# Clinical Application of Procalcitonin in the Critically Ill

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Maves RC, Enwezor CH.
**Uses of Procalcitonin as a Biomarker in Critical Care Medicine.**
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Diagnosing sepsis in a timely manner is imperative to rapidly administering an effective antimicrobial drug. Fast delivery of treatment for sepsis is one of the few modifiable risk factors for mortality in a sepsis patient. Yet, rapid diagnostic techniques for sepsis identification are lacking, creating a gap between diagnostic uncertainty and management.

To address this gap, physicians are looking to biomarkers as an approach to improve care. Procalcitonin (PCT) is often elevated in bacterial infections and the degree of elevation correlates with the illness severity. In addition, PCT levels decrease with effective antibiotic treatment. Thus**, PCT can be used as a biomarker for disease severity.**

Increased PCT levels are indicative of increased disease severity in infected patients, and in populations of patients with sepsis and septic shock, PCT levels can predict adverse outcomes. In a study that evaluated PCT levels at baseline and at 72 h, patients with decreases in PCT levels of 80% or greater had reduced risks of in-hospital mortality.

Empiric antibacterial drugs are routinely recommended for patients with community-acquired pneumonia (CAP). Even though elevated PCT levels are associated with greater likelihood of bacterial vs viral pneumonia, available data could not identify a PCT cutoff level that precluded use of empiric antibacterial therapy at the time of presentation**. Evidence for PCT in CAP is strongest as a prognostic rather than a diagnostic marker**, at least at time of initial presentation.

PCT can also be used as a guide for antimicrobial treatment duration. Once an antibiotic treatment regimen has begun, it can be difficult to know the appropriate duration. Since PCT levels are indicative of disease status and decrease in treated bacterial infections, they can be used to guide therapy. Indeed, the PRORATA[1] trial demonstrated that in PCT-guided therapy vs usual care, antibiotics could be stopped when PCT levels decreased to 0.5 ng/mL, resulting in fewer days of antibiotics (11.6 vs 14.3 days). **Serial measurement of PCT may therefore be a useful tool to guide antibiotic therapy discontinuation in a seriously-ill patient**.

At this time, however, **PCT is not specific enough to distinguish between bacterial versus viral infections to permit withholding antibiotics from seriously-ill patients**, and its contribution to illness severity scores is mostly incremental. Additional research on evaluating PCT as a biomarker for disease severity, as well as and delineating the host response to bacterial versus viral infections and patient response to therapy, is needed.

**The best-validated use for PCT in critically-ill patients is to promote antibiotic de-escalation and reducing duration of total therapy.**

*"There is generally positive support for PCT-based algorithms to guide antibiotic discontinuation in patients in the ICU if adherence to algorithms is high and supported by a strong antimicrobial stewardship program."*

1. Bouadma L, Luyt CE, Tubach F, *et al. The Lancet.* 2010; 375(9713):463-474