

Point-of-Care C-Reactive Protein Testing

Subjects: Others

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C-reactive protein (CRP) point-of-care test(-ing) (POCT) is one of the top strategies targeted at clinicians to reduce antibiotic prescribing, and it is increasingly being promoted to enhance antibiotic stewardship. CRP-POCT can guide antibiotic prescribing for (lower and upper) RTIs in primary care can reduce antibiotic prescribing at index consultations especially if cut-off guidance is provided.

Keywords: antibiotic stewardship ; antibiotic prescribing ; antibiotic use ; point-of-care testing ; c-reactive protein ; diagnostics ; respiratory tract infection ; primary care ; systematic review ; meta-analysis

1. Introduction

C-reactive protein (CRP) point-of-care testing (POCT) is increasingly being promoted to reduce diagnostic uncertainty and enhance antibiotic stewardship. In primary care, respiratory tract infections (RTIs) are the most common reason for inappropriate antibiotic prescribing, which is a major driver for antibiotic resistance.

Acute respiratory tract infections (RTIs) are among the most common reasons for patient encounters in primary care and for inappropriate antibiotic prescribing, which is a major driver for antibiotic resistance (ABR) ^{[1][2][3][4][5]}. RTIs are predominantly of viral aetiology and self-limiting in most otherwise healthy individuals. Evidence from systematic reviews and other studies shows that most patients suffering from acute RTIs, such as sore throat, acute sinusitis, pharyngitis, rhinosinusitis, otitis media, and acute bronchitis, do not benefit from antibiotic therapy ^{[6][7][8]}. International clinical practice guidelines consequently advise against routine treatment of uncomplicated RTIs with antibiotics ^[9]. The vast majority of patients with these infections, however, receive an antibiotic prescription for systemic use after seeking medical attention from their primary care physician ^{[4][9]}.

Inappropriate use of antibiotics is linked to the development of drug-resistant bacteria and increases the incidence of adverse events, re-consultations, and complications and subsequently increases healthcare costs ^{[3][10][11][12][13][14]}. Moreover, the rates of antibiotic prescribing have been directly associated with the rates of ABR at the individual, community, and national levels ^{[3][4]}. The reduction of antibiotic prescribing for acute RTIs could thus help to decrease ABR. If no effective actions are taken ABR could become the leading cause of death, surpassing cancer ^[15].

C-reactive protein (CRP) point-of-care test(-ing) (POCT) is one of the top strategies targeted at clinicians to reduce antibiotic prescribing, and it is increasingly being promoted to enhance antibiotic stewardship ^[16]. It has been demonstrated that uncertainty about the diagnosis of infection can lead to inappropriate antibiotic prescribing, overuse of resources, and disease complications ^{[17][18][19]}. With CRP as a biomarker of systematic inflammation, however, CRP-POCT enables clinicians to discern bacterial infections from other inflammatory disorders and helps them to identify the patients who benefit the most from antibiotics ^[20]. The robustness and accuracy of CRP-POCT compared with laboratory testing have been demonstrated by diagnostic studies ^[21]. CRP-POCT has also been integrated into some clinical guidelines as part of the assessment for RTIs to reduce diagnostic uncertainty and to aid prescribing decisions ^{[22][23]}.

2. Functions of CRP-POCT

Based on evidence of moderate to high- quality, the results demonstrate that CRP-POCT can reduce immediate (at index consultations) antibiotic prescribing in patients presenting to primary care with upper and lower RTIs. CRP-POCT in combination with CRP (cut-off) guidance effectively reduced immediate antibiotic prescribing in children and enhanced the effect already gained by performing CRP-POCT in adults. Although there was a significant increase in the rates of re-consultation (NNTH = 27) within 30 days of testing, an NNTnet of 11 indicates that the benefit in reducing antibiotic prescribing (NNTB = 8) outweighs the harm when adding CRP-POCT to usual care. Most of the evidence originates from the GP setting where, in addition to the (hospital) outpatient care setting, CRP-POCT appears most effective in reducing antibiotic prescribing. We found no significant effect of CRP-POCT in the rates of clinical recovery, resolution of symptoms, hospital admissions, referrals to secondary care, or in the ordering of further investigations. One study

reported no deaths. Limited evidence showed that CRP-POCT did not significantly reduce antibiotic prescribing at any point during 28-days of follow-up ($n = 7$) and that antibiotic prescribing at the index consultation was still lower in the GPs intervention at 12 months ($n = 1$).

CRP-POCT is a simple test that is being widely used in many countries to help clinicians identify whether patients with RTIs need antibiotics and to consequently reduce unnecessary antibiotic prescribing. The test can be performed within five minutes, helping clinicians with rapid decision-making during the consultation. Considering the global importance of antimicrobial resistance and its association with the extent of antibiotic consumption, compared with previous reviews [24] [25], we found a slowly increasing volume of evidence from empirical research ($n = 13$ RCTs) mostly published in English. The studies were carried out mostly in high-income countries, predominantly in general practices in the northern European setting, mainly the Netherlands. The evidence represents populations of all ages (range: 0-90), the majority of whom were young adults (mean age: 26.4, SD 15.0), mostly women (56%), with signs and symptoms of RTIs.

3. Conclusions

So far, evidence of moderate to high quality shows that compared with usual care, using CRP-POCT to guide antibiotic prescribing for (lower and upper) RTIs in primary care can reduce antibiotic prescribing at index consultations especially if cut-off guidance is provided. This reduction in antibiotic prescribing appeared to increase the re-consultation rate but did not affect clinical recovery, resolution of symptoms, or hospital admissions. Limited evidence showed no significant effects of CRP-POCT on antibiotic prescribing at any point during 28 days of follow-up ($n = 7$) but less antibiotic prescribing at the index consultation in the GPs intervention sustained at 12 months ($n = 1$). The increased re-consultations and longer-term effects of CRP-POCT need further evaluation. The overall benefits of CRP-POCT (NNTnet = 11) on reducing antibiotic prescribing (NNTB = 8) outweigh the potential harms of increased re-consultations (NNTH = 27).

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