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Use of Point of Care (POCT) C-Reactive Protein (CRP) to support antibiotic prescribing in primary care – Are they good enough? A Review of Performance on the Weqas POCT CRP Programme

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Introduction

Antimicrobial resistance is a major global healthcare problem. Antibiotics for respiratory infections account for around 60% of all primary care prescriptions, which in turn comprise 80% of the total antibiotic burden. In the UK, the National Institute for Health and Care Excellence guidelines for suspected acute respiratory infection in over 16s, recommend that antibiotics are not routinely offered if CRP < 20 mg/L, to consider back-up antibiotic at 20-100 and offer immediate antibiotics > 100 mg/L.

Suspected acute respiratory infection in over 16s: assessment at first presentation and initial management (NG237)

1.3.4 If, after clinical assessment, it is unclear if antibiotics are needed for someone with a lower respiratory tract infection, consider a point-of-care C-reactive protein (CRP) test to support clinical decision making and:

- offer immediate antibiotics if the CRP level is more than 100 mg/litre
- consider a back-up antibiotic prescription if the CRP level is between 20 mg/litre and 100 mg/litre
- do not routinely offer antibiotics if the CRP level is less than 20 mg/litre.

In Wales, the guidelines for the management of acute COPD exacerbation recommends an alternative threshold in this cohort of 20-40 for antibiotic consideration and a lower threshold of > 40 mg/L to prescribe antibiotics. POCT CRP has increasingly been used in primary care to support prescribing in suspected acute respiratory infection and in 2017, Weqas developed an EQA programme to assess and monitor the performance of these devices in primary care.

The All-Wales Primary Care Management of Acute COPD Exacerbation Guideline

Method

Samples were collected from volunteers and patients and a panel of linearly related samples were produced from spiking base serum with a purified source of human CRP to provide an extended clinical range. Two samples were distributed to the primary care sites bimonthly, with the same samples distributed to Laboratories each alternate month as part of the monthly Weqas Laboratory EQA CRP programme. This allowed for a comparison of POCT performance against laboratory methods. Data was collected from February 2023 to April 2024.

Analytical Performance specification (APS)

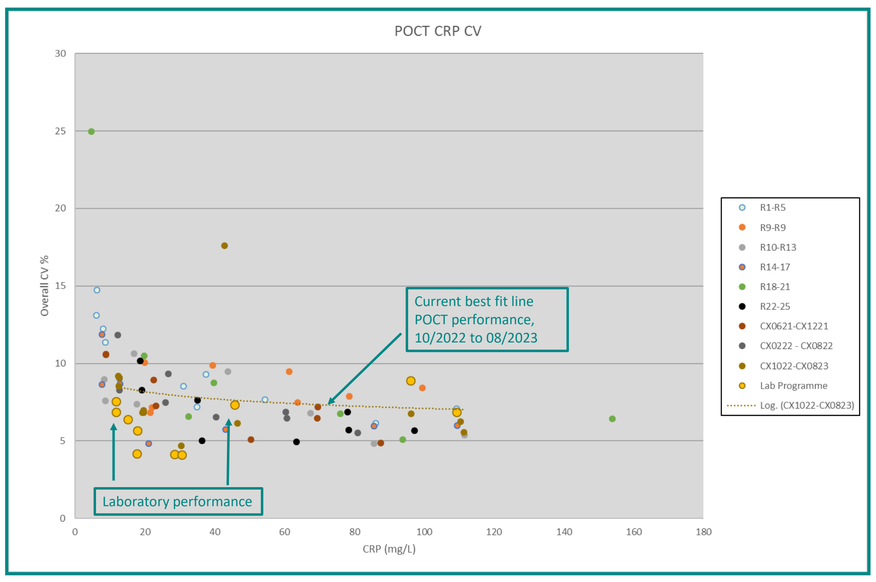
An APS of +/- 15% was used for both programmes which is compares well with the optimal Total Error of 25.4%, EFLM biological variation database, Table 1. A graphical representation of the performance of the POCT analysers as the overall coefficient of variation (CV%) at different concentrations is provided in Figure 1. The performance of the Laboratory Analysers is also included for comparison.

Table 1 APS EFLM biological variation database

	EFLM Biological variation database				Weqas
Specification	Imprecision (Cva) (%)	Bias (%)	MaU (%)	Total Error TAE (%)	TAE (%)
Minimum	25.3	34.8	50.6	76.5	
Desirable	16.9	23.2	33.7	51.0	
Optimal	8.4	11.6	16.9	25.5	15

