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MONITORING THE SPREAD OF HOSPITAL INFECTIONS USING ARTIFICIAL INTELLIGENCE

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Abstract
This thesis analyzes the factors influencing the spread of hospital infections (nosocomial infections) and the application of artificial intelligence (AI) technologies in their prevention. The study examines the possibilities of early detection of infectious risk zones through AI-based monitoring systems, digital tracking of patient and medical staff movement, real-time processing of epidemiological data, and the development of predictive models. Proposals have been developed to improve infection process forecasting, strengthen control in sterilization procedures, and enhance the effectiveness of clinical decision-making using AI technologies. The research results are aimed at improving hospital hygiene quality, reducing the spread of infections, and creating a safe environment in medical institutions.

Keywords: Artificial intelligence, hospital infections, nosocomial infection, epidemiological surveillance, monitoring system, predictive model, data analysis, risk assessment, sterilization control, clinical decision-making.

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Introduction

Hospital infections (nosocomial infections) are one of the most pressing problems of modern medicine, posing a serious threat to patient health, prolonging treatment duration, and significantly increasing healthcare system costs. The main causes of infection spread include insufficient compliance with hygiene rules, inadequate sterilization of medical equipment, unmanaged flow of staff and patients, and weak real-time monitoring in large medical institutions. Traditional control methods often fail to deliver expected results due to late detection, human factors, and susceptibility to statistical errors.

In recent years, the rapid development of artificial intelligence (AI) technologies has expanded opportunities for early infection detection, risk assessment, and prediction of their spread. With AI, it has become possible to process large volumes of epidemiological data, digitally track patient movement, automatically monitor the hygiene level of medical equipment and rooms, and mathematically model the development of infectious processes. This plays an important role in improving infection control quality and creating a safe hospital environment.

This thesis analyzes the mechanisms of hospital infection spread, the role of AI technologies in their prevention, and the effectiveness of AI-based control and monitoring systems. In addition, proposals are developed to reduce infections in medical institutions through AI integration based on practical examples.

Main Part

Hospital infections pose a serious threat to patient health, and traditional control methods are often delayed or prone to human error. Artificial intelligence (AI) technologies enable early detection of infections, identification of risk zones, and real-time monitoring of patient and staff movement. With AI, the hygiene of medical equipment and rooms, disinfection processes, and patient flow are analyzed, reducing the likelihood of infection spread. At the same time, algorithms help predict infectious processes and support doctors in making rapid clinical decisions. As a result, AI emerges as an effective and efficient tool for controlling hospital infections.

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Conclusion

Hospital infections significantly affect patient health and the efficiency of medical institutions. Traditional control methods are often delayed and prone to human error.

Artificial intelligence technologies enable early detection of infections, identification of high-risk areas, monitoring of patient and staff movement, and assessment of the hygiene of medical equipment and rooms. AI-based systems serve as an important tool in effectively controlling infection spread, planning preventive measures, and ensuring rapid clinical decision-making by physicians. At the same time, AI integration helps create a safe and healthy environment in hospitals.

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