

Chapter 12

Enhancing Healthcare Through Data Visualization: Improving Patient Care, Disease Trend Recognition, and Process Optimization

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ABSTRACT

Data visualization is a critical tool in healthcare for enhancing data comprehension, facilitating information extraction, and effectively communicating findings. This study aims to underscore the significance of data visualization in improving patient care, recognizing disease trends, and streamlining healthcare processes. Through the utilization of interactive dashboards, predictive models, and scoping reviews, healthcare professionals can access real-time data, support early intervention, and identify research gaps. While existing studies validate the effectiveness of data visualization in healthcare analysis and optimizing hospital performance, further research is necessary to fully grasp the impact of interactive visualization techniques on healthcare sectors and patient outcomes. The implications of this research are vital for advancing healthcare practices and enhancing overall patient well-being.

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BACKGROUND STUDY

Data visualization is crucial as it enhances comprehension of linguistic patterns, facilitates information extraction and knowledge representation, overcomes information overload, and effectively communicates findings to diverse stakeholders (Spadacin, 2023).

Data visualization provides an intuitive way for users to easily read and understand data, especially in big data analyses. It enhances the quality of policies and services by presenting an integrated view and evidence for informed healthcare decisions (Ko & Chang, 2017).

Moreover, The integration of big data analytics in healthcare is gaining traction, offering opportunities for identifying high-risk patients, personalized medicine, and genomics research (Batko & Ślęzak, 2022).

Data visualization offers a myriad of benefits across the healthcare landscape. Firstly, it significantly enhances overall patient care by facilitating the efficient utilization of health data, thereby positively impacting healthcare provision. Secondly, it aids in disease trends and pattern recognition, enabling healthcare professionals to identify emerging health issues and respond proactively. Thirdly, data visualization allows for the presentation of complex information comprehensibly tailored to different audiences, ranging from clinicians to policymakers, thus fostering informed decision-making. Moreover, it contributes to accelerated performance within healthcare systems by streamlining processes and improving operational efficiency. Lastly, data visualization is a potent tool for error and fraud detection, enabling timely intervention and ensuring the integrity of healthcare data and services (Abudiyab & Alanazi, 2022).

Data visualization is applied across multiple facets of healthcare, including clinical decision support, patient monitoring, public health surveillance, and medical research. Interactive dashboards provide clinicians with real-time data on patient vitals, lab results, and medical history, improving diagnostic accuracy and treatment efficacy. For example, the review by Schulze et al. (2023) highlights the goals and problems of public health while analyzing the current level of dashboard research concerning risks and diseases. It examines how user needs are considered while creating and assessing dashboards. According to the literature, few research assesses dashboards for their design and efficacy in risk communication models (risk perception, health literacy, etc.). Furthermore, whereas some studies evaluate usability from the viewpoint of possible users, many restrict their analysis to functional elements carried out by development teams.

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