CRP and PCT in Primary Care Patients with LRTI: Association with Microbiological Etiology

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Introduction

Lower respiratory tract infection (LRTI) is one of the most common reasons for encounter in primary care. C-reactive protein (CRP) and procalcitonin (PCT) can be used as point-of-care tests (POCT) to aid in the diagnosis of LRTI but the association between these biomarkers and microbiological diagnosis has not been described in primary care patients. This study investigated the association between CRP and PCT concentrations and etiology of infection in patients presenting with LRTI in the GRACE Network of Excellence (www.grace-lrti.org), the largest primary care LRTI study to date.

Methods

Subjects with LRTI* were prospectively recruited from 16 primary care networks (PCNs) in 11 European countries from October 2007 through April 2010. Nasopharyngeal flocked swabs (NPS) +/- sputum and blood were obtained at presentation; chest radiography was obtained within 7 days to diagnose community-acquired pneumonia (CAP). RT PCR was used to detect viral pathogens, RT PCR and serology to detect M. pneumoniae, C. pneumoniae, B. pertussis; S. pneumoniae and H. influenzae were detected in NPS and/or sputum using conventional culture methods. CRP was measured by a POCT (Orion) and PCT was measured by the Kryptor (Brahms GmbH).

Results

Figure 2. Mean (SD) CRP concentration by microbiological diagnosis for LRTI subjects with (n=141) and without CAP (n=2963).

Figure 3. Mean (SD) PCT concentration by microbiological diagnosis for LRTI subjects with (n=141) and without CAP (n=2963).

Results (Figures 2 - 3): Mean (SD) CRP was 68.05mg/L (8.1) and 12.4mg/L (32.2) for subjects with and without CAP, respectively (P<0.001). Mean (SD) PCT was 0.335µg/L (0.23) and 0.052µg/L (0.004) in those with and without CAP, respectively (P<0.001). Among those without CAP, CRP was higher in subjects with a single bacterial infection (17.1mg/L (2.9)) than those with single viral infection (11.2mg/L (8.0); P<0.03) and this was also true for those with CAP (62.0mg/L (19.8) vs 37.9mg/L (0.13); P<0.02). PCT concentrations were not significantly different for subjects with single bacterial vs single viral infection whether CAP was present (0.056µg/L (0.11) vs 0.14µg/L (0.04); P=0.07) or not (0.04µg/L (0.02) vs 0.15µg/L (0.003); P=0.08). Mixed infection was associated with higher CRP values in CAP and non-CAP subjects compared to single infection (all P<0.04) and with higher PCT values in non-CAP patients only (P<0.01).

Figure 4. Proportion of microbiological diagnoses by CRP concentration.

Results (Figure 4): Among non-CAP and CAP subjects, there was a lower proportion of viruses recovered and a greater proportion of bacteria and mixed pathogens recovered in those with higher CRP concentrations.

Conclusion

LRTI patients with higher CRP concentrations may be more likely to have a bacterial infection. Further elucidation of the utility of biomarkers to differentiate between respiratory viruses in these patients is needed.