Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letter to the Editor

Single-centre experience of using procalcitonin to guide antibiotic therapy in COVID-19 intensive care patients

Sir,

Williams *et al.* recently reported in this journal a study on using procalcitonin (PCT) to reduce antibiotic use in COVID-19 patients admitted to a tertiary teaching hospital [1]. Antibiotics have been widely used in the COVID-19 pandemic despite a low incidence of bacterial co-infection [2]. There is growing evidence that PCT can reduce antibiotic consumption among moderate to severe COVID-19 patients requiring hospital admission. PCT has been reported as a useful marker to aid antimicrobial stewardship in hospitals and intensive care units (ICUs) with improved outcomes and lower consumption of antibiotics [3,4]. A lower PCT has been shown to have a 94% negative predictive value for bacterial co-infection in ICU patients with confirmed influenza A (H1N1) [5]. We evaluated whether early PCT-guided antibiotic therapy results in reduced antibiotic consumption among COVID-19 population admitted to the ICU.

We performed a retrospective observational cohort study of COVID-19 patients who were transferred to the ICU within 72 h of admission in Milton Keynes University Hospital, UK. All patients were transferred to ICU for either non-invasive or mechanical ventilation. A total of 48 COVID-19 patients (19 and 29 patients from waves 1 and 2, respectively) were included in the study. There were no baseline differences between the no PCT group vs PCT group except that most patients in the PCT group were from wave 2 (100% vs 15%, $P<0.0001$). Overall, 26/48 (54.1%) patients had at least one PCT carried out within the first seven days of ICU admission and 14/26 (53.8%) patients had a first PCT value less than 0.5 ng/mL. Twenty-one of 26 patients had serial PCT measurements at least 24 h apart during their ICU stay. A total of 83 PCT levels were taken from 26 patients during their ICU stay. Of the levels taken, 47.0% (39/83) were <0.5 ng/mL. We measured the number of days patients received antibiotics – if a patient received a dose of antibiotic on a given day, then it was counted as one day of treatment. Multiple doses or different antibiotics on a single day were counted as one day of treatment.

Both median durations of antibiotic therapy in the first seven days after admission (7 days vs 5.5 days, Mann–Whitney test, $P<0.019$) and throughout admission (13.5 days vs 10 days, Mann–Whitney test, $P<0.012$) were significantly shorter in patients who had a PCT measured during admission (Figure 1). The median duration of total antibiotic days, in those patients with a first PCT value <0.5 ng/mL, was 7.5 days compared with 12.5 days for patients who had the first PCT value >0.5 ng/mL

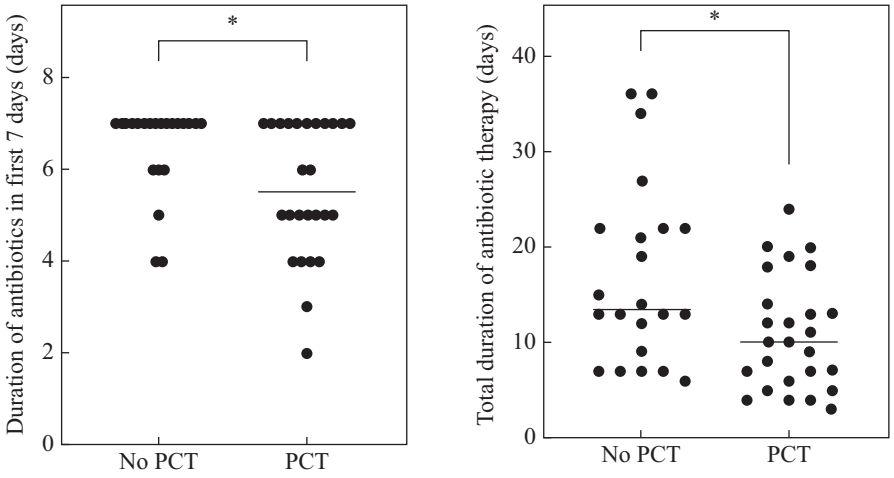

Figure 1. Procalcitonin (PCT) use reduces the duration of antibiotic therapy at seven days and total duration of antibiotics therapy. Mann–Whitney test. * $P<0.05$.

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($P<0.05$). Eight patients who had a PCT value <0.25 ng/mL within the first seven days had the lowest antibiotic exposure (median four days) in the first seven days as well as during the total hospital stay (median 5.5 days).

The mortality across the population was 35.4%. There was no significant difference in mortality between the two groups. The incidence of at least one ICU-acquired infection was 37.5% and most of these infections occurred after the first week of admission. Infections included ventilator-associated pneumonia (22.9%) and central venous catheter-related infections (20.8%). Five (10.4%) patients had multiple ICU-associated infections. There was no significant difference between groups in any of the adverse outcomes measured.

Overall, our findings are consistent with Williams *et al.*, in that implementation of PCT-based antibiotic decision-making guidelines can reduce the consumption of antibiotics in various COVID-19 populations. Using a 0.5-ng/mL PCT cut-off, there were no significant differences in adverse events or mortality. Patients with PCT values <0.25 ng/mL had the shortest antibiotic durations, but the number of cases was small. Further studies are needed to determine the optimum cut-off for de-escalation of antibiotics among ICU patients. A limitation of our small study was that other confounding factors may have affected the use and duration of antibiotic therapy in the both the studies. However, our data add to the evidence that low PCT levels have a high negative predictive value for invasive bacterial co-infections in COVID-19 patients, which in turn may allow avoidance, or early cessation, of empiric antimicrobial therapy.

Conflict of interest statement

The authors have no conflicts of interest to disclose.

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