Characteristics of health professionals affected by Covid-19: an integrative literature review

Características de profissionais de saúde acometidos por Covid-19: revisão integrativa da literatura

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ABSTRACT The objective of the study was to identify the characteristics of health professionals affected by Covid-19. It is an integrative literature review guided by six steps and which researched five data sources. After establishing the selected material flow (N=5,522), the analyzed sample of articles was determined (n=30). From this, information was summarized regarding the characteristics of the workers and related to getting sick by Covid-19. Among the selected studies, data from 10,760 health workers were compiled, predominantly nursing team (27.3%) and physicians (13.2%). Most (n=20; 66.6%) of the studies attested that health professionals were contaminated in the work environment, mainly in hospitals. RT-PCR testing was the main diagnostic method. Some studies (n=16; 53.3%) reported previous comorbidities among workers. The main symptoms of Covid-19 in affected health professionals were: fever, coughing, fatigue, and myalgia. Characteristics that go back to a concentrated profile of nurses and doctors contaminated in the hospital were found. This reality was focused on Chinese, Italian and North American cross-sectional research.

KEYWORDS Covid-19. Health personnel. Sars-CoV-2. Occupational health.

RESUMO *O objetivo do estudo consistiu em identificar as características de profissionais de saúde acometidos por Covid-19. Trata-se de uma revisão integrativa da literatura guiada por seis etapas e que pesquisou cinco fontes de dados. Após o estabelecimento do fluxo de seleção do material levantado (N=5.522), determinou-se a amostra de artigos analisada (n=30). Desta, foram sintetizadas informações a respeito das características dos trabalhadores e relativas ao acometimento por Covid-19. Entre os estudos selecionados, foram compilados dados de 10.760 trabalhadores de saúde, predominantemente da equipe de enfermagem (27,3%) e médicos (13,2%). A maior parte (n=20; 66,6%) dos estudos atestou que os profissionais de saúde foram contaminados no ambiente de trabalho, principalmente hospitalar. A testagem por RT-PCR foi o principal método diagnóstico. Alguns estudos (n=16; 53,3%) relataram comorbidades prévias entre os trabalhadores. Os principais sintomas da Covid-19 nos profissionais de saúde acometidos foram: febre, tosse, fadiga e mialgia. Constataram-se características que remontam em perfil concentrado de enfermeiras e médicos contaminados no hospital. Essa realidade foi focalizada entre pesquisas transversais chinesas, italianas e estadunidenses.*

PALAVRAS-CHAVE *Covid-19. Pessoal de saúde. Sars-CoV-2. Saúde do trabalhador.*

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Introduction

Covid-19 is an infectious disease caused by the new coronavirus (Sars-CoV-2), declared as a pandemic in March 2020[1]. Sars-CoV-2 is a type of coronavirus that first appeared in the interior of China, belonging to a large viral family and the main cause of mild and moderate respiratory diseases and/or even severe acute respiratory disease[1].

Despite being a disease that predominantly affects the respiratory tract, other symptoms such as diarrhea, abdominal pain, nausea and vomiting have also been attributed to Covid-19[2-3]. In Wuhan, China, the primary epicenter of the disease, patients experienced symptoms such as fever, productive cough, dyspnea, myalgia, fatigue, reduced white blood cell counts, and radiographic evidence of pneumonia[4]. This was gradually being verified in other places with the progressive worldwide dissemination of the virus[4].

Covid-19's numbers are updated on a daily basis, dismaying the population and bringing evident health and socioeconomic concerns around the world. Currently, in the month of June 2021, there are more than 178,2021,610 confirmed cases worldwide, in a total of 3,865,738 deaths and more than 70 thousand new confirmed cases in a single day[5]. In terms of number of cases and deaths, the countries of greatest concern today are Brazil, the United States of America (USA) and Russia, as the situation in Italy, Spain, France and China – previously considered alarming epicenters of the disease – seems to have reached better sanitary control, despite new waves of the virus still frightening these and other places[6]. Furthermore, Brazil has been frequently questioned, including in the media, with regard to managerial effectiveness on the immunization of the population against Covid-19, when comparing the percentage of people vaccinated in several other countries rated as more assertive in this regard.

The Covid-19 worsening rate, which leads to the need for hospitalization, is estimated at between 5% and 15% of cases. Among the most serious cases, the need for advanced assistance in the Intensive Care Unit (ICU) is estimated at around 50% to 80%[1]. In this sense, considering that the demand for health services has increased significantly with the pandemic and that the burden of care for persistent and emerging diseases is uninterrupted, the landscape is one of trend or actual collapse in many health systems[7].

Faced with the potential or actual collapse of health systems, there is a concern with professionals in this area who work directly in the fight against the Covid-19 pandemic, given their evident exposure to Sars-CoV-2, combined with a common panorama of precarious work conditions or made precarious by the health situation[7,8]. Studies[9,10] point out that the lack of materials such as gloves, masks, syringes and other appropriate equipment represents 46.8% of the reasons that determine greater vulnerability in health work, especially for nursing; and that the rhythm and pressure of the volume of work activities account for 51.2% of these reasons. This scenario tends to be aggravated in the current pandemic context due to work overload, high transmission rate of this virus and the need for constant use of specific personal protective equipment[7].

