issues, fear about having sensitive personal information used against them, and a lack of confidence in computers compared to human decision-making due to the tacit knowledge that people possess (Yan & Xu, 2021). Yan & Xu (2021) found that the degree of sensitivity was negatively correlated with the willingness to share data. They did add, though, that the logic of the privacy calculus hypothesis holds that people only divulge their personal information when they think doing so will be favourable. Additionally, the boundary of information sharing is determined by two variables: trust and anticipated advantages. Consequently, anthropomorphic AI

development and other contributing factors may encourage consumers to disclose their personal health information (Yan & Xu, 2021).

Suttaket et al., 2021 states a similar concern, that deep technologies (a subset of AI) are unable to analyse electronic health records (EHR) as effectively as they do in other areas. Therefore, it become important to implement explainability and accuracy. However, they suggest a new model called RLR (Rational Logistic Regression) that combines weighted finite state automata with logistic regression to predict clinical events from EHR data and discover comprehensible patterns. Because RLR links characteristics into logical sequential patterns, it may be easier to comprehend than other techniques.

Furthermore, the presence of already informative features, limited data size, and variable time scales are three aspects of EHR (Electronic Health Record) data that may explain why deep learning (technology) has not been as effective in the healthcare business as it has in other areas. Even if deep learning is effective on EHR data, it may be difficult to implement in clinical settings where judgements need to be transparent due to its "black-box" nature. Therefore, RLR might resolve the issue of transparency of algorithms.

Similarly, it's important to foster trust among medical professionals as well. Rey, Bouaynaya, et al. (2022) claimed that the efforts made were less impressive than they ought to be. The study also investigated the resistance to implementing AI techniques in medical settings. According to the investigation, healthcare workers' trust in AI is influenced by both emotional and cognitive trust. Peer review, absorption of AI, and expectations for a medical procedure were factors influencing cognitive trust, whereas character qualities, social imagination, and the representation of AI in science fiction were factors influencing emotional trust. The study does, however, have several drawbacks, such as the possibility of bias in the findings because of the few and mostly pharmacist-focused interviews. Building trust among medical professionals would thus inevitably lead to ethical and governance issues when deploying AI in the healthcare business.

Sun & Wang (2021) investigated the effect of a telehealth strategy on the gaps in healthcare access between rural and urban locations in order to link all people with healthcare through technology. The studies found that the rise of telehealth disproportionately benefited urban patients more than rural patients, with rural patients having far lower rates of telehealth visits and greater rates of infections because of their reliance on office visits. Adoption of digital technology in telehealth has been hampered by a number of governance issues, including social variables like geography, age, gender, and travel time. that their findings will increase awareness of the issue and encourage policymakers to take further actions to increase rural patients' access to telehealth (Sun & Wang, 2021).

Additionally, using digital technology to encourage guided self-regulation in behaviour might be a helpful tool in limiting the spread of viruses like Covid-19 (pandemic). Sweeney, Jeffrey, and Vervest (2021) talked about a framework and identified functional properties to aid this process. They also talked about challenges and opportunities for additional research and development in this field, such as the

need to accurately measure epidemiological risk information in real-time, develop private and secure methods to integrate various sources of individual epidemiological risk information, and develop automated features based on transmissible traits (Sweeney, Jeffrey and Vervest, 2021). However, difficulties with ethics and governance, such as control, responsibility, transparency, and respect for privacy, may come up.

Similar issues with mobile health (mHealth) were raised by Fallon et al. (2021) in their study, which examined how mHealth uses information on people's physical activity patterns. Which brings up the problem of privacy. As it gets the access of sensitive information that can rethink before giving the access.

Overall, there are numerous ethical, governance, and regulatory challenges that must be resolved for the use of digital technology in the healthcare sector.

Case Description

Recognizing that AI has the potential to increase productivity in radiology work, Urbanside, a tertiary medical centre in one of the major US cities, has made an effort to incorporate it into their various radiology departments. In her targeted data collection and analysis, Sarah Lebovitz (2019) examined the diagnostic decision-making procedures for the three ailment categories: routine lung nodule search (Chest section), routine breast cancer screening (Breast section), and bone age assessment (Paediatrics). The radiology department in this instance is using AI to increase productivity while also reducing the workload of the staff members that work there.

The intricacy and quantity of instances have a direct correlation with the amount of time required. It places an excessive demand on the few healthcare professionals. That increases the likelihood of inaccurate or incorrect diagnosis, which might result in litigation, financial loss, and a threat to employment security. Individuals are under tremendous pressure as a result, which raises the possibility of mistake. Therefore, medical professionals expected AI technologies to make the tiresome parts of their work easier. However, in order to trust the AI's judgement, users must be aware of its accuracy and its rationale. As a result, Sarah Lebovitz (2019) presents an experiment in which 34 radiologists' decision-making processes were tracked. From simple bone age detection to complicated cancer screening tasks, they found that AI is representing false negatives and false positives more than half the time. As a result, it was difficult for the medical team to formulate a judgement.

