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Care-AI: An AI-Based System for Post-Treatment Lifestyle Optimization

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ABSTRACT:

Care-AI is a web-based AI technology that provides post-surgical patient monitoring and clinical decision support. Traditional wearable health monitoring systems track patients' physiological data, including heart rates, oxygen saturation (SpO_2), sleep, and physical activities. However, the data collected by these systems is generally not interpreted or predictive. Care-AI improves the situation by using its AI technology to interpret multi-parameter wearable health monitoring data and convert it into medical knowledge using various machine learning and anomaly detection algorithms.The Care-AI system uses patients' baseline health data and physiological data collected from wearable health monitoring devices to calculate the Recovery Stability Index (RSI), detect abnormal patient recovery patterns, forecast short-term patient recovery trends, and calculate the probability of patient readmission. Care-AI also calculates the Doctor Alert Score. Further, Care-AI provides adaptive patient lifestyle and diet recommendations based on the patient's condition. Care-AI improves the state of the art of post-discharge patient care by incorporating patient monitoring, prediction, and recommendations into an interactive platform.

I INTRODUCTION:

Recovery is a critical stage in patient health management whereby constant observation and timely action are crucial in preventing health complications and re-admissions to healthcare facilities. After being discharged from healthcare facilities, patients are expected to take responsibility for managing their own recovery process. This has been cited as a major cause of delayed recognition of health deterioration. Although wearable health devices such as smartwatches and fitness trackers are able to monitor physiological parameters such as heart rate, oxygen saturation (SpO_2), sleep cycles, and physical activities, these devices are only able to offer raw data without any clinical interpretations or predictive capabilities.However, recent advancements in artificial intelligence technology have presented an opportunity to convert wearable health data into useful clinical intelligence. Using various machine learning and data analysis techniques, abnormal patterns and health risks can be identified and predictions made to enable healthcare experts to make informed decisions. Such integration is likely to improve patient recovery processes after being discharged from healthcare facilities.Against this background, the proposed system is intended

to be an AI-based system that interprets wearable health data to offer recovery monitoring services, risk prediction services, and recommendation services to post-surgical patients.

II .BACKGROUND OF THE PROJECT:

The advancements in wearable health technology have allowed for continuous health monitoring of physiological parameters including heart rates, oxygen saturation levels (SpO_2), sleep patterns, and activity levels. Wearable devices including smart watches and fitness trackers have become popular devices used in personal health tracking and wellness management. However, these devices are mostly used as a tool for collecting and presenting health-related data.In the context of post-surgical care, continuous health monitoring is crucial since patients may develop complications after discharge from the hospital. Complications may arise in the form of abnormal vital signs or decreased activity levels during the recovery process. Although various hospitals are using remote patient monitoring systems, these systems are mostly used as a tool for collecting and presenting health-related data.The recent advancements in artificial intelligence and machine learning have allowed for the analysis of large amounts of health-related data and the identification of patterns in the data, which may indicate potential health risks. It is possible to analyze the health data collected from wearable devices using artificial intelligence and machine learning techniques. These advancements in technology have led to the development of intelligent systems used in post-discharge patient monitoring systems including Care-AI.

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III . LITERATURE REVIEW:

1. Title: "Wearable Sensors for Remote Health Monitoring" – Patel et al.

The study examined the role of wearable devices in continuously monitoring physiological parameters such as heart rate, oxygen saturation (SpO_2), sleep patterns, and physical activity. The research demonstrated that wearable technologies can provide continuous health tracking and improve preventive healthcare. However, the system primarily focused on data collection and visualization without incorporating predictive analytics or clinical risk assessment models for post-surgical patients.

2. Title: "Machine Learning in Healthcare: Predicting Patient Outcomes" – Rajkomar et al.

This research explored the application of machine learning algorithms such as Random Forest, Logistic Regression, and Neural Networks for predicting patient outcomes using electronic health records. The study showed that AI models can improve the accuracy of disease prediction and healthcare decision-making. However, the work mainly relied on hospital database records and did not consider real-time data from wearable devices or continuous patient monitoring after hospital discharge.

