

Chapter 5

Escalating Artificial Intelligence–Enabled Clinical Decision Support Systems to Enhance Home–Based Care: A Study on Healthcare Supply Chains

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ABSTRACT

Artificial intelligence is rapidly advancing to replace human-based approaches in Clinical Decision Support Systems (CDSS), which has caused a revolution in the home-based care sector. CDSS provides instant diagnostic and therapeutic suggestions, hence improving the communication and gap between the medical professionals and patients in hard-to-reach areas. This review paper looks into how healthcare supply chains can be optimised through AI, in addition to monitoring the availability of inventory and medical products and predicting what a patient might need. Moreover, the investigation assesses the effectiveness of such systems in the overall consideration of the issue—cost containment and patients' outcomes, especially in chronic illness treatment. The study fits directly to SDGs 3, 9, and 10 since it aims to eliminate health disparities by proactively endorsing home-based healthcare services. This paper gives recommendations to healthcare organisations and government entities, mainly in prospecting how AI would reshape home-based care.

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1. INTRODUCTION

Healthcare supply chains are the most quintessential requirement across the world (Gupta et al., 2023). This industry has relied a Just-in-Time (JIT) distribution model for more than a decade, but was unable to manage demands during the COVID-19 spread (Bhakat and Arif, 2021). The insufficient medical supplies and drugs during the COVID-19 had led this industry to shore up the new urgency which consequently stressed upon the healthcare supply chain (Zamiela et al., 2022). The pandemic has led health impacts and caused negative psychological, social, political, and financial impacts. To mitigate these impacts needs a robust health supply chain encompassing drugs, medical equipment like personal protective equipment (PPE), diagnostic and testing devices and other ancillary supplies (Manero et al., 2020). The impact of COVID-19 has no doubt impacted the industry to develop resilient supply chains. Moreover, the uncertain environment needs healthcare supply chains to become more flexible to deal with the volatility of the environment (Araujo et al., 2023). Healthcare supply chains are facing pressure to reduce costs due to changes in client demands, digital commerce, and increased competition. However, recent disruptions such as manufacturer consolidation, natural disasters, and political and economic upheaval make it challenging to achieve cost efficiency in the healthcare supply chain (Bhakoo and Choi, 2013). Integrated delivery networks (IDNs) are compelled by disruption to respond quickly to backorders and recalls of critical medical supplies (Cortes, 2022). This raises the overall cost of serving the healthcare supply chain, which already accounts for 37.3% of the total cost of patient care on average. The healthcare supply chain needs to make longer-term investments in profitable solutions that ensure company continuity in order to thrive in the face of disruption (Bialas et al., 2023).

Artificial intelligence (AI) technologies are transforming the supply chains to improvise the existing processes and thus steadily implementing in healthcare for enhancing the number of benefits to the stakeholder (Duan et al., 2019; Agarwal and Narain, 2023). AI in healthcare has potential to assist healthcare providers in numerous aspects including the patient care and administrative processes, help them in transforming the existing systems and overcoming the challenges quickly (Mansour and Sharour, 2021; Garg et al., 2023). With AI, huge data of population from wearables and implant can enhance understanding of human biology, clinical trials, personalized and real-time treatment etc. The efficiency of care delivery may be improved through AI solutions and also day-to-day life of healthcare practitioners supporting them to spend more time looking after patients. AI may offer life-saving treatments to market hastily and can improvise patient-care, health system logistics processes, and the ability to diagnose disease that consequently support transformation of hospital-based to home-based care (Modgil et al., 2022).

The dynamics of AI growth is shifting. Asia has the fastest growing trend in healthcare, especially China. Ping An's Good Doctor (healthcare service platform) have more than 300 million users (Wong et al., 2024). Moreover, due to increasing number of infections and diseases spread more advance AI technologies such as remote monitoring, AI-powered alerting systems, etc. for supporting the shift from hospital-based to home-based care (Motwani et al., 2022). Previous studies have conducted research on patient engagement, attitude measurement and other patient related factors, but how CDSS are driving the patient's perceived attitude, satisfaction and intention to avail clinical decision support are very limited (Jacob, 2023; Mathkor et al., 2024). Also, how the perceived privacy concern influences the intention and behavior of the patients will be measured (Zhang et al., 2022). Therefore, this study has made an attempt in to assess the CDST for better patient engagement and consequently influencing the patient's behavior. To address this gap, the following objectives are established

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