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Short Communication

Human Hearts, Machine Minds: How Artificial Intelligence Can Transform Paediatric Care in Nigeria

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Abstract

Due to its ubiquitous use in diverse sectors, artificial intelligence (AI) has been hailed as the fourth industrial revolution. AI's potential has not been fully realised in Nigeria's medical space, notably in paediatric care. We discuss how AI can improve paediatric care in Nigeria, focusing on early diagnosis, precision medicine, and remote monitoring.

AI must overcome several obstacles to be appropriately integrated into paediatric care. The disparity between training data and healthcare settings can cause algorithmic bias, diagnostic errors, and flawed treatment recommendations. More substantial patient privacy rights and transparent AI algorithms are needed to build healthcare workers and patient trust in AI and ease AI adoption.

This paper contends that medical curricula must include training in AI and related fields to equip future Nigerian paediatricians with the skills to maximise AI's potential. Meanwhile, Nigerian paediatricians and AI specialists must join forces to adapt AI technologies to Nigeria's particular needs.

Keywords: Artificial Intelligence (AI); Paediatric Care; Nigeria.

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Key Message

1. AI use in paediatric care offers new ways of early diagnosis, effective patient monitoring and the development of personalised care for children.
2. Nevertheless, concerns over potential AI bias against resource-constrained countries and data privacy must be addressed to foster trust and ease AI's adoption among Nigerian health workers.
3. AI training must be promptly integrated into the medical curriculum for AI's possible benefits to be maximised in the care of Nigerian children. Nigerian paediatricians must work hand-in-hand with local AI specialists.

Our department faced a challenging task one sultry afternoon. We were due to hold the hospital grand round and had to develop a topic that would resonate with most people since our audience would primarily be non-paediatricians. After much deliberation, we eventually focused on obesity. But obesity was a trite topic, so we desired a creative approach. Hence, we turned to ChatGPT, a popular artificial intelligence (AI) model. In a flash, ChatGPT offered several superb topics. Among these, the relationship between screen addiction and obesity fascinated us. Finally, we settled on the topic, "Screen Addiction: The Unseen Enemy of Child Development." The grand round was a resounding success. This experience highlights the crucial function of AI in surmounting obstacles and sparking innovative ideas.

AI is not as enigmatic as it first seems. AI implies the ability of a machine to capture information, adapt to evolving situations, and solve problems like humans. Access to cutting-edge algorithms, high-quality datasets for learning, robust computational power, and well-defined goals are essential to building an AI system. The most crucial aspect of AI is the continuous process of learning and adaptation, which makes AI get better with time and successfully handle new and unanticipated events.

AI has applications in many fields, including medicine and, specifically, paediatrics. One such area in paediatrics is the early diagnosis of developmental anomalies. AI can be helpful in analysing genetic, clinical, and behavioural information in medical records, which can help unravel children at risk of developmental problems early when diagnosis is difficult or impossible. Such children would benefit from prompt intervention, which could lead to a more favourable neurodevelopmental outcome. *Ubenwa*, a mobile app that uses AI to diagnose perinatal asphyxia from newborn cry patterns, is currently under investigation with promising results so far.[1] If this app's diagnostic accuracy is finally proven and the device is approved for clinical practice, it could offer a quicker, safer, more reliable, and cost-effective method for diagnosing perinatal asphyxia. This innovation has the potential to significantly reduce global mortality rates associated with this severe neonatal condition.

AI's role may also be critical in precision paediatrics. AI can analyse genetic, laboratory, radiological, and physiological data, leading to a more precise diagnosis and a better forecast of a child's response to a given medication or intervention. After that, treatment plans can be personalised accordingly. This personalised strategy can enhance therapeutic outcomes and optimise resource allocation, especially in resource-constrained Nigeria. Furthermore, AI can help with remote patient monitoring, particularly in chronic conditions such as diabetes, asthma, and epilepsy. AI technologies in patient monitors contained in wearables and sensors, which continuously collect and analyse patient data in real-time, can provide timely information to the patients, their caregivers, and health practitioners to prevent or swiftly treat emergencies.

Furthermore, AI's ability to synthesise and summarise vast amounts of medical information can facilitate paediatricians' access to up-to-date knowledge, which may improve the quality of healthcare delivery. Academic paediatricians can also free up more time for clinical and research work by utilising AI to compose their instructional materials and examination questions. ChatGPT passed USMLE [2] it might as well help in creating test questions.

