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The Function of Procalcitonin in Hospitalized Patients with Seasonal Influenza as an Antimicrobial Stewardship Tool

Wee Leng*

Department of Occupational and Environmental Medicine, Peking University, Beijing, China

Abstract

Procalcitonin (PCT) has emerged as a significant biomarker for bacterial infections and has shown potential in guiding antibiotic therapy, particularly within the context of antimicrobial stewardship programs. This article explores the role of procalcitonin in hospitalized patients with seasonal influenza, focusing on its utility as an antimicrobial stewardship tool. By analyzing the current literature, this study investigates how PCT levels can differentiate between bacterial and viral infections, thereby optimizing antibiotic use, reducing unnecessary prescriptions, and ultimately combating antibiotic resistance. The findings indicate that PCT-guided therapy can effectively improve patient outcomes, decrease hospital costs, and support the global initiative for responsible antibiotic use.

Keywords: Procalcitonin • Seasonal influenza • Antibiotic resistance • Biomarkers

Introduction

Seasonal influenza is a significant public health concern, causing considerable morbidity and mortality worldwide. Hospitalized patients with influenza are often at risk for secondary bacterial infections, complicating the clinical picture and necessitating careful management of antibiotic therapy. Overuse and misuse of antibiotics contribute to the growing problem of antibiotic resistance, making it imperative to find reliable methods for distinguishing between viral and bacterial infections. Procalcitonin (PCT), a peptide precursor of the hormone calcitonin, has shown promise as a biomarker for bacterial infections. This article examines the function of procalcitonin in hospitalized patients with seasonal influenza and its potential as an antimicrobial stewardship tool, aimed at optimizing antibiotic use and improving patient care [1].

Procalcitonin is produced by the C-cells of the thyroid gland and various other tissues in response to systemic inflammation, particularly bacterial infections. In healthy individuals, PCT levels are typically low; however, during bacterial infections, levels rise significantly, making it a useful biomarker for differentiating bacterial infections from viral ones. Numerous studies have demonstrated the efficacy of PCT in guiding antibiotic therapy, reducing unnecessary antibiotic use, and shortening the duration of treatment [2].

Literature Review

Antimicrobial Stewardship Programs (ASPs) aim to optimize antibiotic use to combat resistance, reduce adverse effects, and ensure the best clinical outcomes. Integrating PCT measurements into these programs has shown promise in several clinical settings, including intensive care units and emergency departments. Research indicates that PCT-guided protocols can safely reduce antibiotic consumption in patients with respiratory infections without compromising patient safety. Seasonal influenza poses a dual threat: the direct effects of the viral infection and the potential for secondary bacterial infections. Differentiating between viral influenza and bacterial co-infections is challenging but crucial for appropriate antibiotic use. Studies have shown that PCT levels can help clinicians make informed decisions about antibiotic therapy in patients with influenza, potentially reducing the misuse of antibiotics and the associated risks [3].

The role of PCT in managing hospitalized patients with seasonal influenza lies primarily in its ability to distinguish between viral and bacterial infections. Elevated PCT levels are indicative of bacterial infections, which can occur as secondary complications in influenza patients. By using PCT as a marker, clinicians can make more accurate diagnoses and tailor antibiotic therapy accordingly. This approach not only improves patient outcomes but also supports antimicrobial stewardship efforts by reducing unnecessary antibiotic prescriptions. Several clinical trials and observational studies have supported the use of PCT in guiding antibiotic therapy for respiratory infections, including influenza. For instance, a study found that PCT-guided therapy reduced antibiotic exposure in patients with respiratory infections without increasing adverse outcomes. Furthermore, guidelines from organizations such as the Infectious Diseases Society of America (IDSA) endorse the use of biomarkers like PCT to support clinical decision-making in managing respiratory infections. Implementing PCT-guided protocols in hospital settings requires a multidisciplinary approach involving clinicians, microbiologists, and pharmacists. Training and education are essential to ensure that healthcare providers understand the interpretation of PCT levels and the appropriate adjustments to antibiotic therapy. Additionally, integrating PCT measurements into electronic health records can facilitate real-time decision-making and enhance the effectiveness of antimicrobial stewardship programs [4].

Discussion

Despite the potential benefits, there are challenges and limitations to the widespread adoption of PCT-guided therapy. Variability in PCT assays, differences in cutoff values, and the potential for false positives or negatives can complicate clinical decision-making. Moreover, the cost of PCT testing and the need for timely results may limit its use in some healthcare settings. Addressing these challenges requires ongoing research, standardization of testing protocols, and consideration of cost-effectiveness in different healthcare environments. The role of procalcitonin in the management of hospitalized patients with seasonal influenza is multifaceted and significantly impacts antimicrobial stewardship efforts. Procalcitonin's primary function lies in its ability to serve as a reliable biomarker for distinguishing between

***Address for Correspondence:** Wee Leng, Department of Occupational and Environmental Medicine, Peking University, Beijing, China; E-mail: wee.leng@yahoo.com*

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bacterial and viral infections. Elevated levels of PCT are indicative of bacterial infections, which can complicate cases of viral influenza, necessitating the initiation or continuation of antibiotic therapy. The clinical utility of PCT stems from its rapid response to bacterial infection, with levels rising within a few hours of infection onset and decreasing quickly with effective treatment. This dynamic response allows clinicians to make timely and informed decisions about starting or discontinuing antibiotics [5].

The integration of PCT measurements into clinical protocols has been shown to reduce the duration of antibiotic therapy, decrease the overall antibiotic exposure, and minimize the risk of antibiotic resistance development. For instance, in patients with lower respiratory tract infections, PCT-guided therapy has resulted in a significant reduction in antibiotic use without compromising patient safety or increasing the risk of adverse outcomes. This approach aligns with the goals of antimicrobial stewardship programs, which aim to promote the judicious use of antibiotics, enhance patient outcomes, and curb the spread of antibiotic resistance. However, the successful implementation of PCT-guided therapy in hospital settings requires overcoming several challenges. These include ensuring the accuracy and consistency of PCT assays, establishing standardized cutoff values for different clinical scenarios, and addressing the cost and logistical aspects of PCT testing. Additionally, healthcare providers must be adequately trained to interpret PCT levels and incorporate them into clinical decision-making processes [6].

Conclusion

Procalcitonin represents a valuable tool in the management of hospitalized patients with seasonal influenza, particularly in the context of antimicrobial stewardship. By enabling more accurate differentiation between bacterial and viral infections, PCT can help optimize antibiotic use, reduce unnecessary prescriptions, and combat antibiotic resistance. While challenges remain, the integration of PCT-guided therapy into clinical practice holds significant promise for improving patient outcomes and supporting global efforts towards responsible antibiotic use.

Acknowledgement

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Conflict of Interest

None.

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