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SARS CoV-2 Dispatches

What prompts clinicians to start antibiotic treatment in COVID-19 patients? An Italian web survey helps us to understand where the doubts lie



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1. Introduction

The appropriateness of antimicrobial prescribing during the COVID-19 (coronavirus disease 2019) pandemic has become a significant issue because antimicrobial stewardship rules have been frequently disregarded [1].

Although the current medical literature is consistent in reporting a low incidence of bacterial co-infections in hospitalised COVID-19 patients, and the World Health Organization's interim guidance does not recommend antibiotic therapy or prophylaxis, the real-life usage of broad-spectrum antimicrobials has undoubtedly been excessive [2–4]. What remains unclear is the propensity of physicians in deciding whether to prescribe an antimicrobial treatment in COVID-19 patients.

To investigate the reasons for antibiotic prescribing, we designed an online survey, which we subsequently administered to Italian physicians experienced in the management of COVID-19.

2. Materials and methods

The survey was developed by the infectious diseases (ID) team of our hospital, Fondazione IRCCS Policlinico San Matteo, in Pavia, Northern Italy.

The survey was sent in December 2020 by providing an email link to the directors of several specialist (internal medicine, emergency room, chest medicine and infectious diseases) referral hospitals in Northern, Central and Southern Italy. The answers were collected in January 2021.

The survey is composed of demographic, clinical, radiological, microbiological and laboratory variables and its aim is to identify those more frequently marked as relevant in deciding whether or not to start antibiotic treatment. The exact weight recognised for each one of these was assigned on a scale from 1–5, whereby 1 is 'not relevant' and 5 is 'extremely relevant'. A total of 51 questions were administered. To overcome the relevant bias related to physicians' previous work experience, we compared the propensity of ID specialists and non-ID specialists and, among ID specialists, those experienced (>10 years of work experience) and non-experienced (<10 years of work experience). *T*-tests were conducted and the

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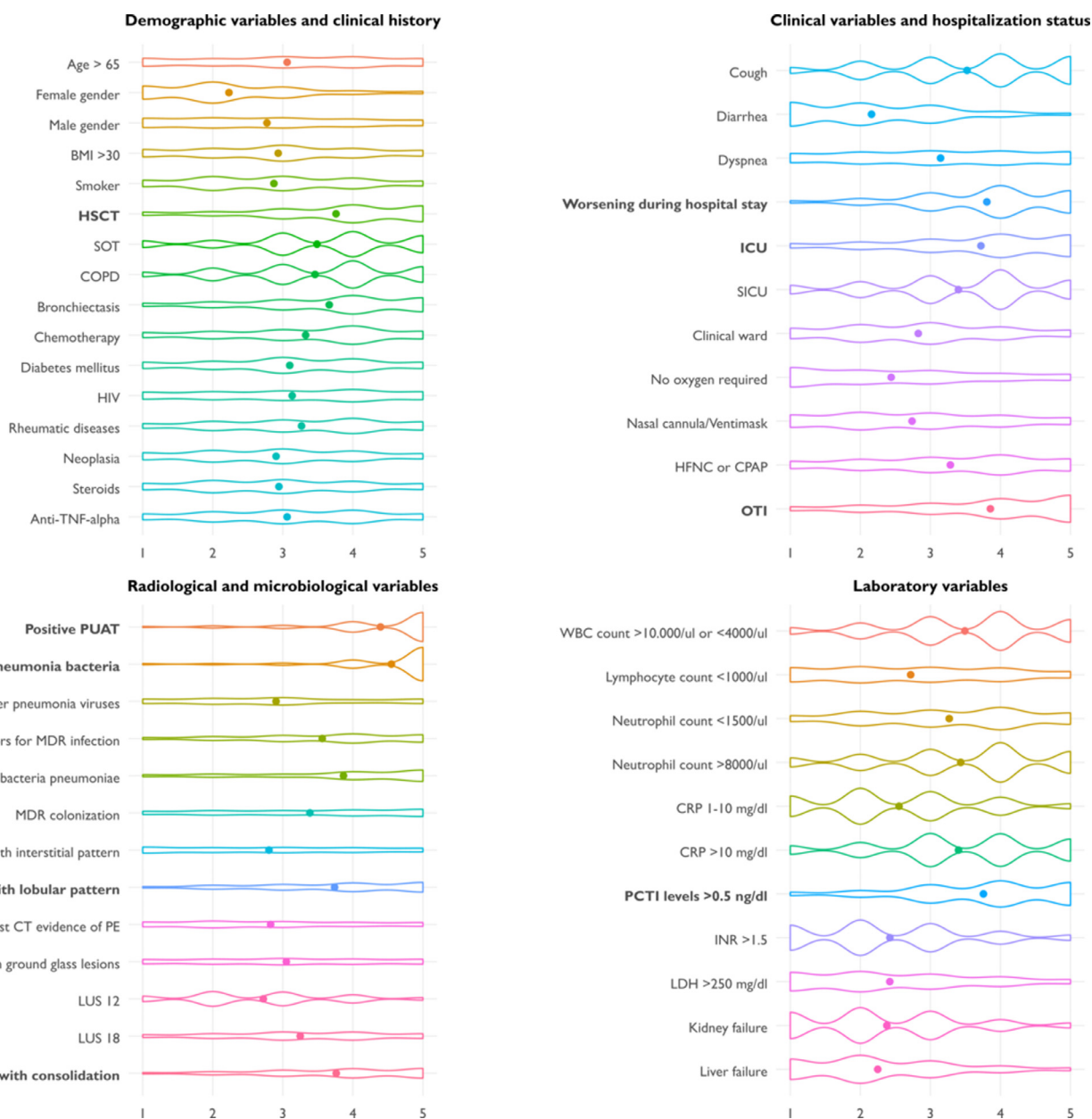


