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Temporal evolution of the COVID-19 pandemic and lethality in healthcare professionals in Brazil

Evolución temporal de la pandemia COVID-19 y letalidad en profesionales de la salud en Brasil

Evolução temporal da pandemia do COVID-19 e letalidade em profissionais de saúde no Brasil

ABSTRACT
Objectives: To analyze the temporal evolution of COVID-19 and to identify the mortality rate due to Severe Acute Respiratory Syndrome in health professionals in Brazil. Methods: Cross-sectional ecological study, using secondary data in the year 2020. Information related to the numbers of deaths, confirmed cases and investigations by COVID-19 were collected. Results: From January to August, 1,241,685 cases of COVID-19 and 4,615 of Respiratory Syndrome were confirmed among professionals. Of these, 991 died, which resulted in a lethality rate of 0.79 / 1,000. There was an increase of 28.7% in the number of cases, between June and August, while, in August, there was a reduction of 33.16%. Pearson's analysis showed that significant correlations were between deaths due to COVID-19 and Respiratory Syndrome. Conclusions: The results, in addition to revealing the real magnitude of the risks faced by this group, present the alert to the public authorities, in all its spheres.
DESCRIPTORS: COVID-19; Collective Health; Attention to Occupational Health; Severe Acute Respiratory Syndrome.

RESUMEN
Objetivos: Analizar la evolución temporal de COVID-19 e identificar la tasa de mortalidad por Síndrome Respiratorio Agudo Severo en profesionales de la salud en Brasil. Métodos: Estudio ecológico transversal, utilizando datos secundarios en el año 2020. Se recopiló información relacionada con el número de muertes, casos confirmados e investigaciones por COVID-19. Resultados: De enero a agosto se confirmaron entre profesionales 1.241.685 casos de COVID-19 y 4.615 de Síndrome Respiratorio. De estos, 991 murieron, lo que resultó en una tasa de letalidad de 0,79 / 1.000. Hubo un aumento del 28,7% en el número de casos, entre junio y agosto, mientras que, en agosto, hubo una reducción del 33,16%. El análisis de Pearson mostró que hubo correlaciones significativas entre las muertes por COVID-19 y el síndrome respiratorio. Conclusiones: Los resultados, además de revelar la magnitud real de los riesgos que enfrenta este colectivo, presentan la alerta a las autoridades públicas, en todos sus ámbitos.
DESCRIPTORES: COVID-19; Salud pública; Atención a la Salud Ocupacional; Síndrome respiratorio agudo severo.

RESUMO
Objetivos: Analisar a evolução temporal do COVID-19 e identificar a taxa de letalidade por Síndrome Respiratória Aguda Grave em profissionais de saúde no Brasil. Métodos: Estudo ecológico transversal, com dados secundários no ano de 2020. Foram coletadas informações relacionados aos números de óbitos, casos confirmados e em investigação da COVID-19. Resultados: De janeiro a agosto foram confirmados 1.241.685 casos de COVID-19 e 4.615 de Síndrome Respiratória entre os profissionais. Destes, 991 foram óbitos, o que resultou em taxa de letalidade de 0,79/1.000. Houve um aumento de 28,7% no número de casos, entre junho e agosto, enquanto, em agosto, houve uma redução de 33,16%. Na análise de Pearson detectou-se que as correlações significantes foram entre os óbitos por COVID-19 e Síndrome Respiratória. Conclusões: Os resultados além de revelar a real magnitude dos riscos em que se encontra este grupo, apresenta a alerta ao poder público, em todas as suas esferas.
DESCRITORES: COVID-19; Saúde Coletiva; Atenção à Saúde do Trabalhador; Síndrome Respiratória Aguda Grave.

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INTRODUCTION

Brazil and the world are facing the most serious pandemic of an infectious disease that represents one of the greatest global health challenges of this century, caused by a new coronavirus (SARS-CoV-2).[1] The disease called COVID-19 is potentially fatal and represents the most important worldwide public health problem in the past 100 years, compared only to the Spanish flu that killed about 25 million people between 1918 and 1920. [2]

In Brazil, the mortality rate in November 2020 (number of deaths per total cases) was 2,8%, while the mortality rate (number of deaths per 100 thousand inhabitants) reached 80,5, and the incidence of COVID-19 cases per 100 thousand inhabitants was 2889,1. [3]

