

Utility of procalcitonin in guiding discontinuation of antibiotic therapy at a community teaching hospital

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Background

High procalcitonin (PCT) concentrations are typically found in patients with bacterial infections, in contrast to lower levels in patients with viral infections. Hence, PCT may be utilized as a clinical biomarker to evaluate the etiology of an infection. The PCT lab was implemented as a send-out lab at our hospital on July 1, 2015. Per the laboratory protocol, drawing PCT was recommended in patients with respiratory tract infections (RTIs) who, after receiving 3 days of empiric antibiotic therapy, (1) displayed equivocal clinical suspicion of infection, for example, chest X-ray unclear, or (2) did not have a confirmed diagnosis of bacterial infection through clinical presentation, culture, and microbiological criteria.

Objectives

To evaluate if PCT-guided antibiotic therapy resulted in a reduction of unnecessary antibiotic use in patients with RTIs, and to assess the total cost impact of PCT-guided antibiotic therapy to the hospital.

Methods

A retrospective review of patients in whom PCT lab was ordered from July 1, 2015 to November 30, 2015 was conducted. The appropriateness for continuing antibiotics after 3 days of empiric antibiotic therapy was evaluated using a proposed PCT algorithm based on the following recommendations: PCT level < 0.25 ug/L: antibiotic use strongly discouraged; PCT level = 0.25-0.49 ug/L: antibiotic use discouraged; PCT level = 0.5-1.0 ug/L: antibiotic use encouraged; PCT level > 1.0 ug/L: antibiotic use strongly encouraged. The primary outcome was the length of antibiotic therapy in patients with a low PCT level (≤ 0.45 ug/L) after PCT level was available, and the secondary outcome was the total cost impact of PCT-guided antibiotic therapy to the hospital. Both values were calculated using the presumed standard duration of therapy of 7 days.

Results

PCT lab was ordered in 17 patients, with most orders coming from the intensive care units (47.1% of all orders). 10 (58.8%) patients had PCT level that was ≤ 0.49 ug/L, out of which 6 patients had pneumonia, 1 had bronchitis, and 2 had sepsis due to pneumonia. PCT was ordered in 1 patient to rule out pneumonia. Antibiotics were discontinued in 6 (60%) patients and 1 (10%) patient did not receive antibiotics after PCT level became available. The duration of antibiotic therapy was shortened by an average of 3.9 days in these 7 patients. The other 3 patients were continued on antibiotics despite having a low PCT level. The total cost incurred was \$586, which included savings from antibiotic acquisition and administration, and the cost of the lab. There would have been a total cost savings of \$272 if the lab was performed in house. The turnaround time for the lab was > 24 hours in most cases, with the average being 37 hours.

Conclusion

Utilization of PCT level as an additional piece of clinical information resulted in a shortened duration of antibiotic therapy. Bringing the PCT lab in house at the hospital can reduce the lab cost and turnaround time. PCT-guided antibiotic therapy may help reduce unnecessary antibiotic use by assisting clinicians in making decisions regarding discontinuation of antibiotics..