The Effects of Artificial Intelligence on Female-Oriented Healthcare: The Current State and Future Implications

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ABSTRACT:

Throughout the 21st century, particularly in our current decade, artificial intelligence has emerged to be a powerful source to the industries of our society: engineering, architecture, and the criminal justice system, to name a few. With the invaluable benefits that come with this tool, certain drawbacks are explicit, especially in artificial intelligence's applicability to modern healthcare. The integration of AI into female-centered health facets, specifically, has the potential to revolutionize healthcare access to underserved populations worldwide. AI's ability to target underrepresented demographics, such as minority urban women and women in rural areas, through software is viable through emerging devices. AI-powered disease monitors for unavoidable chronic diseases provide the opportunity for early disease diagnosis and personalized treatments, noticing female-evident symptoms. Further, AI-driven chatbots serve as an intelligence that breaks the stigma barrier behind female sexual health, allowing women to acquire the help they need to empower their bodies. Despite these advancements, AI raises concerns regarding the data privacy of the developments it is integrated into, and thus the collection of sensitive medical information. Moreover, AI algorithms risk the reinforcement of the biases that healthcare workers have worked so hard to eliminate as AI becomes further intertwined with global medical education. This paper examines and analyzes the ethical considerations and implications that have and will continue to guide artificial intelligence's integration into female healthcare, analyzing both its transformative potential and the challenges it contains.

KEYWORDS: Artificial Intelligence, Female Healthcare, Telemedicine, Data Privacy, Intimate Partner Violence, Discrimination

INTRODUCTION:

With the rapid ascent of artificial intelligence (AI), the world undoubtedly faces and will continue to face positive and negative changes. Whether the effects of AI lean more towards one side of the continuum is a controversial debate, especially within female-oriented healthcare. As time progresses, there has been a growth of initiatives to properly address female healthcare concerns. Considering the recent AI takeover, there is a grand promise of how this medical sector can be impacted, for better or for worse.

While there is discussion surrounding AI's authority within certain topics, such as mental health and the workforce, female healthcare is a more 'niche' topic with less emphasis surrounding its intersection with AI. When exploring past publications, it can be seen that the main focus within this subject is AI's many benefits for women's health. For instance, Harvard Health states that AI is a grand assistance for radiologists in detecting cancer. Most prior publications relating to this topic are in agreement that AI has been a breakthrough in the healthcare field as it has a precision that humans will never be able to match. However, there seems to be a lack of knowledge surrounding the nuances of these two topics.

This paper discusses AI in female telemedicine, the impacts of AI on women residing in rural communities, AI's role in domestic violence prevention, the loss of physicality in medicine, data privacy issues, and the consequences of AI algorithm bias. When approaching healthcare, especially the female facet, there must be a significant degree of consideration as this subject involves sensitive topics. The common ignorance surrounding the risks of utilizing AI for women's health is concerning. Thus, this paper will explore the nuances of commonly utilizing AI in female healthcare and its following implications.

I.   Artificial Intelligence's Role in Female-Directed Telemedicine:

Telemedicine, simply put, is the use of technology to aid in healthcare in areas where distance is a significant issue. This breakthrough in healthcare has been revolutionary in assisting patients who do not have direct access to healthcare. A basic framework of the technology emerged in the early 1900s in the Netherlands, involving a case where heart rhythms were transmitted over the telephone. This concept has evolved into the delivery of healthcare services, from virtual physician consultations to remote patient symptom monitoring. It is evident that telemedicine contains the ability to increase the overall access and equity to healthcare resources globally as this technology manipulates physician demands to the terms of respective medical responsibilities and needs.

In terms of female healthcare, this multifaceted tool empowers women to seek medical advice and take agency over their healthcare. This can be especially empowering in rural areas where women face stigma around seeking medical help due to their cultural or religious beliefs. In impoverished regions, there is often a lack of proper infrastructure and extensive distance from resource-filled health centers. It is uncommon to see adequate educational clinics in rural areas, leading to higher pregnancy mortality rates and sexual assault-related deaths.

Financially, telemedicine consultations are much more feasible. According to Penn Medicine, a telemedicine visit is, on average, 113 dollars cheaper per patient than a traditional appointment. With the prevalent gender pay gap in today's society, a woman earns an average of 85% of what a man earns. The beneficial price of virtual appointments can greatly aid women who are sole providers, receive lower wages, or are impacted by poverty.

The integration of AI into telemedicine further enhances the possibilities of virtual care, especially for females. In specific, AI within telemedicine aids in employing gender-specific approaches that optimize beneficial engagement. AI assistants within telemedicine software often bridge the first step for females to inquire about stigmatized questions, such as those regarding sexual health. The platform PatientsLikeMe is a real-world data platform and telemedicine software that integrates community with health education. Founded in 2005, this platform has amassed over 850,000 members. In November of 2024, PatientsLikeMe collaborated with Ema, a Universal AI Employee, to produce "Ella," an AI assistant accompanying PatientsLikeMe. Ella adds to the community benefits of the platform, with one concrete takeaway: it is designed for women of all ages, from those dealing with menstruation to menopause. As a personal health assistant, this AI allows women to make informed decisions for their health while allowing case-related businesses to engage them with appropriate and personalized care. Ella has the potential to provide an objective view to female patients, eliminating the biases women often face from real-world professionals. AI is further utilized to synthesize data insights of patients allowing for early detection of life-threatening cases such as high-risk pregnancies, saving countless lives. Ella signifies the increased emergence of female-oriented healthcare technologies while highlighting the advantage of AI in alleviating the health inequity gap.

