*Clinical Infectious Diseases*

CORRESPONDENCE

## Bacterial Coinfection in COVID-19

To the Editor—We read with interest the work of Rawson et al, "Bacterial and Fungal Coinfection in Individuals With Coronavirus: A Rapid Review to Support COVID-19 Antimicrobial Prescribing" [1]. In most of the cited studies there is no distinction made on the timing of acquisition of the infection relative to the patients' coronavirus disease 2019 (COVID-19) diagnosis. This results in the inclusion of both coinfections: 2 separate infectious processes contemporaneously and secondary infections; and a second infective process developing as a result of the first. In fact, almost all studies considered by Rawson et al examine infections secondary to COVID-19.

The North Middlesex University Hospital (NMUH) was one of the most COVID-19 affected hospitals in the early stages of the pandemic in the United Kingdom [2]. At this time the prevalence of COVID-19 among the community served by NMUH was high: from 1 March 2020 to 30 April 2020, 728 of the 1944 (37%) patients tested by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) polymerase chain reaction (PCR) returned positive results. This study examined the incidence of diagnosis at presentation of both COVID-19 and a confirmed bacterial bloodstream coinfection.

From 1 March 2020 to 30 April 2020, 420 patients were identified as SARS-CoV-2 PCR positive on nasopharyngeal swab at the time of admission to NMUH. Eleven (3%) also had a significant positive blood culture (excluding the growth of skin flora organisms in a single set of blood cultures). These patients were older (median 83 years, interquartile range [IQR] 71–86) than the cohort of admitted COVID-19 patients as a whole (median 64, IQR 50–79). All had ≥1 comorbidity that has been identified as a risk factor for severe COVID-19 disease [3] (Table 1). The range of clinical presentations, organisms identified, and underlying causative pathologies were diverse (Table 1). Only 2/11 (18%) patients reported respiratory symptoms, and 4/11 (36%) reported fever. Although the prevalence of respiratory symptoms was low, 6/11 (55%) had a chest radiograph consistent with COVID-19 infection at the time of presentation. Despite the universal treatment of severely unwell emergency department patients with ceftriaxone at this time, the outcomes of patients with COVID-19 and bacteremia were poor: 7/11 (64%) patients died during their admission, and the remaining 4 (36%) had prolonged hospital admissions (8–17 days, median 14 days).

The majority, if not all, of these cases represented true bacterial coinfection of an etiology independent of COVID-19

**Table 1. Summary of the Characteristics of Patients Presenting to North Middlesex University Hospital in March–April 2020 With Both PCR Confirmed Coronavirus Disease 2019 (COVID-19) and Bacteremia**

| Age | Presentation | Relevant Background and Comorbidities | Organism | Source of Bacteremia | Outcome |
|---|---|---|---|---|---|
| 92 | Collapse | CVD<br>T2DM | *S. aureus* | Not identified | Died |
| 71 | Collapse | COPD<br>CVD<br>T2DM | *S. aureus* | Not identified | Died |
| 86 | Collapse | CVD | *S. parasanguinis* | Skin/soft tissue infection leg | Died |
| 58 | Fever, lethargy, cough | T2DM | *E. faecalis* and *K. pneumoniae* | Hepatic abscess and infected biliary stent | Discharged |
| 70 | Deranged blood sugars and vomiting | Pancreatic cancer<br>T2DM | *E. coli* | Presumed hepatobiliary | Died |
| 88 | Fever and fall | Care home resident<br>CVD | *E. coli* | Likely urinary | Discharged |
| 86 | Fever and dysuria | Care home resident<br>CVD | *K. pneumoniae* and *E. coli* | Urinary | Died |
| 85 | Collapse and dysuria | Care home resident<br>CKD<br>CVD | *P. mirabilis* | Urinary | Discharged |
| 81 | Fever and fall | CVD<br>T2DM | *P. mirabilis* | Urinary | Discharged |
| 83 | Diarrhea and lethargy | Care home resident<br>CVD<br>IBD<br>Pressure sores | *E. coli* | Sacral osteomyelitis | Died |
| 53 | Shortness of breath | CKD<br>CVD | *S. epidermidis* | Line infection | Died |

Abbreviations: CVD, cardiovascular disease including hypertension; CKD, chronic kidney disease; COPD, chronic obstructive pulmonary disease; IBD, inflammatory bowel disease; PCR, polymerase chain reaction; T2DM, type 2 diabetes mellitus.

(Table 1). This suggests that in times of high COVID-19 prevalence Hickam's dictum, "a patient may have as many diseases as he pleases," trumps Occam's razor, the principle that a single explanation for the patient's symptoms is most likely, particularly in older patients.

Rawson et al rightly identify the need for antibiotic stewardship in the era of COVID-19, especially given low rates of confirmed bacterial infection [1]. However, the nonspecific presentation of COVID-19 patients with bacterial coinfection makes them challenging to identify prospectively, and their outcomes are extremely poor. In the context of increasing availability of rapid SARS-CoV-2 testing, it is imperative that clinicians remain alert to the possibility of bacterial coinfection and that patients are not denied antibiotics based on a positive SARS-CoV-2 result in the emergency department.

## Note

***Potential conflicts of interest.*** The authors: No reported conflicts of interest. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest.

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## References

1. Rawson TM, Moore LSP, Zhu N, et al. Bacterial and fungal coinfection in individuals with coronavirus: a rapid review to support COVID-19 antimicrobial prescribing. Clin Infect Dis **2020**; ciaa530. Available at: https://doi.org/10.1093/cid/ciaa530.
2. April 2020 GB. Revealed: the hospitals facing most pressure to meet coronavirus demand. Health Service Journal. [cited 2020 May 6]. Available at: https://www.hsj.co.uk/quality-and-performance/revealed-the-hospitals-facing-most-pressure-to-meet-coronavirus-demand/7027354.article. Accessed 24 July 2020.
3. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult in patients with COVID-19 in Wuhan, China: a retrospective cohort study. Lancet **2020**; 395:1054–62.

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