International Journal of Health Technology and Innovation
An Official Journal of **Kalam Institute of Health Technology** | ISSN - **2583-8547**

EDITORIAL

A New Dawn for Healthcare Transformation in India: Real-World Evidence and Data Centers

Anuj Mubayi and Phani Veeranki*

Advisors, Kalam KAS Experts, India.

Received: 10th August, 2024; Revised: 27th October, 2024; Accepted: 18th November, 2024; Available Online: 05th December, 2024

International Journal of Health Technology and Innovation (2024)

How to cite this article: Mubayi, A., Veeranki, P. A New Dawn for Healthcare Transformation in India: Real-World Evidence and Data Centers. International Journal of Health Technology and Innovation. 2024;3(3):1-3.

Doi: 10.60142/ijhti.v3i03.01

Source of support: Nil.

Conflict of interest: None

INTRODUCTION

Healthcare is entering a transformative era where precision medicine and advanced therapies coupled with generative AI, robust evidence and data centers intersect to define patient outcomes. By 2030, the industry envisions a shift toward empowering patients to prevent diseases rather than merely seeking treatment (Vicente *et al*. 2020). This transformation will require leveraging innovation, groundbreaking therapies, and use of next-generation technologies.

Challenges and Opportunities in Healthcare Transformation

Consider a case of a patient with a rare and deadly form of solid or blood tumor. Traditional treatments might offer limited relief, but the disease progresses rapidly despite intervention. This gap in treatment highlights the urgent need for innovation. The T-cell transfer therapies including Tumor Infiltrating Lymphocyte (TIL) therapy and Chimeric Antigen Receptor-T therapy exemplifies this shift. As T-cell transfer therapies and other innovative targeted therapies continue to merge, their safety and effectiveness in real-world clinical practice along with patient accessibility continue to remain a challenge demanding the need for evidence from real-world clinical practice, aka real-world evidence (RWE) emerging from real-world data (RWD).

RWD can bridge the gap between clinical trials and clinical practice, and vice versa allowing an investigator in appropriate clinical outcomes measurement in clinical trials. By utilizing different RWDs either alone or as a combination--claims (closed and open claims), chargemaster data, electronic health record (EHR), and registry data, stakeholders can assess the broader societal and economic value of these innovative treatments. This data-driven approach is essential as healthcare transitions toward a model where patients are active participants in their care, informed and empowered by data (Hao, 2023).

The Rise of Generative AI and Healthcare Applications

Parallel to advancements in therapies, the rise of generative AI is revolutionizing healthcare analytics and operations. Since the introduction of ChatGPT in 2023, AI has demonstrated its potential to streamline predictive analytics, optimize clinical decision-making, and enhance operational efficiency (Montazeri *et al*. 2024). In the next few decades, advancements such as DNA sequencing for unborn children and remote robotic surgeries spanning continents are expected to become common while relying heavily on AI-driven systems. Generative AI is already enabling patients to monitor vital signs from anywhere, creating opportunities for more personalized and preventative care. However, integrating AI into healthcare has its own challenges. Open-source models like Llama and ChatGPT raise concerns around HIPAA compliance, data governance and data security. To harness AI's potential responsibly, healthcare organizations must prioritize proprietary solutions and adhere to stringent governance frameworks. Proactive governance will ensure the ethical use of AI in healthcare, fostering trust and scalability.

Data Centers as a Cornerstone for Generative AI

The increasing reliance on generative AI models, such as GPT-4, necessitates robust infrastructure. These models require real-time, low-latency processing of vast datasets, placing unprecedented demands on data centers. Major tech companies, including Microsoft, Google, and Amazon, are investing heavily in expanding data centers to support these computational needs. However, the energy-intensive nature of AI model training has contributed to a surge in CO_2 emissions, emphasizing the need for sustainable solutions (Zhuk, 2023).

India, with its focus on developing technology hubs like Andhra Pradesh MedTech Zone (AMTZ), offers a unique opportunity to address these challenges. Establishing energy-efficient data centers in regions like AMTZ could

*Author for Correspondence: pveeranki@kalamexperts.org

not only support generative AI applications but also align with India's sustainability goals. Incorporating technologies like Nvidia's 'superchip' and advanced cooling systems can further mitigate the environmental impact of these centers (McDowell *et al*. 2023). This infrastructure will also support future advancements, such as the use of connected devices for real-time health monitoring and personalized medicine.

Transforming Healthcare Data with AI and Edge Computing

The convergence of AI, edge computing, and cloud-native systems is reshaping healthcare. Innovations like Electronic Health Records (EHR), telemedicine, and mobile health (mHealth) are enabling real-time decision-making and personalized care. Platforms such as IBM Watson Health are already leveraging AI to enhance clinical outcomes, while IoT-enabled devices are driving smarter data flows.

Edge computing brings data processing closer to patients, improving the efficacy of remote monitoring and telemedicine. Through this localized approach via integration of these technologies into healthcare infrastructure, data centers can support patient-centered strategies that prioritize security, efficiency, and accessibility.

Federated Data Health Networks (FDHNs) in India

India is taking a proactive approach to healthcare data management through Federated Data Health Networks (FDHNs). In few years, hospitals are expected to evolve into health centers focused on prevention and acute care, supported by FDHNs that enable real-time data exchange across institutions. These networks enable secure data sharing across institutions while preserving decentralization, thereby addressing concerns around privacy and interoperability (Hallock *et al*. 2021). Initiatives such as the National Digital Health Mission (NDHM) and Ayushman Bharat Digital Mission (ABDM) exemplify this approach. By linking decentralized patient data through unique Health IDs, these programs facilitate real-time data access and collaborative algorithm development.