Now to discuss another facet of telemedicine: wearable health devices. AI has been increasingly integrated into these gadgets whether for optimising athletic recovery or tracking subtle symptoms for high-risk patients. Engineers have now created AI health sensors with machine learning that can analyze health patterns, determine subtle anomalies, predict future symptoms, and tailor health advice in real time. AI is typically engineered into sensors that have been proven to increase the accuracy of telemedicine predictors and are economically feasible. These sensors, especially for females, are practical as these wearable devices incorporate features designed specifically for the well-being of female health, as they track menstrual cycles, hormonal conditions, and monitor pregnancy progress. However, with these benefits come various drawbacks. For example, certain AI models are designed with male-centric data models, failing to recognize the differing symptoms between genders. Many sensors have not yet been developed to interpret female-specific biomarkers. It has been illustrated in studies that some heart rate trackers have been less effective in detecting symptoms in females during times of pregnancy and menstruation. Additionally, privacy concerns continue to remain emergent as intimate data, especially in terms of women's health, remain in jeopardy due to the continued misuse and leakage of sensitive information (see section III).

Essentially, AI in the field of female telemedicine is increasingly beneficial. Whether it be through wearable devices integrating AI or virtual appointments. Although it is important to highlight the ramifications of model inaccuracies and data privacy along with this analysis of AI.

II.   *The Utilization of AI Chatbots in Intimate Partner Violence:*

An unfortunate reality of today's society is the commonality of intimate partner violence (IPV). Approximately one in three women and one in ten men experience intimate partner violence in the United States (National Library of Medicine). This statistic not only demonstrates the gravity of the situation and how shockingly common IPV is but also illustrates the disproportionate way this issue affects women. Thus, if a survivor decides to seek help, it is important they are met with the utmost care and consideration.

While AI bots are designed to replicate the sincerity of a human, they will never fully be 'enough' to care for patients in the sense that they cannot feel. While AI can be convincing, the inevitable truth is that AI bots are not real people. Thus, when receiving care from a chatbot, there is a high chance that one may be met with discomfort as in sensitive situations, like what is mentioned above, it can be highly beneficial for a survivor to be met with human empathy. However, as everyone has different needs, there is no one way for a survivor to receive care. In some cases, a survivor may feel more comfortable relaying their thoughts to someone who they know is not real but can still give them valuable advice.

It is also significant to take into consideration the dangers of storing sensitive female data. The above thought of AI chatbots being beneficial for the comfort of women becomes dangerous if any of this information were to be breached. This is a topic of concern for any technology, but it can be especially harmful for survivors. For instance, if a survivor were to discreetly seek shelter, the exposure of their information could potentially reveal their location and put them at further risk. Situations like this could discourage survivors from pursuing help again, in fear of a similar circumstance occurring. Thus, the question of the integrity of AI chatbots and their advantages outweighing their pitfalls comes into consideration once again.

A final reflection regarding the use of AI for IPV cases is that the use of AI is still very recent. The use of chatbots can often be experienced as inefficient. While this instrument has already been implemented in various medical situations, it may be a while until it can be fully trusted to give and store information for survivors. It is essential to recognize the need for diversity when developing technologies if they are to be implemented within female healthcare to ensure the elimination of any biases against women. This technology has the power to give accurate medical advice to women; it is simply a matter of guaranteeing that this standard is met, which is to be discussed in the next section.

As AI diagnostic tools begin to replace or supplement the healthcare roles mentioned above, they devalue empathy-filled work. This move towards AI also creates discomfort within women who may be unwilling to discuss their personal issues with AI software due to mainstream leakage and the forever-holding of the information women might share in times of crisis. This could result in women refraining from obtaining the help they desire.

III. Artificial Intelligence Influence in Female Healthcare Discrimination

The normalization of artificial intelligence in education has much more profound impacts than one would believe. Its permeation into our modern-day society has made current generations increasingly dependent on AI generators for educational data. Taking this concept into the education of medical students is a multi-faceted conflict. According to the BMC Medical Education Journal, around 80% of medical students "reported using AI at least once a week or more frequently to study concepts of medical curriculum." It is also interesting that 66.8% of this survey's participants "believed that AI offered more precise answers to their medical queries."

