J Bras Pneumol. 2020;46(3):e20200216
https://dx.doi.org/10.36416/1806-3756/e20200216

EDITORIAL

COVID-19: what have we learned?

Yeh-Li Ho[1,a], Anna Miethke-Morais[2,b]

In December of 2019, a number of cases of pneumonia of unknown etiology were reported in China, in the city of Wuhan (Hubei province). On January 7, 2020, confirmation was provided that the cases had been caused by a new coronavirus, which was later named SARS-CoV-2, and the disease was designated coronavirus disease 2019 (COVID-19).[(1)] Four months later, the disease had been detected in more than 185 countries, affecting almost three million people and accounting for more than 200,000 lives lost.[(2)]

The exponential escalation in the number of cases led governments around the world to adopt policies to restrict social movement with the aim of reducing the rate of transmission, expressed as the basic reproduction number (R_0), of COVID-19, that is, the number of secondary cases resulting from an infected individual. The R_0 value of an infectious agent is dependent on the characteristics of the disease—time from transmission to the onset of symptoms, duration of transmissibility, and forms of transmission—and, in respiratory infections, on population density and cultural behavior. Studies using mathematical models found that there was a reduction in the R_0 after the city of Wuhan was quarantined and social movement was restricted.[(3)]

It is of note that social distancing aims to reduce human-to-human transmission, consequently flattening the curve of cases; however, as long as the virus is circulating in the community, social distancing alone does not prevent disease transmission. Nevertheless, social distancing is important because it gives health care systems time to prepare to provide sufficient, appropriate care for patients. Mathematical models developed for the metropolitan area of São Paulo, Brazil, using a mean R_0 value and the proportion of ICU patients then available in the literature, estimated that, within the first 30 days after confirmation of the first case, there would be a demand for approximately 5,300 ICU beds; that is, a demand 130 percent above the actual capacity of the area (study submitted for publication). Similar data were reported for other countries, underscoring the importance of social distancing in reducing the lethality of COVID-19.[(4,5)]

To increase the capacity of the public health care system to care for patients with COVID-19, officials at various levels of government have implemented measures such as opening field hospitals, increasing the number of ICU beds, and partnering with private hospitals. In the city of São Paulo, for instance, the University of São Paulo School of Medicine *Hospital das Clínicas*—which is the largest public hospital in Latin America and receives highly complex cases—became one of the referral hospitals for the care of critically ill patients with COVID-19, its largest division, the Central Institute, which has 900 beds, being devoted exclusively to the care of such patients. The number of ICU beds has been doubled, to 200.

The high demand for hospital beds results from the difference between COVID-19 and other acute viral respiratory diseases. In patients infected with influenza A(H1N1)pdm09 virus, the course of the infection is short, some patients requiring hospitalization in the first days of illness and most hospital stays being relatively short.[(6,7)] In patients infected with the SARS-CoV-2 virus, the infection leads to delayed clinical deterioration and most hospital stays are prolonged.[(8,9)] These characteristics result in the need for longer outpatient monitoring—especially among patients in high-risk groups—and in slower turnover of hospital beds. These factors can contribute to increasing lethality because of the lack of hospital support. There are also certain clinical aspects of COVID-19 that differ from those of other viral respiratory diseases. Worthy of note are the low frequency of upper respiratory symptoms, together with the persistent fever and myalgia, as well as the high frequency of anosmia, with or without ageusia.[(10,11)]

Despite the clinical differences between COVID-19 and other viral respiratory diseases, confirmation of SARS-CoV-2 as the etiologic agent is dependent on molecular biology techniques, the sensitivity of which varies according to the timing of sample collection and the biological material analyzed.[(12)] Wang et al.[(13)] reported that nasopharyngeal swab sampling, the method most widely employed to confirm the diagnosis, has a sensitivity of 63%, compared with only 31% for oropharyngeal swab sampling. In addition, the performance of serological tests varies according to the severity of disease and the timing of sample collection, which limits their utility at the time of hospital admission.[(14)] In view of this scenario and the risk of exposure for health care workers, various recommendations rapidly emerged in the literature regarding diagnostic aids, supportive therapies (especially in the context of intensive care), and specific antiviral therapies.

Among the auxiliary diagnostic tools, chest CT detection of lung abnormalities, with findings of diffuse ground-glass infiltrates, was the first strategy adopted. However, it is important to bear in mind that various other conditions can lead to this radiological finding, including other viral pulmonary infections, such as influenza.[(15)] Another recommendation from various medical societies is that support strategies for acute respiratory failure should

1. Divisão de Moléstias Infecciosas e Parasitárias, Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo, São Paulo (SP) Brasil.
2. Gestão Assistencial Corporativa, Diretoria Clínica, Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo, São Paulo (SP) Brasil.

be used. The recommendation for early orotracheal intubation to reduce the risk of exposure for health care workers was widely disseminated. However, it should be borne in mind that this measure may lead to the unnecessary intubation of patients with etiologic diagnoses other than SARS-CoV-2. In addition, patients are exposed to the risks and complications of long-term sedation and mechanical ventilation. Recent studies have shown that the use of strategies such as high-flow nasal cannula oxygen therapy and noninvasive ventilation results in shorter viral particle dispersion distances in comparison with the use of conventional nasal cannula oxygen therapy.[16,17]

Therapeutic and antiviral strategies, especially the use of convalescent plasma collected from patients who have recovered from COVID-19, prophylactic or therapeutic anticoagulant therapy, and the use of antiviral drugs, also emerged rapidly in the literature. However, at this writing, no strategy is supported by sufficient scientific evidence to justify its inclusion in routine daily practice. It is in this regard that we, physicians, need to be careful in our decisions, always bearing in mind that we may put our patients at risk of complications. The off-label use of a therapeutic strategy is reserved for life-threatening situations. Patients and their families need to be aware if there is a lack of evidence of efficacy of such strategies. It is up to researchers to maintain high standards of scientific rigor when designing and conducting research on COVID-19, as well as when disseminating the results of studies related to COVID-19, thereby preventing errors of interpretation by the medical community and the lay public.[18,19]

