

Procalcitonin as an antimicrobial stewardship tool in the COVID-19 era: a single centre experience

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BACKGROUND

- In the COVID-19 era, antimicrobial stewardship can be challenging. Many patients, particularly those with severe COVID-19 disease exhibit a “cytokine storm” which can be difficult to distinguish from sepsis.¹
- Procalcitonin (PCT) has greater specificity as a biomarker than other pro-inflammatory markers in identifying bacterial infection² and may aid in diagnosis or exclusion of superimposed bacterial infection in COVID-19.
- A PCT assay by Abbott diagnostics was introduced to our hospital in November 2020.

AIMS AND METHODS

- We aimed to evaluate the use of PCT as a stewardship tool to stop or prevent escalation of antimicrobials in patients with COVID-19 in the intensive care unit (ICU). A protocol by NICE was used to develop interpretative comments on PCT results³ (see Table 1).
- Over a 12-week period from November 2020, we prospectively recorded all PCT results on in-patients with COVID-19 in the ICU, as well as stewardship actions taken following discussion with the ICU physicians.
- Microbiology records were reviewed to ascertain whether bacterial infection was subsequently confirmed at the time of the result.

RESULTS

- Sixty-four PCT results were recorded on 27 patients (mean 2.4/patient). The median PCT result was 0.19 ng/mL. (see Table 1).

Table 1: Summary of PCT results:

Result	Intpretation	No of samples
<0.05 ng/mL	Absence of bacterial infection	4
≥0.05 ng/mL and <0.5 ng/mL	Systemic bacterial infection is not likely	41
≥0.5 ng/mL and <2 ng/mL	Systemic bacterial infection is possible	12
≥2 ng/mL and <10 ng/mL	Systemic bacterial infection is likely	5
≥10 ng/mL	Systemic bacterial is highly likely	2

- Antimicrobial stewardship actions taken following discussion with the intensive care team are summarized in figure 1.
 - Antimicrobials were discontinued on 12 occasions in 11 patients where PCT was <0.5 ng/mL.
 - Antimicrobials were withheld on 16 occasions in 15 patients where PCT was <0.5ng/mL.

- Bacterial infection was not confirmed in any patient with a PCT level of <0.05ng/mL
- Bacterial infection was subsequently confirmed on blood culture in two patients with a PCT between 0.05 and <0.5 ng/mL (6 results)
 - One patient, in whom antimicrobials were initially withheld, was diagnosed with a *Staph. aureus* bloodstream infection (PCT level 0.09ng/ml on day of bacteraemia, and 0.08ng/ml 24 hours later).
 - One patient with a *Staph. epidermidis* CRBSI who was continued on treatment with vancomycin had 4 PCT results of <0.5ngl/mL while bacteraemic (0.06, 0.1, 0.12, 0.25 ng/mL).
- Bacterial infection was designated “probable” based on clinical presentation and positive non-sterile site cultures in 4 patients with PCT levels between 0.05 and <0.05ng/mL (5 results total), in one of whom antimicrobials had been initially withheld, and in 3 patients with PCT levels between 0.5 and <2ng/ml (3 results total).
- Bacterial infection was suspected and empirically treated in other cases based on clinical suspicion in the absence of positive cultures.

Fig 1: Antimicrobial stewardship actions

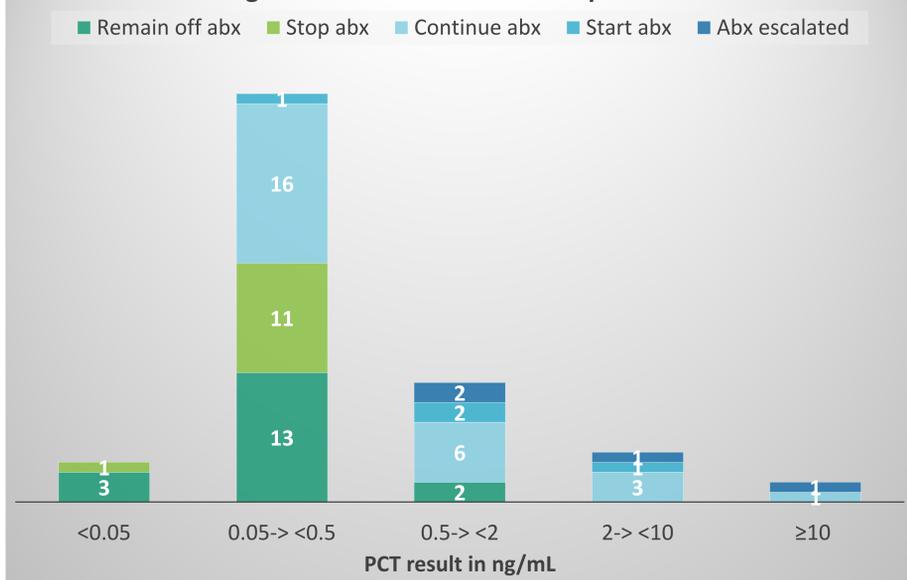
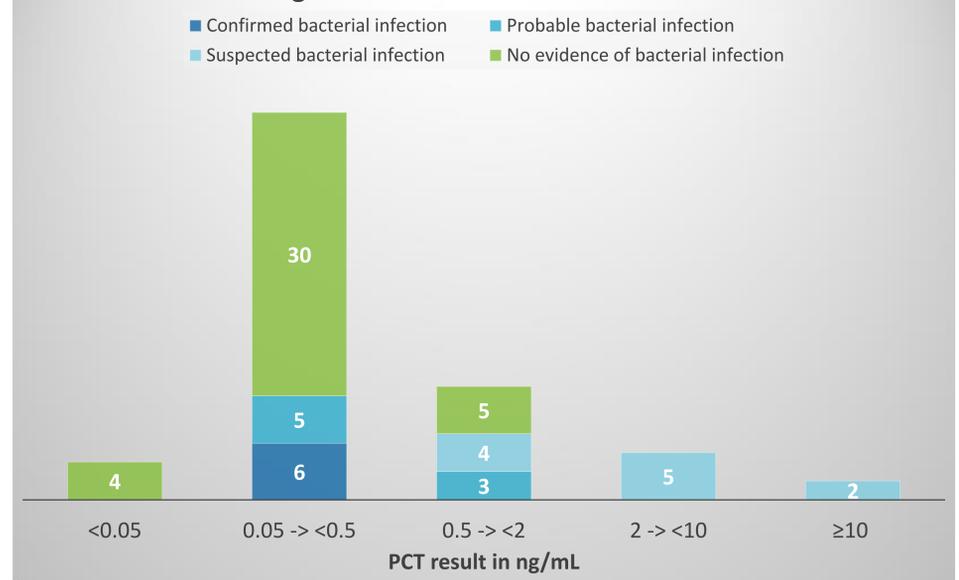


Fig 2: Evidence of bacterial infection



CONCLUSIONS

- Procalcitonin may be a useful tool in enabling antimicrobial stewardship actions in patients with severe COVID-19, but results need to be interpreted within the clinical context.
- PCT results may be more helpful in guiding discontinuation of antimicrobials rather than in withholding antimicrobials.
- Further data is needed to inform the use of PCT, both in COVID-19 and in other settings.

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