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Diagnostic value of neutrophil CD64, procalcitonin, and interleukin-6 in sepsis: a meta-analysis

Shan Cong, Tiangang Ma, Xin Di, Chang Tian, Min Zhao and Ke Wang*

Abstract

Background: The aim of the study was to conduct a meta-analysis to evaluate the accuracy of neutrophil CD64, procalcitonin (PCT), and interleukin-6 (IL-6) as markers for the diagnosis of sepsis in adult patients.

Methods: Various databases were searched to collect published studies on the diagnosis of sepsis in adult patients using neutrophil CD64, PCT, and IL-6 levels. Utilizing the Stata SE 15.0 software, forest plots and the area under the summary receiver operating characteristic curves were drawn. The pooled sensitivity, specificity, positive likelihood ratio, negative likelihood ratio, diagnostic odds ratio, and area under the curve (AUC) were calculated.

Results: Fifty-four articles were included in the study. The pooled sensitivity, specificity, and AUC of neutrophil CD64 for the diagnosis of sepsis were 0.88 (95% confidence interval [CI], 0.81–0.92), 0.88 (95% CI, 0.83–0.91), and 0.94 (95% CI, 0.91–0.96), respectively. The pooled sensitivity, specificity, and AUC of PCT for the diagnosis of sepsis were 0.82 (95% CI, 0.78–0.85), 0.78 (95% CI, 0.74–0.82), and 0.87 (95% CI, 0.83–0.89), respectively. Subgroup analysis showed that the AUC for PCT diagnosis of intensive care unit (ICU) sepsis was 0.86 (95% CI, 0.83–0.89) and the AUC for PCT diagnosis of non-ICU sepsis was 0.82 (95% CI, 0.78–0.85). The pooled sensitivity, specificity, and AUC of IL-6 for the diagnosis of sepsis were 0.72 (95% CI, 0.65–0.78), 0.70 (95% CI, 0.62–0.76), and 0.77 (95% CI, 0.73–0.80), respectively.

Conclusions: Of the three biomarkers studied, neutrophil CD64 showed the highest diagnostic value for sepsis, followed by PCT, and IL-6. On the other hand, PCT showed a better diagnostic potential for the diagnosis of sepsis in patients with severe conditions compared with that in patients with non-severe conditions.

Keywords: Sepsis, Neutrophil CD64, Procalcitonin, Interleukin-6, Meta-analysis

Background

In recent years, the incidence and mortality of sepsis have increased significantly due to the increase of drug-resistant bacteria, the widespread use of antibiotics, and the aging of the population. The latest epidemiological study, including septicemia cases in 195 countries around the world, showed that in 2017 there were 48.9 million

sepsis patients and 11 million deaths from sepsis worldwide, which was equivalent to 19.7% of total deaths throughout the year [1]. In 2016, the Society of Critical Care Medicine (SCCM) and the European Society of Intensive Care Medicine (ESICM) jointly issued the definition of Sepsis 3.0 as the life-threatening organ dysfunction caused by dysregulation of the host's response to infection [2]. At the same time, the diagnostic criteria for sepsis were proposed. For patients with ICU infection or suspected infection, sepsis is diagnosed when the sequential organ failure assessment (SOFA) score is ≥ 2 [3]. However,

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P. K. Verma



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Inflammation, 4 Volume Set Jean-Marc Cavaillon, Mervyn Singer, 2018-02-20 Dieses Fachbuch erl utert die molekularen Grundlagen von Entz ndungen spannt den Bogen zu Infektionskrankheiten und den Zusammenhang zwischen Entz ndungen und chronischen Erkrankungen behandelt abschlie end den Heilungsprozess und zeigt Therapiem glichkeiten Clinical Approaches to Hospital Medicine Kevin Conrad, 2017-11-09 This book provides an update on recent clinical practice and an in depth view of selected topics relevant to hospital medicine It is divided into four sections that explore clinical administrative systems and ethical issues Each section places an emphasis on the opportunities challenges and potential directions of this burgeoning subspecialty An important topic covered extensively is how hospitalists are being called to lead on the current opioid epidemic given that they are well suited in responding to complicated challenges crossing all specialties Other chapters explore worldwide practice patterns and practical application of philosophical tools in daily practice This up to date resource provides hospitalists advanced nurse practitioners medical students and administrators with the latest research trends and issues in hospital medicine **Principles and Practice of Critical Care** P. K. Verma, 2019-09-08 This edition is presented in a totally new and reader friendly format The focus of this volume is on holistic management of critically ill adult patients and it builds upon concepts one step at a time allowing one the opportunity to develop competence at one s own pace *Inflammation* Jean-Marc Cavaillon, Mervyn Singer, 2017-10-02 The leading reference on this topic of increasing medical relevance is unique in offering unparalleled coverage The editors are among the most respected researchers in inflammation worldwide and here have put together a prestigious team of contributors Starting with the molecular basis of inflammation from cytokines via the innate immune system to the different kinds of inflammatory cells they continue with the function of inflammation in infectious disease before devoting a large section to the relationship between inflammation and chronic diseases The book concludes with wound and tissue healing and options for therapeutic interventions A must have for clinicians and biomedical researchers alike **Advances in Clinical Chemistry** , 2012-12-31 Volume 59 in the internationally acclaimed *Advances in Clinical Chemistry* contains chapters submitted from leading experts from academia and clinical laboratory science Authors are from a diverse field of clinical chemistry disciplines and diagnostics ranging from basic biochemical exploration to cutting edge microarray technology Written by authors representing the diverse field of clinical chemistry and diagnostics reviews in *Advances in Clinical Chemistry* cover a range of cutting eduge research ranging from basic biochemical exploration to microarray technology New Trends in Biomarkers and Diseases: An Overview Juan Antonio Vilchez, María Dolores Albaladejo-Otón, 2017-09-29 Biomarkers are any measurable biochemical characteristics of an organism that reflect a particular physiological state Biomarkers can take many different forms including particular proteins or peptides antibodies cell types metabolites hormones enzyme levels compounds related to genomics etc A biomarker can also be a substance introduced into a patient to assess the internal organ systems role In medicine biomarkers considered as