It is a fact that health professionals have felt the impact of contamination by Sars-CoV-2, whether due to the demand for work, social stigma, emotional burden or even their compromised individual health[11]. This allusion is confirmed by current data from two Chinese studies that showed that 29% (n=138)[4] and 35% (n=1099)[12] of patients with Covid-19 were health professionals, with a predominance of men who required hospitalization.

The need to further analyze the scientific information on the illness of health professionals contaminated by the new coronavirus is emphasized, as, empirically and

according to media outlets, it is known that there are many contaminated workers and professionals who died as a result of Covid-19, which reinforces the need for studies that compile data on the illness of these workers. Still, it is urgent to investigate the illness of these professionals because this corresponds to a social response that can help to fight the pandemic, as well as foster discussions about working conditions in health in the expected post-crisis period. Thus, the objective was to identify the characteristics of health professionals affected by Covid-19.

Material and methods

This is an integrative literature review guided by a framework[12] that provides for the study to be carried out in six stages: 1) identification of the theme and selection of the hypothesis or research question; 2) establishment of inclusion and exclusion criteria and literature search; 3) definition of the information to be extracted from the selected studies; 4) evaluation of included studies; 5) interpretation of results; and 6) knowledge synthesis.

The question that guided the study was structured through the PICo[12] strategy, an acronym for Population, Interest and Context. Thus, the elaboration took place as follows: P – Health professionals, I – Characteristics/profile; and Co – Affected by Covid-19. This resulted in the research question: what are the characteristics of health professionals affected by Covid-19 available in the scientific literature?

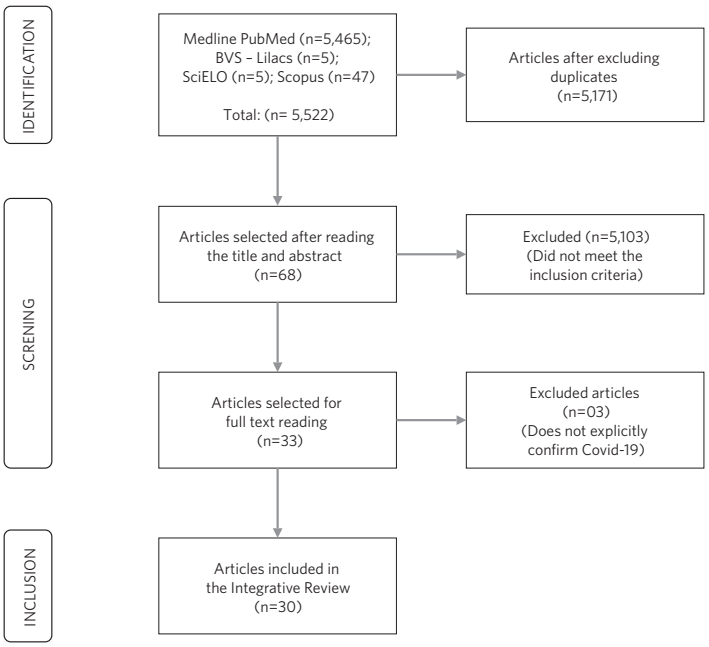
The established inclusion criteria were: online articles available in full, published in Portuguese, English and/or Spanish; that presented data from health professionals with confirmed Covid-19. Articles published in more than one database, those that did not answer the research question after reading the abstract and/or text in full, were excluded, as well as duplicates.

The search was performed in the following sources: Latin American and Caribbean Literature in Health Sciences (Lilacs), Medical Literature Analysis and Retrievel System Online (Medline via PubMed), Scientific Electronic Library Online (SciELO) and Scopus. The following Health Sciences Descriptors (DeCS) and the United State National Library of Medicine (MeSH) were selected: *Profissional de saúde, Coronavírus, Covid-19 vírus, Sars-CoV-2, 2019-nCoV, coronavírus disease 2019*. Furthermore, their corresponding descriptors in English were: Health Personnel, Coronavirus, Covid-19 virus, Sars-CoV-2, 2019-nCoV, coronavirus disease 2019.

The terms were crossed among themselves through search strategies using the Boolean operator AND. Specific structures were carried out, according to the characteristics of each electronic database. The following search strategy was applied: "Coronavirus" AND "Covid-19 virus" AND "Sars-CoV-2" AND "2019-nCoV" AND "coronavirus disease 2019" AND "Health Personnel"; and the search strategy: Coronavírus AND Covid-19 vírus AND Sars-CoV-2 AND 2019-nCoV AND coronavírus disease 2019 AND Profissional de saúde.

The search was carried out preliminary in June 2020 and was updated in June 2021 by two researchers. The first stage of article selection was performed by reading and analyzing the titles and abstracts of all the references raised (N=5,522) for prior verification of the potential inclusion of each study in the review, in ad dition to the exclusion of duplicate texts. After this preliminary screening, in the second stage, the recruited studies were read in full, which allowed that other texts were also excluded, as they did not meet the proposal of this review. *Figure 1* shows the flow of article selection, adapted according to the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Prism).