The new coronavirus, in turn, is one of the main etiological agents that result in Severe Acute Respiratory Syndrome (SARS), in addition to the influenza A virus, dengue fever, respiratory syncytial virus, adenovirus and hantavirus, and other agents (pneumococcus, other bacteria, Legionella sp., Leptospirosis, etc.). 2 With the arrival of COVID-19 and the detection of community transmission in the country, the SRAG surveillance protocol started to also include the test for SARS-CoV-2, as of the 12th epidemiological week. [4]

Individuals with a combination of high fever symptoms (above 37,8ºC) and cough or sore throat and difficulty in breathing or dyspnoea or O2 saturation <95% and need for hospitalization are considered as cases of SARS. or death having presented the referred symptoms, regardless of hospitalization. [5]

Due to its high transmissibility and the lack of drugs and vaccines to treat and control the spread of the virus, the only effective strategy for the containment of COVID-19 is social distancing. 6 However, for health professionals who are in the direct care of patients diagnosed with COVID-19 in primary care services, in emergency care units and in hospitals, the recommendation to stay at home does not apply. [7]

The new coronavirus, in turn, is one of the main etiological agents that result in Severe Acute Respiratory Syndrome (SARS), in addition to the influenza A virus, dengue fever, respiratory syncytial virus, adenovirus and hantavirus, and other agents (pneumococcus, other bacteria, Legionella sp., Leptospirosis, etc.)

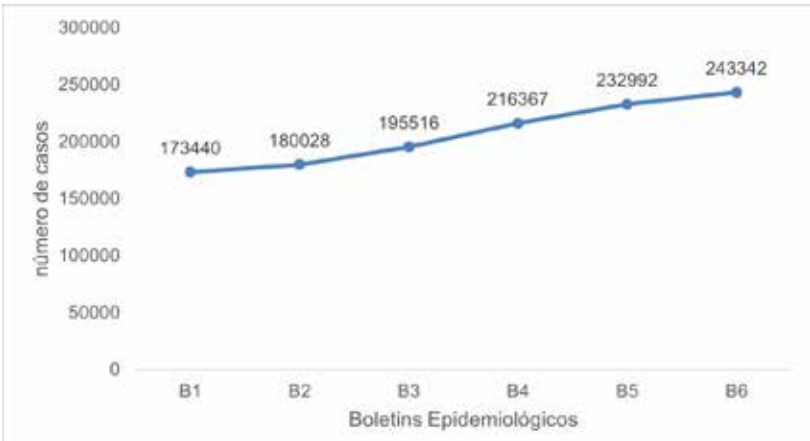
Thus, these professionals constitute a risk group for COVID-19 because they are directly exposed to infected patients, which provides greater contact with high viral load. [7,8] In view of the above, understanding the mortality data, mainly in the referred population, although mortality statistics are criticized, is necessary for monitoring public health as well as in the planning and evaluation of health care. In addition, it is comprehensible and applicable data on epidemiological surveillance and trend analysis. [9]

Epidemiological data record that in Brazil, as well as in other countries, many health professionals were removed from work activities because they became infected and many died as a result of COVID-19. [10]

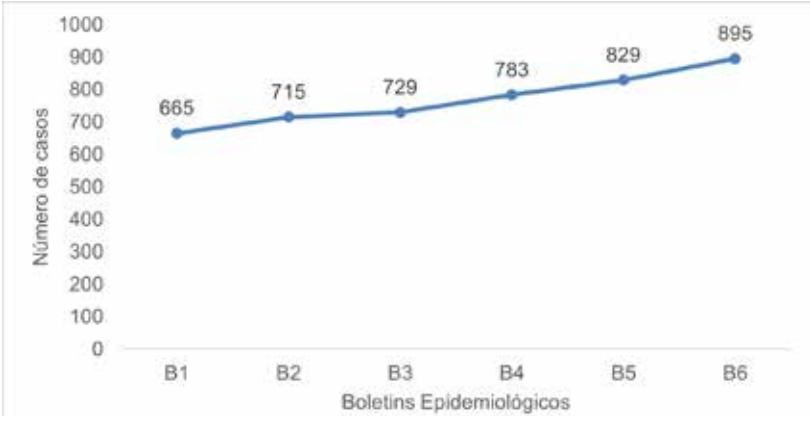
Among these professionals, who are directly linked to health care, nursing technicians, nurses, doctors, community agents, agents to combat endemic diseases, laboratory technicians, physiotherapists and pharmacists stand out. [3]

In this context, considering the increasing occurrence of COVID-19 in health professionals and the importance of this team in coping with the pandemic, it is necessary to develop this study, which aims to analyze the temporal evolution of the COVID-19 pandemic and identify the mortality rate due to SARS due to the disease in health professionals in Brazil.