3. Title: "Remote Patient Monitoring Using IoT and Wearable Devices" – Islam et al.

The research proposed an IoT-based remote patient monitoring framework where wearable sensors transmit patient health data to healthcare providers. The system enabled continuous monitoring and improved communication between patients and healthcare professionals. Despite its advantages, the system lacked predictive analytics, anomaly detection mechanisms, and intelligent decision-support capabilities required for early identification of recovery complications.

4. Title: "Anomaly Detection in Healthcare Data Using Machine Learning" – Chandola et al.

The study focused on detecting abnormal patterns in healthcare datasets using machine learning-based anomaly detection techniques. Algorithms such as Isolation Forest and statistical outlier detection methods were used to identify unusual physiological conditions that could indicate potential medical risks. While the research highlighted the effectiveness of anomaly detection in healthcare data analysis, it did not integrate these techniques into a real-time patient monitoring system or clinical decision-support platform.

5. Title: "Artificial Intelligence in Remote Patient Monitoring Systems" – Topol et al.

This study explored the role of artificial intelligence in improving remote patient monitoring systems through predictive analytics and intelligent decision support. The research highlighted the potential of AI models to detect early warning signs of patient deterioration and assist healthcare professionals in decision-making. However, the study mainly discussed conceptual frameworks and lacked implementation of integrated systems that combine monitoring, prediction, and personalized patient recommendations.

6. Title: "AI-Based Healthcare Monitoring Systems: A Survey" – Jiang et al

The research provided a comprehensive overview of AI-based healthcare monitoring systems and discussed various techniques used for health data analysis and prediction. The study highlighted the importance of combining wearable technologies with machine learning algorithms to improve healthcare outcomes. However, most existing systems focus either on monitoring or prediction individually rather than integrating monitoring, anomaly detection, recovery forecasting, and personalized recommendation systems into a single platform.

IV. COMPARATIVE ANALYSIS TABLE

Authors	Title	Methodology	Key findings
Patel et al.	Wearable Sensors for Remote Health Monitoring	Experimental analysis of wearable devices collecting physiological data such as heart rate, SpO_2, sleep, and activity for continuous monitoring.	Experimental analysis of wearable devices collecting physiological data such as heart rate, SpO_2, sleep, and activity for continuous monitoring.
Rajkomar et al	Machine Learning in healthcare: Predicting patient outcome	Application of machine learning algorithms such as Random Forest and Neural Networks on electronic health record datasets to predict patient outcomes.	Machine learning models improve prediction accuracy in healthcare but rely mainly on hospital data rather than real-time wearable inputs.
Islam et al.	Machine learning models improve prediction accuracy in healthcare but rely mainly on hospital data rather than real-time wearable inputs.	IoT architecture using wearable sensors and cloud platforms to transmit real-time patient health data to healthcare providers.	Remote monitoring improves patient supervision but lacks intelligent prediction and anomaly detection features.
Chandola et al.	Anomaly Detection in Healthcare Data	Use of machine learning anomaly detection algorithms such as Isolation Forest and statistical methods to identify abnormal health patterns.	Anomaly detection is effective for identifying unusual health conditions but is rarely integrated into real-time monitoring platforms.
Topol et al.	Artificial Intelligence in Remote Patient Monitoring	Conceptual framework analyzing how AI can enhance remote patient monitoring through predictive analytics and automated insights	AI can significantly improve healthcare monitoring, but most systems remain theoretical or lack integrated recommendation

			engines
Proposed System (Care-AI)	AI-Based Post-Surgical Monitoring and Decision Support System	Integration of wearable health data with machine learning models (Random Forest), anomaly detection (Isolation Forest), and trend forecasting to monitor patient recovery	Provides Recovery Stability Index (RSI), readmission prediction, anomaly detection, and personalized lifestyle and diet recommendations for post-surgical recovery.

