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Use of Pro-calcitonin Assays to Predict Serious Bacterial Infection in Young Febrile Infants
Jan 2016. Milcent K, Faesch S, et al.

Objective:

To evaluate the usefulness of Pro-calcitonin (PCT) in comparison to CRP in identifying serious bacterial infection in febrile infants < 3 mo of age. (7 days – 91 days). Data were also gathered on WBC count and ANC count.

Methods:

Prospective cohort study performed at 15 French Emergency Departments between 2008 and 2011. PCT, CRP, WBC, and ANC measures drawn on all patients. SBI (serious bacterial infection) defined as culture confirmed bacterial growth in blood, CSF, urine, or stool. Sub-group analysis of IBI (invasive bacterial infection) was performed by classifying IBI as a positive blood or CSF culture. The diagnostic studies performed were left to the discretion of the attending physician, so not all patients received all studies. Inclusion criteria were: T>38 either at home or at the hospital, no antibiotics in 48 hours, and no major comorbidities. Patients were dispositioned per the attending physician, with admitted patients followed until discharge and discharged patients followed up at 48 hours with an in-person visit or telephone call. Statistical analysis included computing ROC curves and corresponding AUC. Data cutoffs obtained from the ROC analysis were used to compute likelihood ratios (LR).

Results:

2,273 patients were included. 708 patients were not consented for inclusion, and a side-analysis of the eligible-but-excluded bunch indicated no difference in the prevalence of SBI (indicating no selection bias there). Availability of follow-up and valid PCT results narrowed the sample down to 2,047 patients. Of these patients, 139 (6.8%) had SBI and 21 (1.0%) had IBI. AUC for detecting SBI, was 0.81 vs. 0.80, p = 0.70, for PCT and CRP, respectively. For detecting IBI, AUC was 0.91 vs. 0.77, p = 0.002, for PCT and CRP, respectively. AUC in detection of SBI, for ANC and WBC were 0.73 and 0.66, respectively, and were less ideal for detection of IBI—suggesting definite inferiority to PCT based on p values provided. ROC analysis lead to cut-offs of 0.3 ng/mL for PCT and 20 mg/L for CRP. Negative LR for SBI was identical at 0.3 between PCT and CRP. For IBI, negative LR was 0.1 (95% CI: 0.03-0.4) and 0.3 (95% CI: 0.2-0.7) between PCT and CRP, suggesting possible superiority of PCT but with overlapping confidence intervals.

Conclusion:

PCT is superior to CRP in detection of IBI, and is similar to CRP for detection of SBI. AUC analysis suggests that PCT is a useful test for detecting occult bacterial illness in young infants, however will not detect all cases—suggesting that physical exam and other biomarkers in conjunction with PCT are likely to still be helpful.

Take-away:

If you are concerned about occult bacterial infection in a febrile young infant <3 months old, but the child is well-appearing, consider getting a PCT to inform your work-up and disposition.