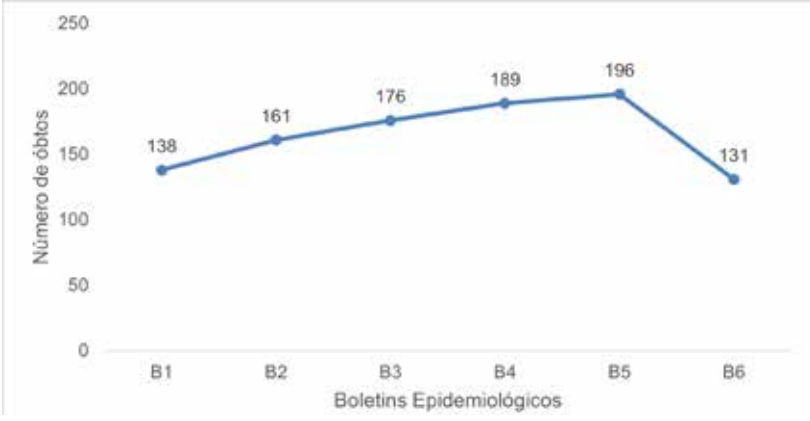
Graph 01. Temporal evolution of the number of COVID-19 cases among health professionals in Brazil, June to August 2020.



Graph 02. Temporal evolution of the number of cases of Severe Acute Respiratory Syndrome (SARS) in health professionals in Brazil, June to August 2020.



Graph 03. Temporal evolution of the number of deaths due to COVID-19 in health professionals in Brazil, June to August 2020.



METHODS

This is a study with an ecological methodological approach, with secondary data from Health Information Systems in 2020, with Brazil as the unit of analysis.

Data were collected related to the number of deaths, number of confirmed cases and investigations by COVID-19 in health professionals in Brazil, from the Epidemiological Bulletin COVID-19 - Ministry of Health. [3]

The number of confirmed and investigated cases in professionals by SRAG were collected from January to August 2020. On the other hand, cases of deaths in professionals by SRAG were collected from the 12th week on in the epidemiological bulletin (April to August 2020), a period in which the test for SARS-CoV-2 was included in the health surveillance protocol.

Initially, a descriptive analysis was performed showing the absolute and relative frequencies of the variables referring to the health professions. The line graph was used to analyze the time evolution of the number of confirmed cases of COVID-19, the number of deaths of COVID-19 and the number of cases of SRAG in health professionals in Brazil in the period studied. A Pearson Correlation of SRAG and deaths by COVID-19 was performed. The relationship was considered statistically significant when $p < 0,05$.

The data were entered and analyzed using the Statistical Package For The Social Science for Windows (SPSS), version 17.0.

This study used secondary data and aggregates from the public domain. Therefore, free and informed consent and approval by the Ethics and Research Committee are waived, according to Resolution No. 466/2012 of the National Research Ethics Committee of the National Health Council in Brazil.

RESULTS

From January to August, 1.241.685 confirmed cases of COVID-19 and 4.615 cases by SARS were identified among health professionals in Brazil (Graphs 01 and 02).

Of these, 991 evolved to deaths (Graph 3) due to this cause, which resulted in a lethality rate of 0,79/1.000 health professionals. There was an increase of 28,7% in the number of cases between the months of June and August, and an increase of 29,5% in the number of deaths between the months of June and July, while, in August, there was a reduction of 33,16%.

The first cases of COVID-19 in confirmed health professionals in Brazil, according to the Epidemiological Bulletin COVID-19 - Ministry of Health, occurred in August, with the first deaths also being recorded (Table 01). With regard to the categories of health professionals, it is observed that 27,68% are nursing technicians, 11,98% nurses and 8,8% doctors (data not shown in the table).

In the analysis of Pearson's correlation, it can be detected that the significant correlations (r) were observed between deaths by COVID-19 and SRAG. The correlation between both variables was significantly high (r = 0,984; p = 0,000). Significant correlations were also found between deaths and number of cases of COVID-19, being (0,358; p = 0,009), respectively.