V. RESEARCH GAPS IN EXISTING SYSTEMS:

Although considerable advancements have been made in wearable health monitoring and remote patient monitoring systems, there are several limitations associated with existing healthcare technologies. Most wearable health monitoring systems and fitness applications primarily track physiological parameters such as heart rate, SpO_2 levels, sleep patterns, and physical activity. While these systems enable continuous health monitoring, they mainly function as data recording tools and do not perform advanced analysis of the collected health data.Most existing remote patient monitoring systems are also limited in their ability to integrate intelligent decision-support mechanisms with wearable health monitoring technologies. These systems are often unable to detect abnormal health patterns automatically or predict recovery trends that may lead to potential complications after patient discharge from hospitals. Furthermore, many current solutions lack integrated risk assessment mechanisms to estimate patient readmission probability or generate early warning alerts for healthcare professionals.Another drawback of existing health and wellness platforms is their inability to provide personalized recovery recommendations. Most available systems provide only generic health and wellness advice that is not tailored to individual patient conditions, recovery stages, or baseline health metrics. As a result, these systems are less effective in supporting post-surgical recovery and long-term patient health management.

VI. PROPOSED SYSTEM:

The proposed system, **Care-AI**, is a web-based AI platform designed to support post-surgical patient monitoring and recovery management. The system collects physiological data such as heart rate, oxygen saturation (SpO_2), sleep duration, activity level, blood pressure, and pain score from wearable devices or patient inputs. This data is combined with baseline patient health information to analyze the patient's recovery condition.Machine learning algorithms are applied to evaluate recovery status and detect abnormal health patterns. The system calculates a **Recovery Stability Index (RSI)** to represent the overall stability of the patient's recovery and performs short-term forecasting to predict recovery trends. In addition, Care-AI estimates the probability of hospital readmission and generates a **Doctor Alert Score** for early medical intervention.Based on the analyzed health data, the system also provides **adaptive lifestyle and personalized diet recommendations** to support effective recovery. By integrating monitoring, prediction, and recommendation features, Care-AI aims to improve post-discharge care and assist patients in maintaining a stable recovery process

VII. System Architecture :

The Care-AI system architecture consists of three main components: **data sources, processing engine, and clinical outputs**. Wearable devices and medical records provide physiological and lifestyle data for monitoring patient health.The **Care-AI Processing Engine** integrates the data and applies machine learning, anomaly detection, and Recovery Stability Index (RSI) calculation to analyze recovery status and predict risks.The system then generates **clinical outputs** such as doctor alerts, readmission risk prediction, and personalized lifestyle and diet recommendations to support post-surgical recovery.

VIII. CONCLUSION:

In conclusion, the proposed Care-AI system demonstrates how artificial intelligence can enhance post-surgical patient monitoring and recovery management. Unlike traditional wearable health systems that mainly record physiological data, Care-AI analyzes multiple health parameters using machine learning and anomaly detection techniques to generate meaningful clinical insights. The system calculates a Recovery Stability Index (RSI), predicts recovery trends, estimates readmission probability, and generates a Doctor Alert Score for early intervention.By integrating monitoring, prediction, and personalized lifestyle and diet recommendations within a single platform, Care-AI provides a more intelligent approach to post-discharge patient care. The proposed system has the potential to improve recovery outcomes,

VIII. REFERENCES:

[1] S. Patel, H. Park, P. Bonato, L. Chan, and M. Rodgers, "A review of wearable sensors and systems with application in rehabilitation," *Journal of NeuroEngineering and Rehabilitation*, vol. 9, no. 1, pp. 1–17, 2012.

[2] A. Rajkomar, E. Oren, K. Chen, et al., "Scalable and accurate deep learning with electronic health records," *npj Digital Medicine*, vol. 1, no. 18, pp. 1–10, 2018.

[3] S. M. R. Islam, D. Kwak, M. H. Kabir, M. Hossain, and K. S. Kwak, "The Internet of Things for health care: A comprehensive survey," *IEEE Access*, vol. 3, pp. 678–708, 2015.

[4] V. Chandola, A. Banerjee, and V. Kumar, "Anomaly detection: A survey," *ACM Computing Surveys*, vol. 41, no. 3, pp. 1–58, 2009.

[5] E. J. Topol, "High-performance medicine: the convergence of human and artificial intelligence," *Nature Medicine*, vol. 25, pp. 44–56, 2019.

[6] F. Jiang, Y. Jiang, H. Zhi, et al., "Artificial intelligence in healthcare: Past, present and future," *Stroke and Vascular Neurology*, vol. 2, no. 4, pp. 230–243, 2017.