EDITORIAL

COVID-19: different waves and different outcomes

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The COVID-19 pandemic forced us to improve our skills in the management of a new multiorgan syndrome.[1] The first wave caught us unarmed, facing the virus and its manifestations with a non–evidence-based approach: the lack of high-quality data supporting the use of any drug to fight the virus was counterbalanced by the need to treat our patients.[2] The accumulation of information and knowledge on the COVID-19 pathology, improvements in clinical management and therapeutic interventions, and the decrease in SARS-CoV-2 virulence went hand-in-hand with a reduction in mortality.[3] A reduction in hospitalization and intensive care unit (ICU) admission rates as well as mortality were observed during the second and third waves almost all over the world.[4-6]

In the current edition of *Polish Archives of Internal Medicine*, Bociąga-Jasik et al[7] present the results of a large, single-center, retrospective study reporting the outcomes of in-hospital COVID-19 treatment during 3 consecutive waves of the pandemic. They included medical records of more than 5000 patients with COVID-19 admitted between March 2020 and May 2021 to the University Hospital in Kraków, Poland. They observed substantial differences in patients' characteristics and outcomes between the 3 analyzed waves. In particular, during the first wave, the patients were younger, had lower oxygen saturation, and were mainly women. Moreover, the authors observed that the hospital death rate increased during the subsequent waves up to 20.3% during the third one (vs 10.4% and 19.8%, respectively, during the first and second waves) but the duration of hospital and ICU stay was becoming shorter.

These data are in contrast with other reports: Matsunaga et al[6] included over 500 000 patients from 553 health care facilities in Japan and observed that case fatality rates were the highest and the lowest during wave 1 (7.3%) and 2 (2.8%), respectively, with higher rates among the individuals who received extracorporeal membrane oxygenation therapy, followed by those requiring invasive mechanical ventilation, high-flow oxygen therapy, and bilevel positive airway pressure / continuous positive airway pressure (BiPAP/CPAP) (29.3%, 25.6%, 23.8%, and 21.6%, respectively).[6] Caramello et al,[4] in a large Italian region-wide study based on a health administrative database, observed a reduction in death rates over the 3 pandemic waves (29.6%, 25.0%, and 19.2%, respectively), with worse outcomes among the patients admitted to ICUs (35.9%, 33.0%, and 27.8%, respectively). The need for CPAP administration increased during the consecutive waves; on the other hand, fewer patients admitted to ICUs required intubation, invasive ventilation, or tracheostomy. During the first wave, the patients were older, with more comorbidities and more severe disease (a higher percentage of hospitalizations, ICU admissions, and deaths). Tandon et al[8] conducted a retrospective study across 5 hospitals in New York City. They observed that during the third wave the patients were younger, with lower intubation and in-hospital death rates (24%, 14%, and 12% in each wave, respectively).

As underlined by several authors, differences in mortality rates between individual studies could be related to many factors. First, the methodology of data presentation differed across the published reports, with a high prevalence of retrospective studies. Second, there could be a bias in patient selection, and individuals with more severe disease selected for treatment in specific health care facilities during the later waves of the pandemic could be the reason for higher death rates in some regions of the same country.[8]

As specified above, the majority of studies reported a reduction in mortality over time: this

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could be due to lower virulence, therapeutic improvements observed across the 3 waves, as well as optimization of resources and better understanding of COVID-19.[4,9-13] Moreover, the reduction in mortality during the third wave could be associated with the introduction of vaccines on a large scale, even if with different timing, numbers, and percentages of vaccinated persons in individual countries. On the other hand, Bociąga-Jasik et al[7] reported a progressive increase in mortality during the 3 waves of the COVID-19 pandemic. The authors pointed out that during the second and third waves the patients admitted to the University Hospital in Kraków were preselected, as usually happens in a network distribution, including more severe cases or individuals requiring specialized care; this could also explain the high mortality rate among the patients admitted to the ICU (exceeding 60%). All these differences in comparison with reports from other countries, even European ones, could be also due to the hospitalization policy and governmental recommendations, with different lockdown rules and protocols for the management of COVID-19 patients and the associated consequences related to hospitalization delay and severity of the disease.[7]

In conclusion, factors influencing the natural course of the COVID-19 pandemic and improvements in the management of patients are so numerous and diverse that they deeply influence the hospitalization and mortality trends. Nevertheless, the clinical experience acquired during the pandemic, as well optimization of nonmedical and epidemiological strategies derived from field knowledge, even if sometimes contrasting in different studies, will give us an advantage during the next invisible enemy's attack.

ARTICLE INFORMATION

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