Chapter 7
Optimizing Hospital Workflows Through Artificial Intelligence

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ABSTRACT

The integration of latest technologies like Artificial Intelligence (AI) plays a vital role in improving the Healthcare systems right from real time monitoring, health record maintenance and efficient disease diagnosis and appropriate treatment. AI systems incorporate machine learning (ML) models, Deep learning models (DL) models, IOT devices and sensor data to provide real time monitoring of patient health. AI models assess lung imaging and real-time oxygen saturation data to predict respiratory deterioration. The power of AI in predictive analytics helps in identifying disease at the early stage to plan for faster treatment and recovery. Automated documentation and AI-powered EHR enhances clinical workflows reducing errors

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and improves patient data management. Generally, the hospitals have large amount of patient data. The usage of AI helps to derive actionable insights from these data that aids in better and faster recovery reducing mortality rates

INTRODUCTION

AI in diagnostic imaging uses machine learning algorithms to analyse X-rays, CT scans and MRIs images. These models are trained on large datasets of annotated medical images to detect abnormalities and patterns (Bekbolatova et al., 2024). It enhances radiologist interpretation, early disease detection and clinical decision support (Muniasamy et al., 2020). However, AI models require large amounts of patient data, raising ethical and privacy concerns. AI-driven drug prescription systems use ML models and big data analytics to recommend optimal medicines, dosages and treatment regimens based on patient data [Yadav et al., 2025]. These systems analyse the medical history of the patient, genetic information and lab results before making the prescriptions (Veernapu, 2022). They can help in tracking medication usage, detect adverse drug reactions and prevent overprescription. AI chatbots can provide real-time medication counselling and answer patient queries (Elhaddad et al., 2024). The chapter explores various AI techniques that contribute to accurate disease detection and personalized treatment plans. Additionally, it discusses the integration of AI with Electronic Health Records (EHR) and hospital information systems to enhance interoperability and streamline workflows (Khamaj, 2025).

Intensive Care Units (ICUs) and critical care departments handle life-threatening conditions, requiring rapid decision-making, continuous monitoring and precise interventions (Bohr & Memarzadeh,2020) AI-driven models analyse real-time patient data, detect early warning signs of complications and assist clinicians in prioritizing interventions. This section explores the role of predictive AI in ICU and critical care applications. Robotic-assisted surgery (RAS) involves the use of AI-powered robotic systems that aid surgeons in performing complex procedures with enhanced precision and control (Iftikhar et al., 2024; Muniasamy & Karunakaran et al., 2026). These systems assist surgeons by providing real-time insights in improving dexterity and enabling minimally invasive procedures. This section explores the role of AI in robotic-assisted surgeries and its impact in AI-driven operating rooms. Despite its transformative potential, AI implementation in patient monitoring presents challenges. The possible ways to address the challenges are discussed in the chapter.

AI-driven solutions enable hospitals to optimize scheduling, automate administrative tasks, enhance clinical workflows and improve overall hospital management. Efficient appointment scheduling and patient flow management are essential in optimizing hospital operations, reducing wait times and improving patient satisfaction