compounds isolated from serum urine or other fluids can be used as an indicator of the presence or severity of a particular disease state The use of biomarkers is becoming a fundamental practice in medicine Biomarker research involves a significantly greater scope of laboratory medicine This monograph presents information on several types of biomarkers for general pathologies preeclampsia metabolic syndrome iron metabolism bone disease liver function renal function cardiovascular pathology including atrial fibrillation peripheral artery disease thrombotic disorders and sepsis Additional information on endocrine and salivary biomarkers is also presented New Trends in Biomarkers and Diseases An Overview is an ideal reference for medical students pathology trainees and clinical researchers seeking information on biomarkers in medicine

Infections in the Intensive Care Unit, volume II Zhongheng Zhang,George Dimopoulos ,Yuetian Yu,2025-02-05 Infectious disease is always a major problem in the intensive care unit ICU especially during the COVID 19 pandemic Based on the EPIC III study it is revealed that almost half of the critically ill patients admitted to the ICU have infectious diseases What s more if the infections are hospital acquired or ICU acquired the pathogens are most likely to be multidrug resistance MDR Thus the application of the antimicrobial stewardship program ASP and infection control program ICP is much more important With the development of laboratory medicine some new diagnostic tools based on molecular detection have been invented in these years Gene X pert FilmArray and metagenomics next generation sequencing mNGS are widely used in the ICU Therefore individualized diagnosis and precise treatment for critically ill patients with infectious diseases are recommended In addition more algorithms and prediction models have been developed based on machine learning and artificial intelligence AI and many new antibiotics have also been approved in clinical practice However the mortality of sepsis or severe infectious diseases does not decrease significantly Therefore the strategies for diagnosing and treating infectious diseases need to be thought over again

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Hepato-gastroenterology ,2001 *Hematologic Problems of the Neonate* Robert D. Christensen (M.D.), 2000 Introducing an up to date reference on causes and treatments of hematologic conditions in newborn infants The book provides definitive coverage of hematopoiesis and hematopoietic growth factors solving hematologic problems of neonates The authors are well known respected authorities

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Table of Contents Diagnostic Value Of Procalcitonin Interleukin 6 And

1. Understanding the eBook Diagnostic Value Of Procalcitonin Interleukin 6 And
 - The Rise of Digital Reading Diagnostic Value Of Procalcitonin Interleukin 6 And
 - Advantages of eBooks Over Traditional Books
2. Identifying Diagnostic Value Of Procalcitonin Interleukin 6 And
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Diagnostic Value Of Procalcitonin Interleukin 6 And
 - User-Friendly Interface
4. Exploring eBook Recommendations from Diagnostic Value Of Procalcitonin Interleukin 6 And
 - Personalized Recommendations
 - Diagnostic Value Of Procalcitonin Interleukin 6 And User Reviews and Ratings

- Diagnostic Value Of Procalcitonin Interleukin 6 And and Bestseller Lists
- 5. Accessing Diagnostic Value Of Procalcitonin Interleukin 6 And Free and Paid eBooks
 - Diagnostic Value Of Procalcitonin Interleukin 6 And Public Domain eBooks
 - Diagnostic Value Of Procalcitonin Interleukin 6 And eBook Subscription Services
 - Diagnostic Value Of Procalcitonin Interleukin 6 And Budget-Friendly Options
- 6. Navigating Diagnostic Value Of Procalcitonin Interleukin 6 And eBook Formats
 - ePub, PDF, MOBI, and More
 - Diagnostic Value Of Procalcitonin Interleukin 6 And Compatibility with Devices
 - Diagnostic Value Of Procalcitonin Interleukin 6 And Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Diagnostic Value Of Procalcitonin Interleukin 6 And
 - Highlighting and Note-Taking Diagnostic Value Of Procalcitonin Interleukin 6 And
 - Interactive Elements Diagnostic Value Of Procalcitonin Interleukin 6 And
- 8. Staying Engaged with Diagnostic Value Of Procalcitonin Interleukin 6 And
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Diagnostic Value Of Procalcitonin Interleukin 6 And
- 9. Balancing eBooks and Physical Books Diagnostic Value Of Procalcitonin Interleukin 6 And
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Diagnostic Value Of Procalcitonin Interleukin 6 And
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Diagnostic Value Of Procalcitonin Interleukin 6 And
 - Setting Reading Goals Diagnostic Value Of Procalcitonin Interleukin 6 And
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Diagnostic Value Of Procalcitonin Interleukin 6 And
 - Fact-Checking eBook Content of Diagnostic Value Of Procalcitonin Interleukin 6 And
 - Distinguishing Credible Sources

13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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