South Health and Policy. 2025; 4:193
doi: 10.56294/shp2025193

ORIGINAL

Impact of early administration of antibiotics in patients with sepsis and its prognoses

Impacto de la administración precoz de antibióticos en pacientes con sepsis y sus pronósticos

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Cite as: Do Nascimento LDN, Lipovestky F. Impact of early administration of antibiotics in patients with sepsis and its prognoses. South Health and Policy.2025; 4:193. https://doi.org/10.56294/shp2025193

Submitted: 02-05-2024 **Revised:** 28-08-2024 **Accepted:** 12-01-2025 **Published:** 13-01-2025

Editor: Dr. Telmo Raúl Aveiro-Róbalo

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ABSTRACT

Introduction: sepsis is a very complex medical condition resulting from a dysregulated inflammatory response of the host to an infectious condition, which can lead to organ dysfunction and, in the most critical cases, death. Early administration of antibiotics is crucial to improve clinical outcomes in patients with sepsis. This study aims to evaluate the impact of early administration on clinical outcomes in patients with sepsis.
Objective: the objective is to evaluate the impact of early administration of antibiotics on clinical outcomes in patients with sepsis, including mortality, length of hospital stay, and complications.
Method: data collection was performed through a search in online database such as: Pubmed, SCIELO, Google Scholar among others. The research will be composed of published and updated literatures showing the importance of early administration of antibiotics for the treatment of sepsis.
Results: the review of studies suggests a strong association between delays in antibiotic administration and increased in-hospital mortality in patients with sepsis. In the first study, it was observed that even administration within six hours showed an increasing risk of mortality with each hour of delay, this risk being particularly high in cases of septic shock. The second study confirmed this trend, with a median time to antibiotic administration of 2,1 hours. Mortality increased in proportion to the length of delay, with higher mortality rates in patients with septic shock compared to those with moderate sepsis. Each additional hour was associated with a marked increase in complications, highlighting the importance of immediate interventions to improve prognosis and reduce associated mortality.
Conclusion: in summary, the studies reviewed show that early administration of antibiotics is a key factor in improving clinical outcomes in sepsis, especially in severe cases. The establishment of clinical practices and guidelines that prioritize rapid intervention in patients with sepsis could contribute significantly to reducing mortality and complications associated with sepsis, that is, training health care personnel to identify probable cases of sepsis and septic shock in order to act quickly in the administration of antibiotics.

Keywords: Sepsis; Septic Shock; Early Antibiotic Administration; Clinical Outcomes; Hospital Length of Stay.

RESUMEN

Introducción: la sepsis es una condición médica muy compleja, resultado de una respuesta inflamatoria desregulada del huésped frente a un cuadro infeccioso, que puede llevar a la disfunción orgánica, y en los casos más críticos a la muerte. La administración precoz de antibióticos es crucial para mejorar los resultados clínicos en los pacientes con sepsis. Este estudio busca evaluar el impacto de la administración temprana en los resultados clínicos de pacientes con sepsis.
Objetivo: el objetivo es a partir de una revisión sistemática evaluar el impacto de la administración precoz

de antibióticos en los resultados clínicos de pacientes con sepsis, incluyendo mortalidad, tiempo de estancia hospitalaria y complicaciones.
Método: la recolección de datos se realizó a través de una búsqueda en la base de datos online como: Pubmed, SCIELO, Google Académico entre otros. La investigación estará compuesta por las literaturas publicadas y actualizadas que muestran la importancia de la administración temprana de antibióticos para el tratamiento de la sepsis.
Resultados: la revisión de los estudios sugiere una fuerte asociación entre los retrasos en la administración de antibióticos y el aumento de la mortalidad hospitalaria en pacientes con sepsis. En el primer estudio, se observó que incluso la administración en un plazo de seis horas mostraba un riesgo creciente de mortalidad con cada hora de retraso, siendo este riesgo especialmente elevado en los casos de shock séptico. El segundo estudio confirmó esta tendencia, con una mediana de tiempo de 2,1 horas para la administración de antibióticos. La mortalidad aumentó en proporción a la duración del retraso, con tasas de mortalidad más elevadas en los pacientes con shock séptico en comparación con los que presentaban sepsis moderada. Cada hora adicional se asoció a un notable aumento de las complicaciones, lo que pone de relieve la importancia de las intervenciones inmediatas para mejorar el pronóstico y reducir la mortalidad asociada.
Conclusión: en resumen, los estudios analizados muestran que la administración precoz de antibióticos es un factor clave para mejorar los resultados clínicos en la sepsis, especialmente en los casos graves. El establecimiento de prácticas clínicas y directrices que prioricen la intervención rápida en pacientes con sepsis podría contribuir significativamente a reducir la mortalidad y las complicaciones asociadas a la sepsis, o sea, capacitar el personal de la salud a identificar casos probables de sepsis y shock séptico para actuar rápidamente en la administración de los antibióticos.

