

Retrospective Study of Procalcitonin, Antibiotics Usage & Outcome in Sepsis at Tertiary Healthcare Center in Maharashtra.

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ABSTRACT

Serum Procalcitonin (PCT) is a biomarker and it is widely studied to guide antibiotic treatment in septic patients. This study considered the diagnostic benefit of PCT in sepsis or septic shock patient and how serum PCT will impact on antibiotic intervention. PCT level was examined at baseline and regular interval to manage the antibiotics. After PCT implementation 82.48% patients were discharged and it also decreased hospital stay.

We conclude that there was a significant decreased in extra use of broad spectrum antibiotics; length of stay in hospital, cost of hospitalization after the implementation of PCT. PCT values had a higher predictive usefulness for proper management of sepsis and decrease use of antibiotics.

Key words: PCT–Sepsis–Antibiotic therapy etc

1 INTRODUCTION

The clinical conditions of patients with sepsis or septic shock is critical, and these patients are often required Intensive Care Unit (ICU). Rapid and accurate diagnosis of disease condition can help to make proper treatment decisions in critically ill patients. To confirm severity of sepsis and septic shock, Serum Procalcitonin (PCT) investigation play as trigger role for identification of infection level, as well as antibiotic management guidance.

Some studies have shown that changes in PCT concentrations are related to the prognosis of patients with sepsis and use of these parameters may improve accuracy of judgment regarding the prediction of infection[i]. The normal value of PCT in adults is 0.5ng/mL or less. More than 50% Patient with sepsis (i.e. bacterial/non bacterial infections) are account for ICU admissions. However, the diagnosis of sepsis and related infections is clinically challenging, and more than 70% of all ICU patients receive antibiotics.[ii] There are limitations associated with microbiological testing in the ICU setting,[iii] thus, inappropriate antimicrobial therapy received in at least one-third of patients with sepsis, which significant increase in mortality and hospital stay.[iv]

Procalcitonin (PCT) is a precursor of calcitonin, has been most widely studied to guide antibiotic treatment in septic patients.[v] The use of a PCT-based intervention for antimicrobial escalation/de-escalation in patients of sepsis led to appropriate use of broad-spectrum antibiotics,[vi] which was associated with lower antibiotic exposure without increase in mortality or treatment failure.[vii]

We have performed a retrospective study involving patients hospitalized in the ICU due to various diagnosis and having sepsis, using serum PCT value for use of antibiotic treatment. Our aim of this study was, to decrease use of unnecessary antibiotics in sepsis based on Serum PCT Value.

2 AIM:

- Use of serum Procalcitonin level to decide antibiotic in septic shock.

Primary Objective:

1. PCT value can avoid unnecessary use of antibiotics
2. PCT useful in reducing duration of antibiotic therapy.

Secondary Objective:

1. Implementation of PCT to decrease the stay in hospital & cost of hospitalization.

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3 MATERIAL AND METHODS:

This study was conducted at Dr. Hedgewar hospital, Aurangabad, Maharashtra. This study was approved by Dr. BAMRS Dr. Hedgewar Hospital Ethics Committee. Patients who are admitted in ICU were selected for this study, during the period from 1 Nov 2018 to 31 Apr 2019.

Inclusion criteria:

1. Patients with sepsis or septic shock (i.e. bacterial/non-bacterial infection)
2. Patient’s age: 18-70 years.
3. Both Male and Female gender

Exclusion criteria:

1. Pediatrics patients
2. Post-operative patients

5ml blood sample collected in EDTA tube at the time of admission 1st, and 5th day for investigation of CBC and PCT. The chemiluminescent microparticle immunoassay (CMIA) was used for the quantitative determination of PCT (Procalcitonin). Total 137 patients were enrolled in the study.

The primary outcome is escalation/de-escalation of antibiotics, number of days stay in hospital, hospital discharge, or death.

4 RESULT AND DISCUSSION:

Out of 137, 54.02% patient was male and 45.98% was female were enrolled in the study.

Table 1. Gender Ratio

Total Sample (N=137)		
Male	74	54.02%
Female	63	45.98%
Total	137	100.00%

Table 2. Escalated Treatment

Escalated treatment		
Discharged	55	40.14%
Expired	11	8.02%
Total	66	48.16%

Total 66 patients had suspicious infection at the time of admission, all patients were received escalated treatment due to high serum PCT value, out of these patients 55 i.e. 40.14% were discharged as more expected. Only 11 patients 8.02% of these groups were expired. (Table-2).

