

Title: Checking Procalcitonin Suitability for Prognosis and Antimicrobial Therapy Monitoring in Burn Patients

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Abstract

Background: Due to greater infection susceptibility, sepsis is the main cause of death in burn patients. Quick diagnosis and patient stratification, early and appropriated antimicrobial therapy, and focus control are crucial for patients' survival. On the other hand, superfluous extension of therapy is associated with adverse events and arousal of microbial resistance. The use of biomarkers, necessarily coupled with close clinical examination, may predict outcomes, stratifying patients who need more intensive care, and monitor the efficacy of antimicrobial therapy, allowing its faster de-escalation or stop, reducing the development of microbial resistances and, possibly lowering financial burden, without increasing mortality. The aim of this work is to check the suitability of procalcitonin (PCT) to fulfill these goals in a large sample of septic burn patients.

Methods: One hundred and one patients, with 15% or more of total body surface area (TBSA) burned, admitted from January 2011 to December 2014 at Coimbra Burns Unit (CBU), in Portugal were included in the sample of this retrospective observational study. All patients had a diagnosis of sepsis, according to the American Burn Association (ABA) criteria. The sample was factored by survival (68 survivors and 33 non-survivors). The maximum value of PCT in each day of the study was used for statistical analysis and when samples were not collected in some days (till a maximum of 5 days), the missing values of the interval were calculated as the median value between the PCT determinations available. Data were summarized by location measures (mean, median, minimum, maximum, quartiles) and dispersion measures (standard error and range measures). Statistical analysis was performed with SPSS[®] 23.0 IBM[®] for Windows[®].

Results: Differences between PCT levels of patients from the survivor and non-survivor groups during the first week of hospitalization were statistically significant (p value = 0.000). A statistically significant difference was also demonstrated for PCT evolution along the last week of stay (p = 0.000), as well as, during the first week after suspicion of sepsis (p = 0.002), being slightly higher during this period. Regarding PCT evolution with antimicrobial therapy, PCT was always higher in the non-survivors during the first 7

days, still no statistically significant difference was found between the survivor and non-survivor groups in this period. However, a within-group significant variation was detected, with a progressive decline along the first 7 days, supposedly due to antimicrobial action. When the analysis was extended to the 15th day, it was found that PCT levels increased rapidly and steadily until the day of death in non-survivors, denouncing therapy failure. This increasing pattern in PCT levels was not observed in the survivor group of patients.

Discussion and Conclusions: Recently, diverse studies have evaluated the utility of dosing PCT levels as an aid to the diagnosis of systemic infection in burn patients, which is still a main cause of morbidity and mortality. Despite not being an ideal biomarker, the close correlation between PCT levels and patients' outcomes was statistically demonstrated in the present work, supporting its use for prognosis determination in severe burn patients. Additionally, this study showed that the persistency of abnormally elevated PCT along the days of antimicrobial therapy was linked with poor outcomes in this set of patients, opposed to what happens when their levels fall in a consistent way, reflecting its efficacy. Therefore, PCT proved to have a good prognostic power in septic burn patients, paralleling the evolution of the infectious process and reflecting the efficacy of antimicrobial therapy. The inclusion of PCT serial dosing may be advised to reinforce antimicrobial stewardship programs at Burn Units, while more accurate approaches are not available. Prospective multicentric studies would surely give more strength to the generalization of PCT use for prognosis and antimicrobial therapy monitoring in burn patients.