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The Use of Artificial Intelligence in Reducing Healthcare Disparities

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ABSTRACT

Healthcare disparities, particularly in vulnerable areas, are important human rights violations that contribute to poor health outcomes and higher healthcare expenses. Artificial intelligence (AI) provides promising solutions for reducing inequities by improving decision-making, disease diagnosis, and access to care. However, if deployed incorrectly, AI has the potential to perpetuate current imbalances. This study investigates the role of AI in addressing healthcare disparities and presents AI applications for closing these gaps, obstacles, ethical concerns, and future potential for using AI to create a more equitable healthcare system. Combining AI with equitable frameworks can encourage inclusion, improve healthcare outcomes, and minimize long-standing healthcare disparities.

Keywords: Artificial Intelligence, Healthcare Disparities, Health Equity, Marginalized Communities, Health Access.

INTRODUCTION

Healthcare disparities in the US infringe on human rights, harm the nation, and disproportionately impact marginalized communities. We must take action to rectify these inequities, enhance health outcomes, and reduce expenses. Achieving a more equitable system requires equal access to quality healthcare, addressing social determinants of health, and promoting holistic wellness practices. By dismantling systemic barriers, advocating for fairness, and recognizing the importance of preventive care, we can create a society that prioritizes the health of all its members. Addressing healthcare disparities is crucial for improving health, reducing costs, and saving lives. Collective action and championing equality are essential for a healthier future [1, 2]. The advent of AI in healthcare reduces disparities and improves outcomes for patients. AI systems test hypotheses, enhance decision-making, develop innovative medications, and automate healthcare tasks. However, some AI solutions may unintentionally exacerbate existing disparities. It is important to proactively identify and address these disparities before widespread AI deployment in clinical settings. To navigate this complex landscape, it is vital to outline concepts, definitions, and potential threats associated with health equity and disparities in AI. Comprehensive frameworks should mitigate the negative impact of AI on health equity and ensure accessibility to all individuals. While integrating AI, addressing potential disparities is critical. Prioritizing equitable frameworks ensures effective and inclusive AI systems in clinical settings [3].

Understanding Healthcare Disparities

Healthcare disparities refer to the differences in the availability, accessibility, and quality of healthcare services among different population groups. They are influenced by a range of factors, including income, education, race, and ethnicity, as well as geographic location. As a result, certain populations, particularly those from low-income families who live in rural areas, post-industrial cities, tribal communities, or belong to minority groups, are likely to encounter barriers to accessing effective healthcare services,

thereby increasing their risk of suffering from chronic illnesses, being diagnosed at later stages, or dying from diseases that are otherwise preventable [4, 5]. Disparities in healthcare quality, access to specialist services, and treatment options impact disadvantaged groups. Hispanics, Blacks, Native Americans, some Asians, Native Hawaiians, and Pacific Islanders are more vulnerable to diseases like HIV/AIDS, Diabetes, and Hepatitis B. A 2018 report stated that 60% of adults face difficulty accessing healthcare, worsened by healthcare deserts in rural areas. Factors like housing, transportation, education, literacy, language, and financial concerns contribute to healthcare disparities [6].

Artificial Intelligence in Healthcare

Artificial Intelligence (AI) is the field of computer science that aims to create machines capable of replicating human-like abilities. There are two types of AI: Narrow AI and General AI. Narrow AI focuses on tasks performed at a human level or better, like playing chess. General AI aims to exceed human capabilities across multiple fields and is currently being researched. AI in healthcare shows promise in reducing costs and improving care. Access to healthcare services and technologies is a challenge, particularly in low- and middle-income countries, due to logistical issues and associated costs and delays [7, 8]. Advanced medical technologies often require specialist personnel to operate them, which can be challenging in remote areas with poorly trained healthcare workers. In such cases, misdiagnoses are more likely due to inadequate knowledge. To address this, developing countries often produce these technologies locally and train healthcare workers for years to operate them. However, relying on specific techniques can be costly and time-consuming. AI can help by automatically detecting pathologies from medical images and forwarding diagnoses to healthcare professionals, eliminating the need for manual intervention [9].