Results and Discussion

Figure 1 Precision profile for POCT CRP (CV%), 2017 to 2023

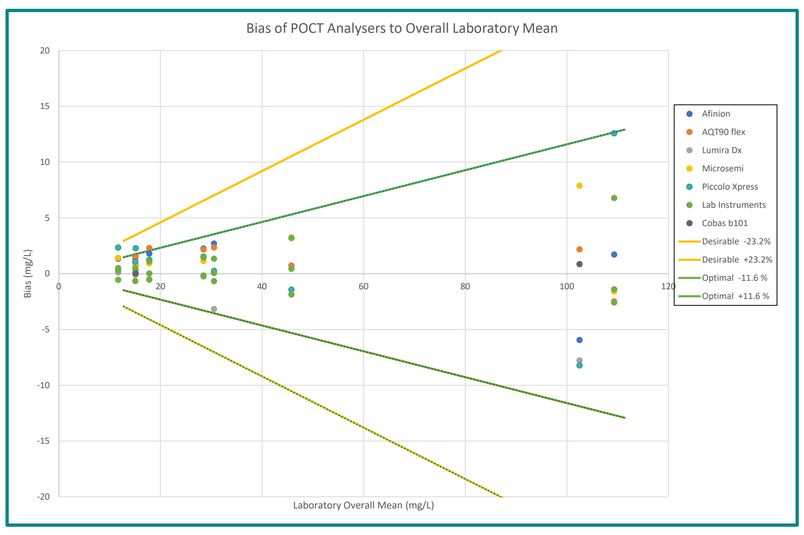


From the precision profile data, from 2017 to 2023, Figure 1, the overall interlaboratory variation on the POCT CRP programme ranged between 5 – 10 % for CRP > 20 mg/L, with slightly higher CVs of 7-15% for CRP <20 mg/L. The Laboratory CVs on the matched samples ranged from 4 – 8% across the analytical range. However, there has been a gradual improvement in performance over time, with the recent best fit line for 2022 to 23, for the POCT methods achieving similar CVs to that observed for the laboratory methods.

Bias to Overall Laboratory Mean

A bias of < 3 mg/L was observed at CRP concentration 0-40 mg/L for most POCT methods compared with the Laboratory programme overall mean. The bias of the POCT method means from the Laboratory Overall Mean were all within the desirable bias specification of ± 23%, with the majority of methods within the specification for optimal bias.

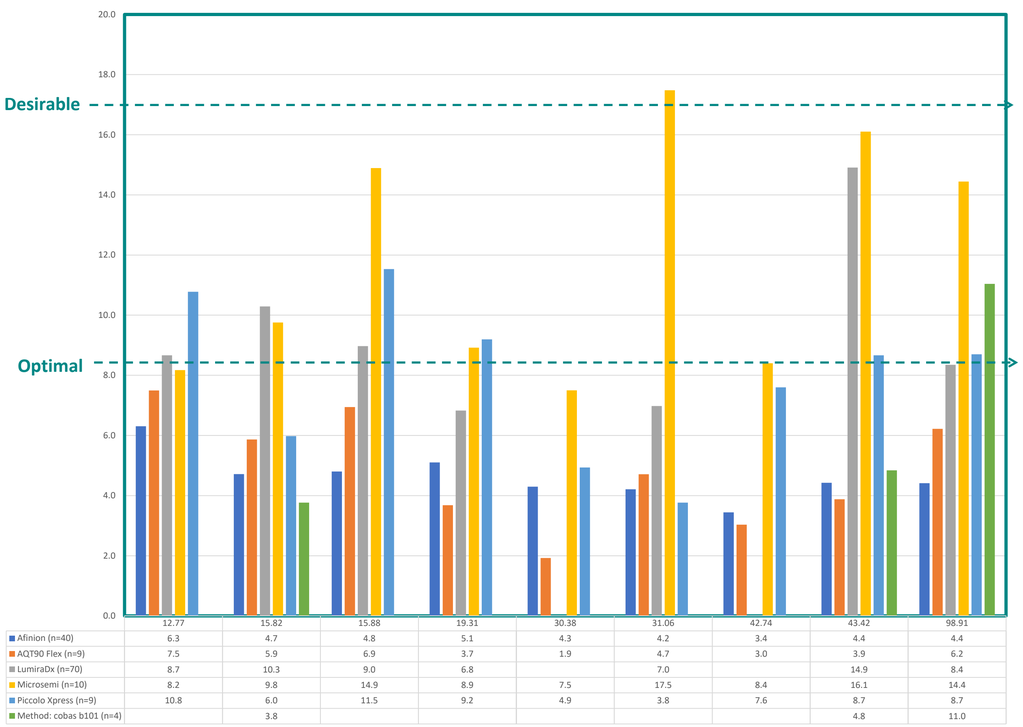
Figure 2. Bias of POCT methods to Laboratory Overall mean.



Imprecision

The majority of POCT instruments achieved the desirable APS for imprecision of 16.9% , with the Afinion, and AQT90Flex, consistently achieving the optimal CV of 8.4% across the analytical range.

Figure 3. Imprecision (CV%) for POCT methods 22-24 by instrument



Conclusion

Data from the Weqas POCT CRP EQA programme suggests that the performance of POCT devices compare well with Laboratory methods and are well within the recommended APS for both imprecision and bias according to the EFLM biological variation database.