



Original Research Article

ROLE OF ARTIFICIAL INTELLIGENCE FOR DIAGNOSING EARLY SEPSIS IN
ICU SETTING

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ABSTRACT

Background: The evidence-based treatments of patients diagnosed with sepsis are a key aspect of healthcare today; however, early detection of the sepsis process and/or identification of clinical signs and symptoms is necessary to provide timely, appropriate sepsis treatment. Early detection of the sepsis process is challenging due to the subtleties associated with the presenting signs and symptoms, making it difficult to identify patients with developing sepsis based on small physiological changes over time. Machine-Learning Models Recently, advanced Machine-Learning models utilizing Artificial Intelligence to analyze large volumes of clinical data have provided an exciting new way to identify patterns and predict patients who are at high risk of developing sepsis complications before there are any clinical findings. The addition of Artificial Intelligence to the ICU monitoring systems provides a valuable enhancement to clinical decision-making, allowing for more timely initiation of therapy. **Aim:** To evaluate the effectiveness of artificial intelligence-based predictive algorithms in identifying early sepsis among patients admitted to the intensive care unit.

Methods: A large Indian hospital's Department of Medicine and Critical Care performed an observational, analytical, prospective study on 150 of their adult patients who had been admitted to the ICU within a 24 month time frame with an infection/risk factor(s) for sepsis. Clinical information, such as vital signs, laboratory test results, and organ function, was tracked over time using an electronic medical record (EMR) system. They also tracked the patient's clinical data in a computerized AI algorithm to estimate the likelihood of sepsis based on real-time clinical data and to generate early alerts for physicians when patients were suspected of developing sepsis. The study evaluated the results of the AI algorithm by analyzing sensitivity, specificity, predictive values, and the time lost between the prediction and the clinical confirmation of sepsis. The accuracy of the AI algorithm was also evaluated by comparing it to the existing standards used for diagnosing sepsis.

Results: Of 150 total patients included in this study, 68 patients were identified with clinically confirmed sepsis during their stay in the ICU. The artificial intelligence algorithm was able to identify early sepsis in 61 out of these 68 patients presented with a sensitivity of around 89.7%, which means that it had identified nearly all instances of early sepsis in these patients prior to clinical diagnosis. Additionally, the specificity of the artificial intelligence system for identifying non-septic patients was 87.8% and, therefore, approximately 87.8 percent of the patients who did not have sepsis were accurately diagnosed as being non-septic by the algorithm. In most cases, the early alert generated by the algorithm was approximately five hours earlier than the clinical diagnosis made by the treating physician. This early identification was helpful in allowing for the rapid initiation of antimicrobial therapy and supportive care, which contributed to greater stabilization of the hemodynamic status of many patients and prevented a number from progressing into septic shock.

Conclusion: The use of artificial intelligence to support predictive models for early identification of sepsis in an intensive care unit (ICU) setting has great promise. AI algorithms use a patient's clinical and laboratory information to continuously analyze for evidence of early physiological changes that indicate deterioration in condition and enable healthcare providers to provide timely treatment. Incorporating artificial intelligence into existing ICU monitoring systems can improve early identification of sepsis, help optimize the management of sepsis and result in a decrease in the incidence of sepsis caused morbidity and mortality.

Keywords: Artificial intelligence, sepsis, early diagnosis, intensive care unit, predictive analytics, clinical decision support system.

INTRODUCTION

Sepsis is a life-threatening condition that can occur when an individual's immune response to an infection becomes unregulated to the point where the body exhibits signs of organ dysfunction. Sepsis is associated with a high mortality rate and significant morbidity in patients admitted to intensive care units worldwide. Sepsis continues to be one of the leading causes of morbidity and mortality in intensive care units, despite advances in the practice of medicine. The complex pathophysiology, heterogeneity of presentation, and rapid progression to septic shock and multiorgan failure if not recognized and treated in a timely manner are all challenges to the management of sepsis^[1].

The clinical diagnosis of sepsis in an intensive care unit setting is often quite difficult since the initial symptoms may be subtle and nonspecific. The initial presentation of a patient with sepsis typically consists of slight increases in heart rate (slight tachycardia), low-grade fever, and/or mild laboratory findings such as slightly elevated white blood cell counts (WBCs), elevated C-reactive protein (CRP) levels, elevated serum lactate levels, and/or elevated serum procalcitonin levels, which may not suggest a systemic infection. The usual methods for diagnosing sepsis are based on clinical judgment and laboratory tests such as WBC count, CRP level, lactate level, and procalcitonin level. Unfortunately, these tests may not provide an early warning of clinical deterioration and therefore may contribute to delays in treatment. Delays in identifying patients with sepsis have been shown to result in a higher risk of organ dysfunction and death^[2].