It is commonly known that AI isn't perfect. Various generators lack high-quality data, leading to misinformation being fed to its users, namely medical students. At its core framework, AI models utilize datasets that are usually from electronic health records, academic research, and global clinical trials. This historical data in itself lacks accurate models related to the differing cases and symptoms of diagnosis in females. An example of this concept is in heart disease. It took centuries for scientists to conceptualize the idea that women are more likely to incorporate lesser common symptoms such as back pain and digestion when exhibiting heart diseases. This bias in health care and research resulted in "more women (having) died of heart disease than men each year," since 1984, according to Harvard Health. It has taken hundreds of years to even recognize this disparity of symptoms, making it vital to highlight the millions of conditions that go untreated in women due to lack of female-oriented medical research. Thus, AI builds upon our current lack of knowledge.

Essentially, these clinical sources massively undermine women fueling AI output bias, ultimately decreasing health equity. This diminished the years of scientists breaking the gender barrier in medicine. Now, as more medical students utilize these skewed datasets to solidify their knowledge of medicine, this technology's bias distorts the proper training of healthcare professionals. Thus, students are more likely to contribute to misdiagnosis, delayed treatments, and neglect of female-specific symptoms, treatments, and conditions. AI in itself increases the ignorance that these professionals must avoid for the betterment of healthcare and signifies the over-reliance that professionals have on AI to diagnose cases, leading to inaccuracy and the jeopardizing of millions of women.

Furthermore, this automation of health-related information through AI has gendered obvious implications in the workforce. Many roles within the healthcare industry, such as nursing, therapy, and hotline counseling are female-dominated. Inputting AI-led chatbots not only reduces the personal aspect of medicine and increases bias, but also has the harmful effect of replacing female jobs.

To address the challenges discrimination in AI poses, it can be beneficial for healthcare professionals to consider diversifying medical data. Whether it be posing unique research questions or incorporating widespread data related to female demographics. It can also be beneficial for AI professionals to consider a larger range of data when designing AI models. Diversifying both workforces is also a large step to alleviating these inequalities in clinical data, as multi-perspective professionals address the nuances of female healthcare.

IV.   *Data Privacy in Female Healthcare:*

Privacy in healthcare is extremely crucial when considering the impacts of artificial intelligence, especially in women's health. Female healthcare has always been more stigmatized than that of men as it involves topics that are often shamed, such as menstruation and pregnancy. It is essential to acknowledge that if sensitive medical information were to fall into the wrong hands, the effects could be drastic due to the current discrimination against women. To expand, if a woman's medical records were breached, certain companies may try to sell medical services that could either be illegitimate or at an inflated price, knowing that the woman may be tempted to buy these services considering the knowledge of her medical history. With the common prejudice in today's society, many individuals may think it is 'easier' for them to avoid consequences because they are manipulating women rather than men. Thus, if AI makes it feasible for this information to be released, the commonality of this practice may worsen.

According to Arizona State University Assistant Professor Victor Benjamin, AI has become "more accessible," meaning it is worryingly attainable for hackers to execute effective attacks against various female health systems. In simpler terms, the feasibility of AI that the world has come to love can actually be a very dangerous threat to large-scale medical software systems, harming women's privacy rights. In fact, the HIPAA Journal recorded an incident in April 2023 wherein the medical data of over 33,000 women was breached, putting their personal information at risk. AI will continue to produce similar large-scale violations, paving the way for a decrease in trust in cybersecurity and reinforcing a negative light on women's health that has already been established due to prior discrimination.

However, although AI does pose a risk of harmful security risks, it is also capable of mitigating these attacks. With AI's precision, it can detect suspicious activity sooner, leading to faster handling of security breaches. For instance, if there was a risk of a healthcare data breach such as the one mentioned above, AI could stop this before private female information could be used to reinforce stigmas.

However, this poses the question of whether it is ineffective to use technology to mitigate risks caused by the same technology. While AI develops and becomes more able to detect data violations, it will also improve its proficiency to cause the very dangers the world worries about. With the manner AI is evolving in, it is difficult to say whether AI will cause more harm or good in protecting healthcare information, especially for females. Essentially, although AI sensors allow efficient diagnosis and tracking, especially within female-emergent conditions, it is vital to recognize the safety and algorithm drawbacks that have become evident within these technologies.

CONCLUSION:

To conclude, this paper has examined the benefits and implications of artificial intelligence in female-oriented healthcare. Specifically, the role of AI in telemedicine, intimate partner violence (IPV) occurrences, female healthcare discrimination, and its according data privacy concerns of the above. It is vital to highlight that AI is in its very beginning stages of evolution. With the current path of development, AI will continue to be a larger force in female healthcare, bringing promises for the future of this industry and shaping it to better target discriminated or health inequity-faced populations. It also brings concerns in terms of personal rights. One could argue that the lack of restrictions around AI is an ethical consideration to be considered in the future. More restrictions could aid in data privacy concerns and in alleviating the loss of human touch in female healthcare, just to name a few. However, too many restrictions also has the potential to take away from the beneficialities AI provides. As stated earlier, the grand debate in this topic is whether AI in female-centered healthcare causes more harm than good. In order to fully understand this question and its infinite answers, it is essential to further investigate this topic. As it is known, AI offers newfound avenues for personalized, inexpensive, and efficient care, fighting against the current gap in global health education. However, it is important to consider governmental and international regulations in order for these technologies to focus primarily on health equity and ethical responsibility.

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