31 patients were received de-escalation treatment after investigation of serum PCT, out of these 23 (17.00%) were discharged and 8 (6.00%) were expired (Table-3).

Out of 137 patients, 40 patients were received baseline antibiotic treatment and not required any change treatment

Table 3. Deescalated Treatment

Deescalated treatment		
Discharge	23	17.00%
Expired	8	6.00%
Total	31	23.00%

Table 4. Not Change treatment

Not Change treatment		
Discharge	35	26.00 %
Expired	5	4.00 %
Total	40	30.00 %

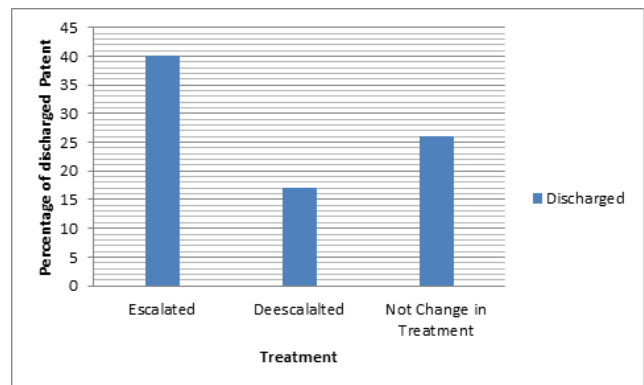


Figure 1.

as per PCT guideline. Out of this 40 (26.00 %) patients were discharged and only 5 i.e. 4.00 % were expired (Table-4).

In our study, patient had following source of infections lung, kidney, liver, blood stream, cellulitis and viral. Lung infection was the largest population in our study.

Procalcitonin is the precursor of the hormone calcitonin, has been used as a biomarker to aid in diagnosis of bacterial infection or sepsis, differentiating bacterial pneumonia from viral pneumonia and chronic obstructive pulmonary disease (COPD).[i] The potential advantages of PCT over CRP include a more rapid increase and earlier peak at 24 h following infection and a faster decrease following resolution of infection. In some cases revealed that PCT was found to be more sensitive and specific than CRP for the diagnosis or prognosis of sepsis. Whilst algorithms for PCT guided antibiotic therapy have been proved to be useful in reducing duration of antibiotic therapy in several Randomized Controlled Trial in different clinical settings, very limited testing has been done for CRP-based algorithms in RCTs. In 2013, Oliveira and co-workers performed a RCT in adult patient admitted in ICU and concluded treatment of antibiotics may be escalated or deescalated is based on PCT algorithms, clinical response and Sequential Organ Failure Assessment (SOFA) score.^[i]

The precise value of the Procalcitonin level can guide to earlier treatment of sepsis and antibiotic use. Treating the infection even a few hours earlier can make change between patient conditions that responds to antibiotics.

If infection symptoms are severe but the Serum PCT level is low, the cause is more likely viral and this can ensure the appropriate treatment and avoid the unnecessary use of antibiotics to the patient.

The appropriate use of antimicrobials is essential, due to drug toxicity, increased drug resistance, and other adverse reaction(10,11). Procalcitonin has been evaluated as a biomarker to assist diagnosis and treatment of bacterial infection to the patient. Most studies are conducting in lower respiratory tract infections and sepsis, and concluded that use of PCT decrease antimicrobial practice without worsening of clinical outcomes(12). Nie et al. suggested in his study Serum PCT as a predictive marker of AKI in patients having suspicion of infection(13).

A valuable PCT algorithm is included in this study, which reflects the results of some of the studies discussed; which is explained how results of PCT testing can be used to guide antibiotic therapy in ICU patients with sepsis/septic shock.

Using PCT level, our aim was reducing antibiotic overuse and provides tailoring antibiotic therapy to individual needs of the patient. As this study makes clear there is now considerable suggestion for measurement of patients PCT provides a safe and effective means of tailoring antibiotic therapy in a range of infectious diseases.

Conclusion:

In this retrospective study, PCT values during admission to the ICU can be used to predict the prognosis of critical illness of patients. We concluded that, PCT is considered a specific biomarker for sepsis/bacterial infection. PCT measurement may help for decision, to initiate antibiotic therapy in low risk.

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