DISCUSSION

This study suggests that the health professionals most affected by COVID-19 are those who are directly linked to health care, nursing technicians, nurses, doctors, community agents, physiotherapists and pharmacists stand out.

Data from the scientific literature reveal that health professionals are three times more likely to contract the virus than the general population. [11] And when restricted to the universe of infected, it is observed that there is a high prevalence in the study group when compared to the Brazilian population. Research by Kowalski et al.[12] records that health professionals represent 3,8% to 20% of the infected popu-

Table 1. First confirmed cases and deaths of COVID-19 among health professionals in Brazil, 2020.

HEALTH PROFESSIONALS	CONFIRMED CASES (N)	DEATHS (N)
Community Health Agent	8.030	5
Endemic Combat Agent	2.227	0
Public Health Agent	1.756	2
Social Worker	1.714	1
Nursing Attendant	0	0
Pharmacy Attendant	0	0
Social Area Assistant	1.628	0
Pharmacy Assistant	0	0
Veterinary Assistant	0	0
Radiology assistant	1.314	0
Biologist	227	0
Biomedic	1.510	0
Dental surgeon	2.897	0
Ambulance driver	2.287	0
Elderly caregiver	0	
Health Caregiver	2.212	0
Doula	10	0
Physical educator	328	0
Nurse	25.718	13
Food engineer	13	0
Work safety engineer	220	0
Pharmaceutical	3.320	3
Physicist	672	0
Physiotherapist	4.220	4
Speech Therapist	537	0
Health managers	3.168	0
Stretcher bearer	1	0
Doctor	19.037	24
Veterinarian or Zootechnician	517	1
Microscopist or health laboratory assistant	615	0
Naturologist	6	0
Nutritionist	1.980	0
Dentist	0	7
Others	0	11
Another type of health worker or health visitor	5.514	0
Other teaching professionals	899	0
Midwife	3	0
Biological Sciences Researcher	165	0

lation, showing the great impact of the disease on the workforce.

These findings confirm data published by the CDC (Centers for Disease Control and Prevention), on the cases of COVID-19 in health professionals in the United States, which found a proportion greater than 75% of the cases of medical and nursing professionals, given greater exposure in clinical and emergency care. [13] In Brazil, until August 22nd, 2020, data from the World Health Organization (WHO), indicated through an Epidemiological Alert that 241 health professionals died and another 268.954 thousand were infected with the new coronavirus. [14]

Thus, it is necessary to reflect on how the process and working conditions can pose risks to health professionals, as potential sources of exposure to the etiologic agent and, indirectly, to family members and other contacts. Greater proximity and more time to care for the infected, necessary for their work processes, the use and/or availability of inappropriate Personal Protective Equipment (PPE), and therefore, exposure to the various forms of transmission of the pathogen, can lead to illness of these professionals. [15]

Health professionals themselves are being challenged to seek knowledge while attending to COVID-19 cases that overload services, monitor patients with other health problems, and protect themselves from exposure to the risk of becoming ill. Thus, there is also a great need for professional knowledge to face the emergency context, and the importance of the circulation of guidelines on biosafety habits is emphasized for all categories involved in the health service, to be adopted in the workplace. [16] The adoption of preventive behavior brings the possibility to mitigate the number of infected and deaths.

In addition, this study identified a reduction in the number of deaths in August 2020, which may be associated with greater knowledge by health professionals about the behavior of the virus and protection management, as well as a reduction in the number of active cases, which prevents infection. This result is similar to the conclusions of Rangel et al. [17], that in the long run, a flattening of the epidemic curve can be observed as a consequence of restrictive measures, such as social distance.

Regarding the panorama of the National Vaccination Campaign against COVID-19, updated on January 12th, 2021, as it is a worldwide search for technology, production and acquisition of the immunobiological, the availability of the vaccine is initially limited. Thus, there was the definition of priority groups for vaccination, with the inclusion of health workers, due to a higher risk of aggravation and death. There is a forecast for all health workers to be covered with vaccination, however it is known that the expansion of coverage of this public will be gradual, according to the availability of vaccines. [18] In this scenario, it is emphasized that, based on prudence, as there are still no vaccines available for everyone, or proven effective drugs, the only strategy to slow the pandemic remains the distance.