On the one hand, specialists criticised the adoption of AI in radiology. In contrast, trainees at Urbanside were willing to make up for their lack of experience in their respective fields. Urbanside consequently had ethical and governance issues. In her study, Diagnostic Doubt and Artificial Intelligence: An Inductive Field Study of Radiology Work, several of the problems encountered throughout the experiment were not addressed. Further discussion of these challenges and the laws that must be implemented to prevent the use of unethical AI practises will be covered in this paper.

Analysis and Discussion

Ethical Perspective:

The Urbanside case study discusses the issues they ran across while employing AI techniques to detect diseases. From an ethical point of view, AI Tools decisions were ambiguous, and the radiology professionals were uninformed of the algorithm and the data that the algorithm is trained on**.** This concern falls under the category of lack of transparency (CS5705 Week 2 Teaching Materials, 2022). Ultimately, doctors squander a lot of their valuable time giving illuminating but inadequate explanations that might be harmful (CS5705 Week 2 Teaching Materials, 2022). However, thorough testing of the technology and rules limiting its use might resolve this problem. Uncertainty over who is accountable if something goes contrary to the recommended approach is another significant ethical problem that medical specialists must deal with. Because people or organizations might not be held accountable for their activities, this can damage trust and justice. When choices that impact a group or community are decided by outside parties rather than by the group or community itself, loss of autonomy (CS5705 Week 2 Teaching Materials, 2022) might be a worry. The decision-making processes may be less effective as a result of a lack of representation. The consent of the data used to train the algorithms was also not mentioned by Sarah Lebovitz (2019). Medical professionals are therefore ignorant of any potential prejudices towards minorities, those of poor means, or those who are marginalized. The employment of AI was resisted by the majority of seasoned experts, whether as a result of the aforementioned issues or out of self-consciousness about making judgmental errors. As a result, there may be a prejudice here compared to young practitioners, which might have an impact on how well AI is adopted.

Overall, it can be said that the central thesis of this article is backed by other papers that point in the same direction, as Sarah noted in her paper on how, rather than lessening the workload of medical professionals, the job of reviewing AI decisions creates significant uncertainty. This uncertainty puts people under additional stress, which raises the possibility of inaccuracy. However, it can be said that radiologists should interact with the AI developers and attempt to comprehend how the algorithms function before deciding whether to rely on the AI's judgment or to do more assessment.

Governance Mechanism:

 Several different approaches were explored to address the ethical issues that emerged while making decisions using AI. First, since radiologists were ignorant of how the algorithm operated, they began investigating potential explanations for the results of the AI. To better comprehend the tools and enable them to make wiser judgments, Urban side urged radiologists to critically evaluate their own practices as well as the underlying assumptions of the AI technologies. In order to make sure

they were employing the most precise and dependable technologies available; radiologists were encouraged to regularly check and assess the quality of the AI tools over time. Third, provided radiologists the opportunity to communicate with their peers and share their knowledge and best practices, enabling them to make better use of AI tools and handle any potential ethical dilemmas. Finally, they began examining the issue from the perspective of AI, which can shed light on how the algorithm functions. For instance, they began acknowledging that bone age may also be expressed in terms of months throughout the process of assessing bone age. As a result, they were now embracing the AI approach of prediction rather than adhering to their traditional textbook method to determine the bone age. Similar to that, they began using the CAD tool to help with the difficult process of forecasting cancer in the breast or chest (AI tool). and made an effort to see the process favourably. Lola, medical practitioner in breast department, "A little assist is not the worst idea... If we're not going to double-read mammos (using two radiology professionals) then something like an AI double-read can be helpful," (Sarah Lebovitz, 2019).

Nevertheless, instead of making the process smoother, using this method made it more challenging. Because there is uncertainty, to resolve, practitioners must fully comprehend the underlying presumptions and how algorithms operate. They did have the option to reconsider their analysis and their underlying presumption, though. As a result, it enhanced the decision's outcome. Moreover, the existing level of medical knowledge is ambiguous and inadequate, as stated in CS5705 Week 4 Teaching Materials (2022), therefore additional study in this area is needed before it can be fully automated. However, it was noted in the CS5705 Week 4 Teaching Materials (2022), that the capacity to obtain such outcomes might often be more significant than the capacity to describe how they were produced. The ability to describe how findings are generated may be less significant than the capacity to generate such results and experimentally confirm their accuracy, according to CS5705 Week 4 Teaching Materials (2022). However, it has to be regulated to simply being utilised for activities whose correctness has been verified (CS5705 Week 4 Teaching Materials, 2022).

