A brief introduction to CRP

Normally, blood contains only trace amounts of CRP, a protein discovered in 1929. The liver rapidly increases CRP production following infection or injury. CRP binds to phosphocholine, which is found in bacterial and fungal polysaccharides and most cell membranes. This 'tags' infective or injured cells, and helps the immune system recognise and remove pathogens and damaged host cells.

Signs and symptoms of an upper RTI generally peak between days 3-5. Therefore, CRP tends to be highest when patients experience the most severe symptoms. A viral infection commonly causes moderately elevated CRP (10-60mg/l) after less than 7 days of symptoms, peaking on days 2-4. CRP that remains elevated after 7 days suggests secondary bacterial infection.

Several studies have examined the diagnostic thresholds that offer the greatest clinical utility for differentiation low-risk from high-risk RTIs.

These studies led to the conclusions that:

——<20mg/L is optimal for identifying people at low risk of serious RTI (negative predictive value 97.4%).

——>100mg/L as the high-risk threshold, when considered alongside clinical signs and symptoms

——Measuring CRP can aid the differential diagnosis of pneumonia and bacterial acute exacerbations of COPD and chronic bronchitis:

——In one study, the 'classic' clinical indicators of pneumonia—such as cough (positive predictive value [PPV] 0.17), sore throat (PPV 0.20), yellow (PPV 0.14) and bloody (PPV 0.30) sputum, and dyspnoea (PPV 0.15)—had a relatively poor predictive value. In contrast, CRP levels >50 mg/l showed a high predictive value (PPV 0.80).

——Another study defined patients at 'low-risk' of pneumonia as having a maximum of one positive score on three items (diarrhoea, dry cough, and temperature >38°C) with CRP<20 mg/l. In this low-risk group, the three items were associated with a predictive value of not having pneumonia of 97%. This approach missed between 2.5% and 4% of cases of pneumonia.

CRP POCT reduces antibiotic use

CRP POCT used alongside history taking and evaluation of signs and symptoms reduces antibiotic prescribing without producing a clinically significant increase in the risk of complications or missed diagnoses. For example, using a threshold of <20 mg/l to define a lowrisk patient potentially avoided 41% of antibiotic prescriptions. Furthermore, in

randomised or cluster randomised controlled trials (RCTs), using CRP POCT was associated with reductions on antibiotic prescribing of:

——41.78% in patients presenting with suspected LRTI with a cough lasting less than four weeks together with one focal and one systemic symptom.

——36.16% in patients presenting with acute cough/LRTI (including acute bronchitis, pneumonia, and infectious exacerbations of COPD or asthma).

——31.25% in patients with upper and lower RTI.

——23.3% in lower RTIs or rhinosinusitis.

In another study, 31.5% of patients managed with CRP POCT received antibiotics during their index visit. This compared to 54.5% in those who were not tested. During the 28-day follow up, 45.3% and 59.7% respectively received antibiotics.

A view from Cochrane

A Cochrane review of CRP POCT encompassed six RCTs or cluster RCTs that enrolled 3284 participants, including 139 children. While the review identified some limitations in the study designs, significantly fewer antibiotics were prescribed in the CRP POCT group (37.4%) versus standard of care (49.1%). The pooled results showed that CRP POCT significantly reduced the number of antibiotic prescriptions issued in primary care for acute RTIs by 22%. The number needed to test (NNT) to save one antibiotic prescription at the index consultation ranged from 6 to 20 depending on the study design.

No difference in clinical recovery (defined as at least a substantial improvement at day 7 and 28 or re-consultation by day 28) emerged between patients managed using CRP POCT and standard care.

No deaths or serious complications were reported in any of the studies.