Palabras clave: Sepsis; Shock Séptico; Administración Temprana Antibióticos; Resultados Clínicos; Tiempo Estancia Hospital.

INTRODUCTION

Sepsis is a severe systemic inflammatory response to infection, which can lead to multiorgan failure and death. It is currently considered an emergency in hospitals and critical care because of its diagnostic and therapeutic complexity.

According to the Sepsis Definitions Task Force, the ''SEPSIS-3'' consensus defines sepsis as: ''a life-threatening organ dysfunction caused by a dysregulated host response to infection''.[1] The SEPSIS-3 consensus came with the concept of ''organ dysfunction'' that was not mentioned before, and that brings us more attention to the degree of severity, thus requiring early intervention with a correct diagnosis and management with early antibiotic therapy. An essential part to aid in the diagnosis is the use of the SOFA (Sequential Organ Failure Assessment) score, which establishes different clinical and laboratory criteria to evaluate organ dysfunction, considering that the ZERO score is the baseline score and means that there is no organ dysfunction, and from 2 points the diagnosis of organ dysfunction is made, thus being the diagnosis of sepsis.[2] Another score used is the qSOFA (quick SOFA), a clinical score that does not require laboratory tests and can be performed quickly to assess organ dysfunction. However, it is not sensitive to sepsis and is an additional tool to aid the diagnosis since other diseases also involve organ dysfunction. In the ICU setting, the criteria used are SOFA and APACHE-II. qSOFA, due to their unspecificity, does not demonstrate relevant results in this setting.[3]

With the help of SOFA and qSOFA scores, we can diagnose sepsis; thus, intervention with antibiotic therapy before ONE one-hour diagnosis is crucial for a more favorable prognosis. Studies show that the delay in antibiotic administration is associated with an increase in the mortality rate and future complications due to septic disease, in addition to increased hospital and ICU stays.[4]

This study is a systematic review that demonstrates the clinical outcomes that can be expected with early antibiotic administration, such as decreased mortality, length of hospital stay, and risk of complications.

Mortality is the most critical point that can lead to sepsis and varies according to the severity of the condition and the therapeutic response time; the earlier the intervention is started, the greater the reduction in mortality. This point should be given importance since sepsis is a frequent clinical emergency in hospitals and ICUs, with an increase in deaths.

Another parameter studied is the time spent in the ICU and hospital. Patients who receive early treatment tend to recover faster with fewer complications, resulting in a shorter hospital stay.[5]

The most common complications that are associated with sepsis may include renal failure, cardiovascular dysfunction, and respiratory failure, among other organ dysfunctions.[6] As noted above, early intervention is the key so that unfortunate events such as complications and longer hospitalization times do not occur.

This study seeks to contribute to understanding antibiotic stewardship's impact on clinical outcomes in

patients with sepsis. By providing robust evidence on the importance of administration time, we aim to influence clinical practices and optimize treatment protocols.

How does early antibiotic stewardship impact clinical outcomes such as mortality, length of hospitalization, and complications in patients with sepsis?

Objective

To reduce mortality and improve recovery in septic patients.