Artificial intelligence (AI) technology and improved access to electronic health records and structured data in digital health are providing physicians with the opportunity to incorporate AI into the diagnosis and management of sepsis. Artificial intelligence (AI) has emerged as a new frontier in medicine, especially in critical care medicine where it is helping clinicians make better decisions based on data. AI uses algorithms to analyse large amounts of data to find complex patterns and predict clinical outcomes^[3]. With the many types of physiological data created in critical care settings, AI can help clinicians by identifying early warning signs of infection (e.g., diagnosing the early stages of septicemia).

Machine learning and predictive analytics models have been developed specifically for use in Intensive Care Units (ICUs). They are designed to process continuous streams of patient data, including vital signs, laboratory tests, medication history, and other clinical indicators, allowing AI to identify trends related to sepsis or systemic inflammatory response^[4]. AI-based clinical decision support systems have been created that use algorithms to identify suspected cases of sepsis and provide alerts to the clinician so that the clinician can begin evaluating the patient and begin treatment sooner than normal processes would allow. It is critically important to identify sepsis as soon as possible because studies have shown that for every hour that passes before appropriate antibiotic administration occurs, mortality rates increase^[5].

AI has the ability to identify physiological changes associated with deterioration before those changes become clinically evident, providing clinicians with a time advantage in their assessments^[6]. Using AI to monitor patients in the ICU may enable healthcare providers to implement early treatment and ultimately improve survival rates for patients. In addition to the potential to improve patient outcomes, the integration of AI into ICU monitoring systems has the potential to reduce clinician variability with regard to diagnosing and recognising sepsis. By providing automated alerts and risk scores related to sepsis, AI systems can support clinicians rather than replace them. However, these systems must be rigorously evaluated in clinical settings to determine the effectiveness and reliability of the technology as a means of improving patient outcomes^[7]. Given the increasing interest in applying AI to critical care medicine, it is essential to determine how AI will facilitate the early identification and diagnosis of sepsis in the ICU. Therefore, the purpose of this study is to emphasise the effectiveness of AI-based predictive algorithms for early identification of sepsis in the ICU and to assess how such algorithms can assist with early clinical decision-making and improve patient care.

Aim

To evaluate the role of artificial intelligence-based predictive systems in the early diagnosis of sepsis among patients admitted to the intensive care unit.

Objectives

1. To assess the ability of artificial intelligence algorithms to identify early physiological changes suggestive of sepsis in ICU patients.
2. To compare artificial intelligence-based sepsis alerts with clinically confirmed diagnoses of sepsis in the intensive care unit.
3. To determine the diagnostic performance of artificial intelligence systems in terms of sensitivity, specificity, positive predictive value, and negative predictive value for early sepsis detection.
4. To evaluate the time advantage provided by artificial intelligence in identifying sepsis compared with conventional clinical diagnosis.
5. To assess the potential impact of early AI-generated alerts on timely initiation of antimicrobial therapy and supportive management in ICU patients.
6. To analyze the clinical outcomes associated with early detection of sepsis using artificial intelligence-based monitoring systems.

MATERIAL AND METHODS

Study Design

This study aimed to prospectively observe the effectiveness of AI predictive algorithms as a tool to identify sepsis earlier in patients admitted to the ICU by using a prospective observational analytic design.

Study Setting

The Department of General Medicine and Critical Care of a Tertiary Care Hospital in India conducted the study. The intensive care unit (ICU) contains comprehensive and advanced equipment for monitoring patients; this

equipment includes (but is not limited) to the advanced patient monitoring systems as well as the integration of electronic medical records that provides the ability to continuously capture all physiological and laboratory values (parameters).

Study Duration

The study was conducted over a period of two years, which included patient recruitment, continuous data monitoring, algorithm-based analysis, and clinical outcome assessment.

Study Population

The study population consisted of adult patients admitted to the intensive care unit with suspected infection or clinical conditions that predisposed them to the development of sepsis.