The absence of studies that give voice to the temporal evolution of COVID-19 is looming, as it is a new disease and situation, with initial reports, more precisely, of December 2019. Thus, the information and knowled-

Professor	158	0
Biotechnology Professional	320	0
Physical Education Professional		0
Psychologist	1.825	1
Chemist working in the health area	91	0
Receptionist	7.642	0
Rescuer	485	0
Acupuncture technician, chiropractic, massage therapy	47	0
Radiology technician or assistant	0	1
Nutrition technician	0	0
Nursing Technician	1	58
Sanitation technician	241	0
Security technician at work	945	0
Electrotechnical technician	197	0
Food Technician	697	0
Diagnostic technician	993	0
Pharmacy and pharmaceutical handling technician	2.101	2
Orthopedic immobilization technician	135	0
Optics and optometry technician	22	0
Orthopedic prosthesis technician	35	0
Nursing Technician or Assistant	59.635	0
Dentistry/dental health technician or assistant	1.965	2
Laboratory technicians	1.988	3
Telephonist	935	0
Occupational Therapist	237	0
Total	173.440	138

ge gaps make themselves present. The unavailability of these data and other variables for analysis was a limitation of this research.

Knowing that serious infections of COVID-19, presented as SRAG, cause an inflammatory lack of control of the organism, which points to a worse prognosis for the affected individual. As for the infection process, the invasion of the cell by SARS-CoV-2, which causes COVID-19, occurs from the binding of protein S with an enzyme receptor, the angiotensin-converting enzyme 2 (ACE2) on the surface of the human cell. The virus then merges with the membrane and releases its genetic material (viral RNA) inside the cell, which, once infected, begins to manufacture proteins that will assist in the production of copies of the virus. Each infected cell is capable of producing millions of new viral particles, which, once released into the host's organism, will infect other healthy cells. [19]

All individuals, despite their age, can be infected with SARS-CoV-2 and present SRAG, which is the most serious condition and the form of COVID-19 responsible for causing deaths and hospitalizations. However, middle-aged and elderly people are most affected by this syndrome. [20]

The present study also demonstrated significant correlations between COVID-19 and SRAG, which corroborates with Bastos et al.4, who argued that in 2020 hospitalization due to SARS, since the detection of the first case of COVID-19 in Brazil, surpassed that observed, in the same period, in each of the previous 10 years, even with the acknowledged delay of existing notification. It was also possible to identify a significant correlation between deaths and the number of cases of COVID-19 in health professionals, which leads to its evolution to more severe forms of SARS.

A similar event, on the mortality of nursing professionals, was discussed by Benito et al. [21], which can be related to several issues, such as, the complexity of the disease and the lack of knowledge of combat and control methodologies, reduced availability of PPE by employing institutions, the high daily workload, the high number of patients instituted a to be served, the reduced number of professionals organized institutionally for the service, among others.

Knowing that serious infections of COVID-19, presented as SRAG, cause an inflammatory lack of control of the organism, which points to a worse prognosis for the affected individual. As for the infection process, the invasion of the cell by SARS-CoV-2, which causes COVID-19, occurs from the binding of protein S with an enzyme receptor, the angiotensin-converting enzyme 2 (ACE2) on the surface of the human cell.

In light of the above, it is understood that it is necessary to consider that the numbers of cases and deaths that occurred may be even higher than those recorded, due to possible underreporting. As well as the lack of confirmation of the cases due to the lack of mass testing in the professionals. [22]

To ensure that decisions are taken in public health and, particularly, in occupational health, it is essential to know the number of cases and deaths of COVID-19 among health professionals, which is a strong point of this study. [23]

Such knowledge can, in addition to revealing the real magnitude of the risks that this work group is in, bring the alert that the public power, in all its spheres, needs articulation to elaborate, adapt, implement and inspect policies and regulations that seek to ensure safety in the work environment of health professionals, as well as assist in the estimation of inputs and equipment needed for health care, in order to contribute to the establishment of strategies to face the pandemic.

CONCLUSION

The evidence compiled in this study shows a high number of infected health professionals who died, especially in the beginning of the pandemic. However, it was possible to observe, from the month of August, a decreasing trend in the cases of deaths. Regarding the category of professionals, nursing technicians, nurses and doctors were the most infected, with the highest fatality rate among nursing technicians.

Thus, as a conclusion, it is necessary to emphasize the importance of greater attention to aspects involving biosafety habits by these professionals, since this, since there is no vaccine for everyone so far, remains the main strategy for controlling transmission, and the damage caused by the new coronavirus. ■

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