Regulatory Stance:

Urban side was employing an AI technology from a third party that they called CAD (Computer-Aided Detection tool). The fundamental issue that arises is accountability. Who will be held responsible for the outcomes that resulted from using CAD tools in practice. The dilemma that arises in this situation is who would be accountable—the tool's user or the owner? Therefore, it is necessary to assign responsibility to both the participants and the manufacturer (CS5705 Week 5 Teaching Materials, 2022). In the area of regulation, ambiguous accountability can lead to uncertainty regarding whether rules or regulations are applicable in a certain circumstance, perhaps resulting in non-compliance or infringement. Additionally, it might make it challenging to enforce laws since it may not be apparent who is accountable. In addition, one of the main issues is data protection. Any company creating AI tools that wants to access patient data must abide by the rules that can protect people' privacy.

Reflection

From above, it can be said that AI in healthcare has potential to change the way how it works now. But many of the people are not aware about the fact that it will come with a cost of issues that need to be addressed. It seems that applying AI to healthcare decision-making processes can increase the ambiguity and uncertainty faced by healthcare practitioners, who may need to spend more time analysing and challenging the results of the AI technologies. This could be as a result of the technical opaqueness of AI tools, which makes it challenging for users to comprehend the underlying assumptions and reasoning that underlie the tool's output. It can also be because the quality of the AI technologies is not always obvious to consumers and may evolve over time. Professionals may consequently turn to their own judgment, even if the AI tool is of high quality. Considering the stakeholders, further studies require to bring the different perspectives to make the implementation and governance as secured and effective as possible.

The proposed research will utilize a qualitative case study approach and in-depth interviews with radiologists from various hospitals as well as other key participants, such as creators of AI tools. The working procedure and analysis of pertinent papers and data will be observed throughout further examination. The goal of the study is to comprehend the elements that affect radiologists' use of AI tools, such as the tools' perceived advantages and disadvantages, the degree to which users rely on them, and any resulting ethical or governance concerns. Additionally, it would look at the issue of data privacy. It contains interviews with individuals from various demographic groups to learn more about the causes of their reluctance to divulge their private health information. On the basis of it, regulations and governance could be created in a more effective way to safeguard data and allay people's concerns about their privacy.

References

1. Buck, Christoph; Hennrich, Jasmin; and Kauffmann, Anna Lina, "Artificial Intelligence in Radiology – A Qualitative Study on Imaging Specialists' Perspectives" (2021). ICIS 2021 Proceedings. 20. https://aisel.aisnet.org/icis2021/is_health/is_health/20, accessed 06 December 2022.

2. Fallon, Monica; Schmidt, Konstantin; Aydinguel, Okan; and Heinzl, Armin, "Feedback Messages During Goal Pursuit: The Dynamic Impact on mHealth Use" (2021). ICIS 2021 Proceedings. 5. https://aisel.aisnet.org/icis2021/is_health/is_health/5 , accessed 15 December 2022.

3. Lebovitz, Sarah, "Diagnostic Doubt and Artificial Intelligence: An Inductive Field Study of Radiology Work" (2019). ICIS 2019 Proceedings. 11. https://aisel.aisnet.org/icis2019/future_of_work/future_work/11, accessed 28 November 2022.

4. Sun, Shujing and Wang, Guihua, "Does Telehealth Reduce Rural-Urban Care Access Disparities? Evidence from Covid-19 Telehealth Expansion" (2021). ICIS 2021 Proceedings. 1. https://aisel.aisnet.org/icis2021/is_health/is_health/1 , accessed 07 December 2022.

5. Suttaket, Thiti; Vardhan, L Vivek Harsha; and Kok, Stanley, "Interpretable Predictive Models for Healthcare via Rational Logistic Regression" (2021). ICIS 2021 Proceedings. 18. https://aisel.aisnet.org/icis2021/is_health/is_health/18 , accessed 08 December 2022.

6. Sweeney, Jeffrey and Vervest, Peter, "Disrupting Viral Transmission by Facilitating Guided Self-Regulation" (2021). ICIS 2021 Proceedings. 13. https://aisel.aisnet.org/icis2021/is_health/is_health/13 , accessed 15 December 2022.

7. Rey, Amayelle and Bouaynaya, Wafa, "Building Trust in Artificial Intelligence: Findings from Healthcare Organization" (2022). AMCIS 2022 Proceedings 2. https://aisel.aisnet.org/amcis2022/sig_health/sig_health/2 , accessed 07 December 2022.

8. Yan, Aihua and Xu, David, "AI for Depression Treatment: Addressing the Paradox of Privacy and Trust with Empathy, Accountability, and Explainability" (2021). ICIS 2021 Proceedings. 15. https://aisel.aisnet.org/icis2021/is_health/is_health/15, accessed 05 December 2022.

9. CS5705 Week 2 Teaching Materials (2022). Lecture 2: The ethical, governance and regulatory contexts. Available at https://brightspace.brunel.ac.uk, accessed 05 December 2022

10. CS5705 Week 3 Teaching Materials (2022). Lecture 3: The Accuracy versus Explainability Debate in AI. Available at https://brightspace.brunel.ac.uk, accessed 06 December 2022

11. CS5705 Week 5 Teaching Materials (2022). Lecture 5: Digital governance in organisations. Available at https://brightspace.brunel.ac.uk, accessed 08 December 2022