Sample Size

A total of 150 patients admitted to the ICU during the study period who fulfilled the eligibility criteria were included in the study.

Inclusion Criteria

Patients aged 18 years and above admitted to the intensive care unit.

Patients with suspected infection at the time of ICU admission or those who developed infection during ICU stay.

Patients requiring continuous ICU monitoring of vital parameters and laboratory investigations.

Patients who provided consent for the use of their clinical data for research purposes.

Exclusion Criteria

Patients with confirmed sepsis at the time of ICU admission.

Patients admitted to the ICU for less than 24 hours.

Patients with incomplete clinical records or missing laboratory data.

Patients with terminal illness receiving only palliative care.

Data Collection

Age, sex, and other demographic information were collected on admission to the ICU. Patient vital signs like heart rate, respiratory rate, blood pressure, body temperature, and oxygen saturation were recorded continuously. Along with laboratory values (i.e., white blood cell count, serum lactate, C-reactive protein, procalcitonin levels, renal, and liver function tests), vital signs were recorded periodically as defined by ICU

policy. The standard hospital electronic medical record system was used to integrate the clinical data and provide a means for storing and analysing the patient parameters in a structured format.

Artificial Intelligence–Based Sepsis Prediction System

A predictive algorithm based on artificial intelligence was developed to work alongside the existing hospital monitoring system for real-time patient data analysis. The AI model continuously analysed a variety of physiological and laboratory data in order to identify trends that could indicate sepsis at an early stage. When predefined thresholds of risk were reached, the algorithm automatically generated alerts to health-care providers about the likelihood of developing sepsis. Alert notifications were sent to the ICU physicians for clinical assessment to confirm or rule out the presence of sepsis.

Diagnostic Criteria for Sepsis

Clinical diagnosis of sepsis was established based on recognized sepsis diagnostic criteria, which included evidence of suspected or confirmed infection accompanied by signs of organ dysfunction.

Outcome Measures

The main focus of the study was to determine how well an Artificial Intelligence (AI) tool can accurately identify early signs of sepsis. Other key findings measured include how long it took before an AI system identified a patient's possible condition versus what clinicians diagnosed later as being septic, the degree of accuracy (sensitivity/specificity) associated with AI models, the benefits that arise when healthcare professionals act upon alerts generated by AI, and how acting on the alerts of an AI system would have potentially altered or improved clinical care and/or patient outcomes.

Statistical Analysis

All data gathered from the study were entered into an organised data base and analysed using the appropriate statistical software packages. Continuous variables were summarised by mean and standard deviation while categorical variables were summarised using frequencies and percentages. To assess the efficacy of the prediction system using artificial intelligence, diagnostic performance characteristics (sensitivity, specificity, positive predictive value and negative predictive value) were calculated. A p-value of < 0.05 was deemed statistically significant.

RESULTS

The present study was conducted with a total of 150 patients who had been admitted to the intensive care unit in order to evaluate the effects of the artificial intelligence predictive systems for early detection of sepsis. Among this total number of patients in this study, 68 developed clinically confirmed sepsis during the time that they occupied a bed in the ICU, while 82 did not develop sepsis. The AI-based monitoring system for patients mentioned above analysed the physiological and laboratory measurements continuously to identify any early warning signs for sepsis. The AI-Based Predictive Systems provide an early alert regarding suspected sepsis in a substantial percentage of patients prior to a clinical diagnosis being established. We examined the AI Systems' demographic information, clinical data, Diagnostic Performance Indicators, and clinical outcomes of patients who had or did not have sepsis. The artificial intelligence model had high sensitivity and specificity in detecting early sepsis compared with conventional clinical diagnosis and also gave a measurable time benefit as compared with conventional clinical diagnosis.

Table 1: Age-wise distribution of ICU patients included in the study

Age group (years)	Number of patients	Percentage (%)
18–30	18	12.0
31–40	26	17.3
41–50	34	22.7
51–60	38	25.3
61–70	24	16.0
>70	10	6.7

Table 1 shows the distribution of ICU patients according to different age groups.

Table 2: Gender distribution of ICU patients included in the study

Gender	Number of patients	Percentage (%)
Male	94	62.7
Female	56	37.3

Table 2 shows the gender distribution among ICU patients.