REFERENCES

1. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern [published correction appears in Lancet. 2020 Jan 29]. Lancet. 2020;395(10223):470-473. https://doi.org/10.1016/S0140-6736(20)30185-9
2. Johns Hopkins University. Center for Systems Science and Engineering (CSSE) [homepage on the Internet]. Baltimore MD: CSSE; c2020 [cited 2020 Apr 26]. COVID-19 Dashboard. Available from: https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html/bda7594740fd40299423467b48e9ecf6
3. Zhu Y, Chen YQ. On a Statistical Transmission Model in Analysis of the Early Phase of COVID-19 Outbreak [published online ahead of print, 2020 Apr 2]. Stat Biosci. 2020;1-17. https://doi.org/10.1007/s12561-020-09277-0
4. Demographic science aids in understanding the spread and fatality rates of COVID-19 [published online ahead of print, 2020 Apr 16]. Proc Natl Acad Sci U S A. 2020;202004911. https://doi.org/10.1073/pnas.2004911117
5. Tuite AR, Fisman DN, Greer AL. Mathematical modelling of COVID-19 transmission and mitigation strategies in the population of Ontario, Canada [published online ahead of print, 2020 Apr 8]. CMAJ. 2020;cmaj.200476. https://doi.org/10.1503/cmaj.200476
6. Jain S, Kamimoto L, Bramley AM, Schmitz AM, Benoit SR, Louie J, et al. Hospitalized patients with 2009 H1N1 influenza in the United States, April-June 2009. N Engl J Med. 2009;361(20):1935-1944. https://doi.org/10.1056/NEJMoa0906695
7. Bassetti M, Parisini A, Calzi A, Bobbio Pallavicini FM, Cassola G, Artioli S, et al. Risk factors for severe complications of the novel influenza A (H1N1): analysis of patients hospitalized in Italy. Clin Microbiol Infect. 2011;17(2):247-250. https://doi.org/10.1111/j.1469-0691.2010.03275.x
8. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med. 2020;382(18):1708-1720. https://doi.org/10.1056/NEJMoa2002032
9. Grasselli G, Zangrillo A, Zanella A, Antonelli M, Cabrini L, Castelli A, et al. Baseline Characteristics and Outcomes of 1591 Patients Infected With SARS-CoV-2 Admitted to ICUs of the Lombardy Region, Italy [published online ahead of print, 2020 Apr 6]. JAMA. 2020;323(16):1574-1581. https://doi.org/10.1001/jama.2020.5394
10. Fu L, Wang B, Yuan T, Chen X, Ao Y, Fitzpatrick T, et al. Clinical characteristics of coronavirus disease 2019 (COVID-19) in China: A systematic review and meta-analysis [published online ahead of print, 2020 Apr 10]. J Infect. 2020;S0163-4453(20)30170-5. https://doi.org/10.1016/j.jinf.2020.03.041
11. Yan CH, Faraji F, Prajapati DP, Boone CE, DeConde AS. Association of chemosensory dysfunction and Covid-19 in patients presenting with influenza-like symptoms [published online ahead of print, 2020 Apr 12]. Int Forum Allergy Rhinol. 2020;10.1002/alr.22579. https://doi.org/10.1002/alr.22579
12. Tahamtan A, Ardebili A. Real-time RT-PCR in COVID-19 detection: issues affecting the results. Expert Rev Mol Diagn. 2020;20(5):453-454. https://doi.org/10.1080/14737159.2020.1757437
13. Wang W, Xu Y, Gao R, Lu R, Han K, Wu G, et al. Detection of SARS-CoV-2 in Different Types of Clinical Specimens [published online ahead of print, 2020 Mar 11]. JAMA. 2020;e203786. https://doi.org/10.1001/jama.2020.3786
14. Xiang F, Wang X, He X, Peng Z, Yang B, Zhang J, et al. Detection and Dynamic Characteristics in Patients with COVID-19 [published online ahead of print, 2020 Apr 19]. Clin Infect Dis. 2020;ciaa461.
15. Coppola M, Porto A, De Santo D, De Fronzo S, Grassi R, Rotondo A. Influenza A virus: radiological and clinical findings of patients hospitalised for pandemic H1N1 influenza. Radiol Med. 2011;116(5):706-719. https://doi.org/10.1007/s11547-011-0622-0
16. Li J, Fink JB, Ehrmann S. High-flow nasal cannula for COVID-19 patients: low risk of bio-aerosol dispersion [published online ahead of print, 2020 Apr 16]. Eur Respir J. 2020;2000892. https://doi.org/10.1183/13993003.00892-2020
17. Ferioli M, Cisternino C, Leo V, Pisani L, Palange P, Nava S. Protecting healthcare workers from SARS-CoV-2 infection: practical indications. Eur Respir Rev. 2020;29(155):200068. https://doi.org/10.1183/16000617.0068-2020
18. Kalil AC. Treating COVID-19-Off-Label Drug Use, Compassionate Use, and Randomized Clinical Trials During Pandemics [published online ahead of print, 2020 Mar 24]. JAMA. 2020;10.1001/jama.2020.4742. https://doi.org/10.1001/jama.2020.4742
19. Habibi R, Burci GL, de Campos TC, Chirwa D, Cinà M, Dagron S, et al. Do not violate the International Health Regulations during the COVID-19 outbreak. Lancet. 2020;395(10225):664-666. https://doi.org/10.1016/S0140-6736(20)30373-1