The potential utilities of AI in paediatrics are already being unveiled in research. AI algorithms have demonstrated a remarkable ability to detect the onset of severe sepsis in critically ill children,[3] predict the development of autism,[4] and diagnose paediatric ear infections.[5] However, it is not all smooth sailing yet; a study demonstrated AI could correctly diagnose only 39% of New England Journal of Medicine case challenges.[6] Another study found that AI has inferior diagnostic precision in detecting paediatric diseases compared to well-experienced paediatricians, although AI outperformed the less-experienced ones.[7] To minimise these drawbacks, continuous improvement of AI algorithms through extensive training on various clinical datasets, better integration of AI with clinical expertise, and strict validation procedures, such as multi-phase testing, is required. Moreover, including AI-assisted decision support tools instead of entirely depending on AI for diagnosis will improve its efficacy while preserving clinical oversight.

Nevertheless, making a diagnosis requires more than just data input and analysis. A thorough medical evaluation is needed, including history-taking, clinical examination, and diagnostic tests. AI's role in physical assessments is constrained, as it cannot substitute the human touch, intuition, and expertise required for such examinations. Despite advances in AI-powered diagnostic tools, such as image recognition for radiology and dermatology, they cannot still perform hands-on assessments. Furthermore, the problem of litigations resulting from missed or erroneous diagnoses resulting from inadequate examination must be considered. Healthcare regulations must ensure that AI supports, rather than replaces, human expertise, with physicians keeping the ultimate responsibility for patient outcomes. Establishing well-defined legal systems and accountability measures will be crucial in reducing such risks.

Moreover, the potential acceptance of artificial intelligence in Nigeria's paediatrics practice presents cybersecurity issues. Spyware, ransomware, and data leaks seriously threaten patient confidentiality and the integrity of medical records. These issues call for strict data security regulations and sustained investment in optimizing healthcare cybersecurity. Another problem is the volatility or lack of internet infrastructure, even in Nigeria's metropolitan areas, which reduces the efficacy of AI-driven healthcare solutions. To deal with this difficulty, there is a need for infrastructure improvement encompassing better internet access and digital literacy among medical professionals.

The high cost of AI-driven tools and technologies could be another serious obstacle to its acceptance among Nigerian paediatricians. To overcome this barrier, governments, private enterprises, and international health organisations must collaborate to subsidise medical AI deployment and provide financial support to healthcare facilities. Public-private partnerships should prioritise investments in AI-driven healthcare so that paediatricians may access these innovations without significant financial strain.

Moreover, one of the main problems with AI is its bias in its application in developing countries such as Nigeria. Since most of the AI training content is from developed nations, there is a lack of adequate understanding of the peculiar sociocultural norms and healthcare challenges in developing countries. This drawback may result in poor contextualisation of AI-generated results, making recommendations from such results inaccurate and impractical in resource-poor settings. To address this, AI models must include region-specific datasets, thoroughly validate local clinical data, and include domain experts from Nigeria in model development and implementation to improve contextual correctness and reliability. Additionally, ensuring the transparency of these AI algorithms is essential so that parents and doctors know how AI make decisions and are confident that such decisions align with best practices.

AI will not replace doctors. Healthcare workers do more than diagnose and treat disease; they bring a human touch, compassion, and sophisticated decision-making that AI cannot match. Healthcare professionals contribute to a holistic understanding of patients, considering sociocultural, religious and

ethical dimensions that surpass AI algorithms' capabilities. Some have also expressed concern that AI will deprive doctors of creativity and encourage intellectual complacency. Contrary to this, AI might nurture ingenuity by taking over mundane tasks and freeing more time for original thinking and collaborations.

A study revealed that many Nigerian medical students and instructors are receptive to AI use in medical education and practice, but very few have been trained in AI.[8] This fact underscores the crucial need for incorporating computer science and emerging fields such as artificial intelligence, software engineering, cybersecurity, and data science into undergraduate and postgraduate medical education curricula. Consequently, future medical professionals, including paediatricians, will be capable of adapting their medical knowledge and skills to a fast-paced world. In the meantime, Nigerian paediatricians and local AI specialists must collaborate to adapt AI technologies to our specific needs and circumstances.

AI should no longer remain a futuristic dream among healthcare providers in Nigeria, where paediatric care encounters unparalleled obstacles; instead, it is an urgent necessity. We must not stand idly by as others leverage this technology. We must embrace AI not as a distrusted partner but as a formidable ally.

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