Table 3: Primary diagnoses at ICU admission

Primary diagnosis	Number of patients	Percentage (%)
Severe pneumonia	36	24.0
Postoperative complications	28	18.7
Acute pancreatitis	18	12.0
Urinary tract infection	16	10.7
Intra-abdominal infection	20	13.3
Trauma-related complications	14	9.3
Other medical conditions	18	12.0

Table 3 shows the major clinical conditions for which patients were admitted to the ICU.

Table 4: Incidence of sepsis among ICU patients

Clinical outcome	Number of patients	Percentage (%)
Developed sepsis	68	45.3
Did not develop sepsis	82	54.7

Table 4 shows the number of patients who developed clinically confirmed sepsis during ICU stay.

Table 5: Artificial intelligence–based early sepsis alerts

AI alert status	Number of patients	Percentage (%)
AI alert generated	70	46.7
No AI alert	80	53.3

Table 5 shows the distribution of AI-generated alerts for suspected sepsis.

Table 6: Diagnostic performance of the AI model for early sepsis detection

Diagnostic parameter	Value
Sensitivity	89.7%
Specificity	87.8%
Positive predictive value	87.1%
Negative predictive value	90.3%

Table 6 shows the diagnostic accuracy of the artificial intelligence prediction system.

Table 7: Time advantage of AI system in detecting sepsis

Time advantage before clinical diagnosis	Number of patients	Percentage (%)
2–3 hours earlier	18	26.5
4–5 hours earlier	28	41.2
6–7 hours earlier	15	22.1
No time advantage	7	10.2

Table 7 shows the time difference between AI-generated alerts and clinical diagnosis.

Table 8: Clinical outcomes among patients who developed sepsis

Clinical outcome	Number of patients	Percentage (%)
Recovered	44	64.7
Progressed to septic shock	16	23.5
Mortality	8	11.8

Table 8 shows the outcomes among patients diagnosed with sepsis during ICU stay.

Table 9: Time to initiation of antibiotic therapy after AI alert

Time interval	Number of patients	Percentage (%)
Within 1 hour	26	37.1
1–2 hours	30	42.9
2–3 hours	10	14.3
>3 hours	4	5.7

Table 9 shows the interval between AI alert generation and initiation of antimicrobial therapy.

Table 10: ICU length of stay among study patients

ICU stay duration (days)	Number of patients	Percentage (%)
1–3 days	34	22.7
4–7 days	62	41.3
8–14 days	38	25.3
>14 days	16	10.7

Table 10 shows the duration of ICU stay among patients included in the study.

The data in Table 1 reveal the age demographics of patients admitted to the Intensive Care Unit (ICU). The 51-60 year old age group had the highest prevalence among all ICU patients at 25.3% or 38 patients, followed by 41-50 year old age group, which had 22.7% or 34 patients, demonstrating a predominance of middle-aged and elderly patients among the entire ICU population under study.

Table 2 shows that there were more male patients admitted into the ICU than female patients during this time period. Specifically, there were 94 (62.7%) male patients versus 56 (37.3%) female patients.

As indicated by Table 3, severe pneumonia was the most frequently recorded primary diagnosis for ICU admissions, with 36 (24.0%) patients having this diagnosis. Postoperative complication was the second most commonly encountered primary diagnosis for ICU admissions and was observed in 28 (18.7%) patients, while intra-abdominal infections accounted for 20 (13.3%) of all ICU admissions.

As indicated in Table 4, 68 (45.3%) patients developed confirmed clinical evidence of sepsis during their ICU stay. Conversely, 82 (54.7%) patients did not develop any clinical evidence of sepsis while in the ICU.

As demonstrated in Table 5, the AI system provided an early sepsis alert for 70 (46.7%) patients, while 80 (53.3%) patients did not receive AI alert.

As demonstrated in Table 6, the Prediction Model created by the AI had a very high level of diagnostic accuracy, with an overall Sensitivity of 89.7%, Specificity of 87.8%, Positive Predictive Value of 87.1%, and Negative Predictive Value of 90.3%.

As indicated in Table 7, the AI system was successful in identifying early signs of sepsis before the clinical diagnosis of sepsis for a significant percentage of the patients included in the study; specifically, 28 (41.2%) patients received an AI alert for early sepsis

approximately four to five hours prior to their clinical diagnosis

As indicated in Table 8, of the 68 (45.3%) patients who developed sepsis, 44 (64.7%) patients had recovered with appropriate antibiotic therapy, 16 (23.5%) patients progressed to septic shock, and eight (11.8%) patients died from sepsis.