FDHNs also enable machine learning models to train on distributed datasets without compromising privacy. This decentralized approach ensures scalability, security, and flexibility, making it a cornerstone of India's digital health strategy. However, there is a lack of accessibility for these datasets to support general research, medical device development, and health economics evaluations, especially for pharma companies (Hunger *et al*. 2022).

The Evolution of Health Economics in the AI Era

As healthcare becomes more data-driven, Health Economics and Outcomes Research (HEOR) and RWE frameworks are evolving to incorporate AI-driven insights. The "Health Economics of Things (HEoT)" represents a new paradigm, where AI automates complex evaluations, accelerates real-world evidence generation, and provides nuanced predictions for high-cost therapies. By the next decade, healthcare systems may rely on AI-driven analytics to automate complex evaluations, optimize resource allocation, and simulate long-term outcomes.

Societal value, including direct medical costs and indirect benefits such as caregiver time and productivity loss, workplace productivity loss or school absenteeism and scientific advancements, must inform drug pricing and accessibility. The debate on drug pricing highlights the need to balance innovation with affordability, ensuring that life-saving treatments remain within reach (Ramagopalan *et al*. 2024). As AI accelerates these processes, its potential to streamline decision-making and enhance patient outcomes will redefine healthcare economics.

To meet these goals, AI is complementing traditional HEOR methodologies, making techniques such as network meta-analyses (NMAs), indirect treatment comparisons (ITCs), and systematic literature reviews (SLRs) increasingly indispensable. These methodologies allow healthcare systems to rigorously assess the value of innovative therapies by synthesizing evidence across diverse sources. AI enhances these processes by automating data aggregation, improving analytical accuracy, and reducing time-to-insight. Despite these advancements globally, India currently lacks integrated, real-time AI-based frameworks for health economic evaluations, particularly for medical technologies. This gap presents a critical opportunity for stakeholders to develop AI-driven platforms tailored to India's unique healthcare landscape, leverage existing data infrastructure, such as the National Digital Health Mission (NDHM), and collaborate across sectors, including private, to address challenges in pricing, access, and sustainability. By responsibly integrating AI into health economics, India can achieve a balance between cost efficiency, sustainability, and improved patient outcomes, paving the way for a future-ready healthcare ecosystem.

Conclusion: Pioneering the Future of Healthcare Data Infrastructure

The development of data centers in India, particularly in hubs like AMTZ, is central to this transformative journey. By addressing challenges such as sustainability, interoperability, and privacy, India has the potential to lead in integrating cutting-edge technologies with healthcare systems. The synergy between advanced therapies and precision medicine, generative AI, and data-driven evidence strategies promises to redefine patient care, fostering a future where innovation and technology go hand in hand making innovative therapies accessible to patients. The future of healthcare is not just about curing diseases but about creating a collaborative, data-driven ecosystem that prevents illness, fosters innovation, and puts the patient at the heart of every decision.

REFERENCES:

1. Phillips, C. (2024, March 5). First Cancer TIL Therapy Gets FDA Approval for Advanced Melanoma. Published by the National Cancer Institute. Retrieved from https://www.cancer.gov/news-events/cancer-currents-blog/2024/fda-amtagvi-til-

therapy-melanoma.
2. Hallock, H., Marshall, S. E., 't Hoen, P. A., Nygård, J. F., Hoorne, B., Fox, C., & Alagaratnam, S. (2021). Federated networks for distributed analysis of health data. *Frontiers in Public Health, 9*, 712569.
3. Hao, K. (2023, March 23). Training AI Models Like GPT-4 Consumes Enormous Amounts of Energy. *MIT Technology Review.* Retrieved from https://www.technologyreview.com.
4. Hunger, M., Bardenheuer, K., Passey, A., Schade, R., Sharma, R., & Hague, C. (2022). The value of federated data networks in oncology: what research questions do they answer? Outcomes from a systematic literature review. *Value in Health, 25*(5), 855-868.
5. Metz, C. (2022, May 4). Data Centers Aren't Keeping Up With the Demand for Cloud Services. *The New York Times.* Retrieved from https://www.nytimes.com.
6. Montazeri, M., Galavi, Z., & Ahmadian, L. (2024). What are the applications of ChatGPT in healthcare: Gain or loss? *Health Science Reports, 7*(2).
7. Ramagopalan, S. V., Diaz, J., Mitchell, G., Garrison Jr, L. P., & Kolchinsky, P. (2024). Is the price right? Paying for value today to get more value tomorrow. *BMC Medicine, 22*(1), 45.
8. Rolnick, D., Donti, P. L., Kaack, L. H., Kochanski, K., Lacoste, A., Sankaran, K., ... & Bengio, Y. (2022). Tackling climate change with machine learning. *ACM Computing Surveys (CSUR, 55)*(2), 1-96.
9. The Innovative Cooling Approach Behind NVIDIA's $5M COOLERCHIPS Grant. (2023, June 1). Steve McDowell, NAND Research. Retrieved from https://www.forbes.com/sites/stevemcdowell/2023/06/01/the-innovative-cooling-approach-behind-nvidias-5m-coolerchip-grant.
10. Vicente, A. M., Ballensiefen, W., & Jönsson, J. I. (2020). How personalised medicine will transform healthcare by 2030: the ICPerMed vision. *Journal of Translational Medicine, 18*, 1-4.
11. Zhuk, A. (2023). Artificial Intelligence Impact on the Environment: Hidden Ecological Costs and Ethical-Legal Issues. *Journal of Digital Technologies and Law, 1*(4), 932-954.