METHOD

This study was conducted as a systematic review of extensive observational studies focusing on the timing of antibiotic administration in sepsis and the likelihood of mortality.

The study examined the population of adults >18 years without trauma admitted to the emergency departments of general hospitals and tertiary care centers in the United States, Germany, and South Korea.

The criteria for defining clinical sepsis are according to the Sepsis-3 and the severity of Emergency Department Sepsis Mortality in Sepsis [MEDS] and Sequential Organ Failure Assessment [SOFA] scores.

The study reports the door-to-antibiotic time ratio from patient admission to the emergency department to antibiotic administration. Moreover, it compares mortality with door-to-antibiotic time, whether administration <1 hour vs > 1h or > three h and < 3h.

RESULTS

The review of studies suggests a strong association between delays in antibiotic administration and increased in-hospital mortality in patients with sepsis. In the first study, it was observed that even administration within six hours showed an increasing risk of mortality with each hour of delay, this risk being particularly high in cases of septic shock. The second study confirmed this trend, with a median time to antibiotic administration of 2,1 hours. Mortality increased in proportion to the length of delay, with higher mortality rates in patients with septic shock compared to those with moderate sepsis. Each additional hour was associated with a marked increase in complications, highlighting the importance of immediate interventions to improve prognosis and reduce associated mortality.

DISCUSSION

The results of this systematic review mark the importance of prompt antibiotic intervention to improve clinical outcomes in patients with sepsis. The association between delays in administration and increased mortality was constant in the studies analyzed. In patients who received antibiotics within the first hour of admission, mortality rates were significantly lower, which shows the need for immediate action in the ED setting.[7] The Surviving Sepsis Guidelines for the management of sepsis in patients with sepsis were published by the Surviving Sepsis Society of America.

The Surviving Sepsis Campaign guidelines recommend administering antibiotics within 1 hour to patients with suspected severe sepsis.[8] This recommendation is based on evidence suggesting that each hour of delay in administration is associated with worse clinical outcomes, especially in patients with septic shock. The reviewed studies reinforce these recommendations, showing that prompt initiation of antimicrobial therapy is crucial to reducing mortality risk. While rapid intervention is essential in severe cases, administration should be adjusted based on the initial risk assessment. Pressure to administer antibiotics quickly may lead to overtreatment in cases of unconfirmed sepsis, which could increase antimicrobial resistance.[9]

The impact of time on antibiotic administration was observed to vary depending on the severity of sepsis. In cases of septic shock, where there is a more intense inflammatory response and rapid organ deterioration, a delay of up to one hour was associated with a substantial increase in mortality. In contrast, patients with less severe sepsis, although also benefiting from early intervention, did not show the same level of risk with moderate delays. This finding suggests that priority for immediate treatment should be given to patients with septic shock. In contrast, patients with moderate pictures could undergo a more careful evaluation before using broad-spectrum antibiotics, thus ensuring the diagnosis of sepsis.[10]

Although rapid antibiotic administration is widely recommended, the evidence has limitations. One is accurately identifying patients who truly benefit from immediate intervention versus those with less severe infectious disease, which may avoid the overuse of antibiotics and reduce the risk of bacterial resistance, as previously stated.[11] The results of this review suggest the need for a more accurate approach to antibiotics.

The results of this review suggest the need to improve hospital protocols to ensure that patients with sepsis, especially in severe stages, receive antibiotics quickly and effectively. Developing tools that allow accurate and agile identification of severe sepsis could help the emergency team prioritize patients who need antibiotics immediately. In addition, the implementation of periodic training for healthcare teams should be considered to reduce antibiotic door time and improve adherence to guidelines.[12]

CONCLUSIONS

In summary, the studies reviewed show that early administration of antibiotics is a key factor in improving clinical outcomes in sepsis, especially in severe cases. Establishing clinical practices and guidelines that prioritize rapid intervention in patients with sepsis could contribute significantly to reducing mortality and complications associated with sepsis, i.e., training healthcare personnel to identify probable cases of sepsis and septic shock to act quickly in administering antibiotics.

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FINANCING

None.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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