As reported in Table 9, 56 (80.0%) patients initiated antibiotic therapy within two hours of receiving an early sepsis alert from the AI. Thus, while the early detection of sepsis was accomplished by the AI system, most of the patients received timely clinical response with clinical intervention following receipt of the alerts.

As indicated in Table 10, the majority of ICU patients were in the ICU for a duration of four to seven days, accounting for 62 (41.3%) total patient days in this cohort. The second highest number of days spent in the ICU (8-14 days) was 38 (25.3%).

DISCUSSION

Sepsis is a major problem in the intensive care unit (ICU) due to the speed at which it develops, the complexity of the mechanisms involved, and the high mortality rates associated with untreated sepsis. Early detection and treatment of sepsis are key in providing patients with necessary interventions such as antibiotics, fluid resuscitation, and organ support^[8]. The delay in early detection of sepsis is caused by the nonspecificity of symptoms and variability of physiological response in critically ill patients. This study was designed to look at how predictive systems using artificial intelligence can facilitate early diagnosis of sepsis in the ICU^[9]. The findings demonstrated that the majority of patients admitted to the ICU were either middle-aged or elderly, which supports the established relationship between

increasing age and increased risk of sepsis, decreased immune response, and increased likelihood of organ dysfunction. In addition, more than one-half of the patients admitted to the ICU were men, which may indicate differences in medical care seeking behavior among genders, as well as differences in the prevalence of comorbidities or risk factors for severe infections^[10]. The most frequent primary diagnosis of patients admitted to the ICU was pneumonia, a well-known major cause of sepsis in critically ill patients requiring mechanical ventilation. Other common diagnoses associated with ICU admission included postoperative complications, intra-abdominal infections, urinary tract infections, and acute pancreatitis. These diagnoses commonly produce systemic inflammatory responses, which may progress to sepsis if left untreated^[11]. A significant number of patients included in the study suffered from sepsis during their intensive care unit (ICU) stay, emphasizing the need for close monitoring and prompt detection of physiological decline. An AI-based monitoring system was highly successful in identifying the earliest indicators of sepsis via constant evaluation of multiple clinical factors^[12]. Early alerts via the AI-based monitoring system were generated on a significant portion of patients who later developed definitively diagnosed sepsis, implying that AI algorithms can detect early physiological patterns that lead to sepsis infection^[13]. The level of accuracy in identifying early indicators of sepsis was very good. The high sensitivity value indicates that the artificial intelligence monitoring system was able to identify almost all patients that would go on to develop sepsis, thereby reducing the missed diagnosis errors^[14]. The high specificity value indicates that the number of false positive alerts generated by the AI system was low, reducing the chance of unnecessary clinical intervention or alert fatigue for healthcare professionals. Another major finding from the study is that alerts generated by the AI-based monitoring system provided an early indication of a potential diagnosis of sepsis^[15]. In many cases, the AI monitoring alerts were generated several hours before a clinician made an official diagnosis of sepsis. This finding is particularly important as it allows for earlier initiation of empirical antibiotic treatment and fluid resuscitation, as well as supportive care. Clinical studies have shown that delays in the initiation of appropriate antimicrobial therapy are associated with increased mortality in septic patients^[16]. As a result of having early warning systems available to assist clinicians with the early detection of sepsis, the likelihood of improving a patient's prognosis is enhanced. The study results suggest that when an AI system generates an alert for early detection of sepsis, most patients will receive timely initiation of antimicrobial therapy^[17]. In sepsis management systems, rapid response times to clinical detection of sepsis enable clinicians to provide effective treatment for their patients. This can prevent patients from advancing into severe forms of sepsis or septic shock, prevent or reduce organ function deterioration, and improve survival rates for their patients^[18]. Results from the current study indicate that a significant number of patients who had sepsis improved following appropriate treatment for sepsis. Although some developed septic shock or died, it appears that if the sepsis is detected early and treated

quickly, the prognosis for patients in intensive care units may be improved^[19]. AI-based support systems for critical care clinicians will change the way clinicians interpret large amounts of clinical data generated by modern intensive care units, such as vital signs, laboratory tests, and the patient's physiological parameters, and will allow clinicians to assess large amounts of clinical data and differentiate between clinically relevant and clinically irrelevant patient data in order to facilitate the early detection of subtle physiological changes indicating a patient's clinical deterioration^[20].