Current Applications of AI In Red Parity Reduction

AI methods can address racial disparities in mental healthcare. Mental health is often affected by cultural and linguistic barriers, poor access to facilities, referral bias, and under-prescription of medications. Researchers at the University of California, Davis designed RaceGAN, a generative adversarial model that transforms unbalanced datasets into rainbow datasets. Using the free-text notes of patients in urgent psychiatric visits, they created rainbow datasets that synthesized notes of racial minorities to match those of white patients. In two emergency departments, RaceGAN usage shortened the point differences in the Empathy and Facilities categories between immigrant patients and white patients. AI methods can reduce disparities in suicide risk prediction with a focus on LGBTQ+ adolescents. The INTERCEPT study recruited patients at risk for suicide aged 15-19 in the ER. After several model adjustments, the AI-enabled prediction showed better accuracy, sensitivity, and specificity in comparison to statistical models. AI has the potential to improve the accuracy of support tools designed to address clinical tasks, such as identifying drug reactions and behavioral indicators on electronic health records [10, 11]. AI methods can address geographical disparities in cancer screening. A study examined breast cancer screening data between 2014-2018 collected in Georgia. Artificial neural networks were trained on a readily available dataset and achieved a 0.86 AUC score. Geographical clustering detected underserved populations at the periphery of Atlanta using a tool extracted from an unsupervised machine-learning clustering method. AI can address insurance disparities in chronic disease management. Insured patients exhibit better treatment adherence and lower spending. A national patient-sided AI-based tool named SEAT was developed to monitor chronic care adherence and estimate medication share by personal claims data. Using SEAT increased treatment adherence by 1.38%. Since there are only four studies covering various forms of disparity reduction, the need for AI-based strategies in healthcare equity is obvious and opportunities to fill this gap should be pursued directly [12].

Challenges and Ethical Considerations

Despite the immense potential of artificial intelligence (AI) in narrowing the healthcare gaps that exist, several obstacles need to be overcome. These barriers have been further exacerbated by the ongoing COVID-19 pandemic. In this paper, we delve into the various challenges and ethical issues surrounding the implementation of AI in healthcare systems, shedding light on the necessary actions that executive leadership should take to address these concerns. Health disparities, which refer to the distinct differences in opportunities, choices, geographical locations, social conditions, and environments that affect individuals' access to quality healthcare, have been a pressing concern. In November 2021, SAS conducted a comprehensive study on health disparities in six major cities across the United States. The findings revealed the persistence of these disparities, albeit with varying degrees of progress made in addressing them [13]. AI has the potential to narrow healthcare gaps but faces challenges like small or incomplete datasets, bias, and a regulatory environment. Finding the right partner to invest in AI is a key challenge

for providers. Control over AI algorithms and data is concentrated in a few companies, raising ethical concerns about patients' ability to choose who controls their data. Gaps exist between tech companies and healthcare leaders, leading to uneven regulation. There are questions about accountability and fairness in deploying AI systems [14].

Future Directions and Opportunities

AI in healthcare needs more investment and innovation to reach its full potential. Collaboration between AI experts, data scientists, and biomedical engineers is necessary to develop effective data acquisition techniques for diverse patient populations. Ethical AI techniques that account for uncertainties of heterogeneous data sources should be developed. Pilot and clinical validation studies of AI tools, especially for underrepresented populations, should be encouraged. Affordable alternatives to AI tools from large healthcare systems should be developed to reduce health disparities. Open-source AI tools that can be retrained on-site without cloud-based services would allow barrier populations to access preventive health screening resources securely. More research and development efforts are necessary [15, 16]. Besides the recommendations above, future explorations of the efficacy and outcomes of AI techniques used with barrier populations are also avenues for growth. This could include diverse applications of AI in healthcare for underrepresented populations and the nuances of its effectiveness. Research efforts that demonstrate the reliability of AI tools for diagnosing disease and designing/optimizing effective treatments could be of interest to healthcare stakeholders [17].

CONCLUSION

AI has the potential to drastically reduce healthcare inequities by increasing access to high-quality care, improving diagnostic accuracy, and lowering costs. However, without well-designed and inclusive frameworks, AI systems risk worsening existing inequities. Addressing these issues necessitates multidisciplinary teamwork, diversified data collecting, and strict ethical control. Future AI-powered healthcare breakthroughs must stress fairness and inclusivity to ensure that technological advancements benefit everyone, regardless of financial class or geographic location. AI can be a transformative tool in establishing a more equitable and accessible healthcare system for all by promoting justice and employing bias-reduction measures.

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