

# Antimicrobial Stewardship Using Biomarkers to Improve Outcomes in the Critically Ill



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[Kyriazopoulou E, Giamarellos-Bourboulis EJ. Antimicrobial Stewardship Using Biomarkers: Accumulating Evidence for the Critically Ill. Antibiotics \(Basel\). 2022;11\(3\):367. Published 2022 Mar 9. doi:10.3390/antibiotics11030367](#)

**A recent review summarizes evidence that using biomarker-guided antimicrobial treatment in antimicrobial stewardship programs (ASPs) for the critically ill may improve patient outcomes and reduce antimicrobial resistance.**

Duration of antibiotic treatment has long relied on low levels of evidence. Although sepsis guidelines recommend shorter treatment durations, broad-spectrum antimicrobial use and long treatment durations are still very frequent, leading to the development of antimicrobial resistance. The use of biomarkers to guide treatment duration has been promoted, but **procalcitonin (PCT) is currently the only biomarker for which evidence from randomized clinical trials (RCTs) is available.**

Recent data on biomarker-guidance in the critically ill (mainly sepsis and COVID-19 patients) was researched using the terms “sepsis”, “COVID-19”, “infection”, “critically ill”, and others. A total of 102 studies published between 2012 and 2022 were analyzed. The majority of these were RCTs which compared a PCT-guided algorithm with standard of care (SOC), based on the treating clinician’s assessment and local and international guidelines.

The RCTs show that **discontinuing antibiotics based on decreasing PCT over serial measurements is a safe and effective method to reduce the length of antimicrobial treatment, antibiotic-associated adverse events, and long-term complications.** Other biomarkers, like C-reactive protein, are in the early stages of testing to be used as guidance for shorter antimicrobial treatments. Real world evidence also highlights the **need for continuous education of healthcare professionals.**

**The study authors conclude that PCT-guided antimicrobial treatment:**

- decreases antimicrobial treatment length,
- reduces hospital/intensive care unit length of stay,
- reduces hospitalization costs,
- improves short- and long-term patient outcomes (mortality and rate of secondary infections by MDRO and *C. difficile*)

Thus, **to reduce antimicrobial overuse, biomarkers should be included in ASPs** even during the COVID-19 era, when, although the bacterial coinfection rate is low, antimicrobial overconsumption remains high.



*“Biomarkers, mainly procalcitonin, may guide antimicrobial treatment with safety in two directions; (i) improve patient outcomes by reduction in antibiotic-associated adverse events and (ii) globally reduce the high burden of antimicrobial resistance.”*