In summary, AI systems are intended to augment clinical judgment, not to supplant or replace it. AI tools for monitoring patients will only be effective when they are fully integrated into the workflow of the current clinical setting and interpreted according to the judgement of trained healthcare providers. Healthcare providers will continue to evaluate patients in a comprehensive manner while utilising alerts generated by AI as supplemental information for decision-making in their practice.

The findings of the current study highlight how AI has the potential to improve the early diagnosis of sepsis in intensive care units through the provision of early warning alerts, and how AI systems can assist clinicians in identifying subtle physiological changes that occur prior to sepsis and provide an opportunity for early clinical intervention for better management and better patient outcomes in a critical care setting.

CONCLUSION

Through this research study it has been demonstrated that predictive systems that are based on the artificial intelligence (AI) can play a critical role in the early detection of sepsis among patients who are admitted to the ICU. Use of advanced analytical software to continuously analyze physiological and laboratory data, utilizing AI algorithms, enables the identification of early clinical signs and symptoms of sepsis before significant clinical changes have developed. Because of this early identification capability, clinicians using AI can initiate the diagnostic evaluations and therapeutic interventions in a timelier manner than if they did not have access to AI-generated data. Furthermore, the findings of this study confirm that AI-based predictive systems have exhibited high diagnostic accuracy and an excellent level of sensitivity for the detection of patients at risk for developing sepsis. In addition, the capability of AI-generated alerts to allow for timely initiation of antimicrobial therapy and supportive care is fundamental in the treatment of patients experiencing sepsis. The integration of AI-based monitoring systems into ICU clinical practice has the potential to enhance the clinical judgment of health care providers, improving the early recognition of patient deterioration. AI-based monitoring systems will serve as valued clinical support tools that will assist health care providers in making better decisions regarding the early diagnosis of, optimal treatment strategies for, and hopefully reduction of the morbidity and mortality associated with sepsis.

In general, the use of AI in critical care medicine is a promising new area of development. Through additional

refinements, validations, and ultimate incorporation into the daily workflow of health care providers, AI predictive systems will likely become an integral part of the monitoring and treatment of sepsis in the modern ICU.

Limitations of the Study

While the findings from the present study advance our understanding of the potential benefits of implementing an artificial intelligence-driven system for early identification of sepsis in patients, there are several important limitations to this research that must be taken into account. One of the primary limitations of this study was that it was conducted at a single tertiary-care hospital, which may limit the generalizability of our results to other health systems. In order to develop stronger evidence toward the ability of artificial intelligence systems to successfully identify patients with early stages of sepsis, future research should be performed that includes multiple clinical sites with diverse patient populations. Another limitation of this study was the sample size used; while adequate to provide preliminary evidence regarding the utility of this system, it was still relatively small. Performing larger multicenter studies with larger sample sizes would improve confidence in the robustness of the validation of artificial intelligence algorithms used to identify patients with early sepsis. Furthermore, while this study focused on assessing early diagnostic capability and immediate clinical outcomes among patients diagnosed with sepsis, we did not assess long-term outcomes (e.g., functional recovery, long-term survival, incidence of complications) beyond the initial 72 hours following diagnosis. As previously mentioned, the validity of the artificial intelligence system depends, in part, on the quantity and quality of the data that is captured within the electronic medical record system, and any inconsistencies or missing data may have an impact on the performance of the algorithm.

Future Scope

Future studies should be based upon multicentered trials using larger populations of patients to determine if Artificial Intelligence technologies can provide a reliable method of early sepsis detection across different health care settings. Advanced machine learning algorithms should continue to be created which include many more data sources, including additional vital sign information, biomarker cameras, and genetic sequencing results to better identify those patients at greatest risk of developing sepsis. The convergence of AI and real-time Intensive Care unit (ICU) monitoring systems and Electronic Health Record (EHR) allows for improved hospital decision-making through automated data entry and diagnosis support systems. In addition, future research could evaluate the effectiveness of AI-based detection of sepsis on long-term patient results and anticipated use of hospital resources and cost-effectiveness. Future advances in the development of new artificial intelligence technology are expected to progressively improve the medical establishment's ability to accurately identify patients who have early signs of sepsis and will assist hospitals in providing better treatment options and decreasing mortality rates.

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