Fig. 1. Percentage of agreement on the weight (from 1–5) assigned to the considered variables, subdivided among demographic, clinical, radiological, microbiological and laboratory variables, by the overall cohort of physicians ($n = 414$). The principal variables are in bold. BMI, body mass index; HSCT, haematopoietic stem cell transplantation; SOT, solid-organ transplantation; COPD, chronic obstructive pulmonary disease; HIV, human immunodeficiency virus; TNF, tumour necrosis factor alpha; ICU, intensive care unit; SICU, surgical intensive care unit; HFNC, high flow nasal cannula; CPAP, continuous positive airway pressure; OTI, orotracheal intubation; PUAT, positive pneumococcal urinary antigen test; MDR, multidrug-resistant; CT, computed tomography; PE, pulmonary embolism; HRCT, high-resolution computed tomography; LUS, lung ultrasound; WBC, white blood cell; CRP, C-reactive protein; PCTI, procalcitonin; INR, international normalised ratio; LDH, lactate dehydrogenase.

Bonferroni correction (factor, procedure?) was applied to adjust the experiment-wise error rate of multiple t -tests.

Analyses and graphical illustrations were produced with the free software R version 3.5.1 (R: a language and environment for statistical computing, Vienna, Austria: R Foundation for Statistical Computing).

3. Results

A total of 680 physicians received our survey, of whom 414 (60.9%) answered. The mean \pm standard deviation age of respondents was 45 ± 12.5 years, with an almost equal proportion of males and females. Specialists in internal medicine comprised the majority (35.9%), followed by infectious diseases (32.6%), emer-

gency room medicine (21.5%) and chest medicine (9.9%). More than one-half (56.8%) had been working as specialists for >10 years.

The results are represented in Fig. 1. The most heavily weighted variables were as follows:

- demographic and clinical history: haematopoietic stem cell transplantation (HSCT);
- microbiological: positive pneumococcal urinary antigen test (PUAT) for *Streptococcus pneumoniae* and isolation of pneumonia bacteria;
- radiological: consolidations on lung ultrasound (LUS) and lobar pattern on chest radiography;
- laboratory: procalcitonin (PCTI) level >0.5 ng/dL;

- clinical: worsening during hospitalisation, intensive care unit (ICU) setting and orotracheal intubation (OTI).

ID specialists showed a tendency to attribute a lower weight on initiating antimicrobial treatment when faced with clinical variables such as diarrhoea, human immunodeficiency virus (HIV) infection and oxygen requirement during hospitalisation.

Furthermore, regarding the difference in starting antibiotic treatment in experienced and non-experienced ID specialists, very little difference was observed between the groups, with more-experienced physicians apparently assigning a higher score to male, obese and diabetic patients.

4. Discussion

Our data show that antibiotic prescribing in COVID-19 patients is driven by the presence of co-morbidities (HSCT, presence of bronchiectasis), definite microbial isolation, PCTI level, chest radiography and ultrasound pattern, in-hospital disease worsening, ICU hospitalisation and OTI [5].

We found that ID specialists tend to spare antibiotics on most occasions, being well aware of the emergence of resistance, and to consider multidrug-resistant (MDR) micro-organism colonisation and risk factors for MDR micro-organism infection as not crucial in starting antimicrobial treatment, with an expectantly even lower average value for colonisation.

We have further explored whether the weight attributed to each variable might vary depending on the work experience and we found that less-experienced ID specialists tend to not prescribe antibiotics in patients such as males, diabetics and obese patients, perhaps because senior ID specialists have experienced a poorer outcome of these subjects.

The lack of prescribing indications likely encourage each specialist to rely on their own habits and, as a consequence, antimicrobial stewardship principles are at risk of being disregarded. Thus, antimicrobial stewardship programmes should quickly be implemented and multidisciplinary evaluation with experts in antimicrobial treatment may improve antibiotic use.

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Competing interests

None declared.

Ethical approval

Not required.

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