Figure 1. Flowchart of the article selection process, 2021



Source: Self elaborated.

From the selected studies, the following variables were extracted: authors, year, country of origin, study design, sample of health professionals studied, characteristics/profile of health workers (gender, age, professional category, workplace and comorbidities), clinical manifestations of health professionals regarding infection by Covid-19, likely form of contamination and form/test of diagnosis of Covid-19 used. The information was summarized in synoptic tables for knowledge synthesis. It is noteworthy that the variable 'age', of quantitative content, was presented as described in each study, whether categorical or continuous; therefore, not always showing the average.

We highlight that, as this is secondary research based on unrestricted access data, this study does not violate the ethical principles that deal with studies involving human beings, exempting the need for institutionalized ethical procedures.

Results

Among the articles selected for the study (n=30), there was a predominance of studies carried out in China (n=13; 43.3%), in Italy (n=4; 13.3%) and in the USA (n= 3; 10%), and the cross-sectional study design was the most frequent (n=18; 60%), followed by cohort studies (n=9; 30%) (*table 1*).

Of the total number of articles analyzed, data from 10,760 health professionals who were contaminated and tested positive for Covid-19 were computed. Of the 30 studies in the sample, 26 (86.6%) stated that the professionals were diagnosed according to the RT-PCR (Reverse-Transcriptase Polymerase

Chain Reaction) test. One (3.3%) study claimed to have used a serological test for diagnosis, and in three articles (10%) the diagnostic mechanism used was not verified.

Table 1 shows the characteristics of the analyzed studies, according to their authors, year, country of origin, study design and number of professionals contaminated by Covid-19.

Table 1. Characteristics of the analyzed studies, according to authors, year, country of completion, study design and number of professionals contaminated by Covid-19, 2021

Authors/Year	Study Country	Study Design	Health professional sample
Alma T et al., 2020[13]	Netherlands	Cohort	90
Chen et al., 2020[14]	China	Exploratory/Transverse	15
Eric J et al., 2020[15]	USA	Cohort	48
Guan et al., 2020[16]	China	Cohort	38
Guo X et al., 2020[17]	China	Exploratory/Transverse	24
Heinzerling et al., 2020[18]	USA	Cohort	121
Jiaojiao C et al., 2020[19]	China	Cohort	54
Keeley et al., 2020[20]	United Kingdom	Exploratory/Transverse	52
Li Q et al., 2020[21]	China	Exploratory/Transverse	15
Liu, M et al., 2020[22]	China	Exploratory/Transverse	30
McMichael et al., 2020[23]	USA	Exploratory/Transverse	151
Qi Z et al., 2020[24]	China	Cohort	44
Sun H et al., 2020[25]	China	Exploratory/Transverse	32
Wang F et al., 2020[26]	China	Cohort	6
Reusken et al., 2020[27]	Netherlands	Exploratory/Transverse	85
Ying-Hui et al., 2020[28]	China	Exploratory/Transverse	103
Yu X et al., 2020[29]	China	Exploratory/Transverse	4
Escribese M et al., 2020[30]	Spain	Exploratory/Transverse	50
Marra M et al., 2021[31]	Italy	Cohort	105
Ying- Hui J et al., 2020[32]	China	Exploratory/Transverse	105
Fwoloshi S et al., 2020[33]	Africa	Exploratory/Transverse	660
Lombardi A et al., 2020[34]	Italy	NS	139
Lahner E et al., 2020[35]	Italy	Exploratory/Transverse	58
Al-Kuwari MG et al., 2021[36]	West Asia	Exploratory/Transverse	1.199
Liu J et al., 2021[37]	China	Cohort	101
Abdelmoniem R et al., 2020[38]	Egypt	NS	29
Rodriguez A et al., 2021[39]	Spain	NS	61
Alkurt G et al., 2021[40]	Turkey	Exploratory/Transverse	119
S. Mandić R et al., 2020[41]	Italy	Exploratory/Transverse	172
Schwartz K et al., 2020[42]	Canada	Exploratory/Transverse	7.050

Source: Self elaborated, 2021.

NS = Não Specified.

Regarding the age of the health professionals involved in the studies, it is noteworthy that not all mentioned this information. Among those who informed the age of the professionals (n=26; 86.6%), there was a predominance of the age group above 40 years (n=13; 43.3%). Regarding gender, females stood out in 21 studies (70%), followed by 3 (10%) in which male participants predominated, and 6 (20%) who did not define this information.

As for the workplace, 27 (90%) studies showed that professionals contaminated by Covid-19 worked in the hospital environment. Of the total number of manuscripts, 20 (66.6%) stated that health professionals were contaminated in the workplace, 4 studies (13.3%) stated that the contamination was extra-hospital, and another 6 (20%) did not specified the form of contamination (*table 2*).

Table 2. Characteristics of health professionals affected by Covid-19 among the selected studies, according to age, gender, workplace and possible place of contamination. Brazil, 2021

Study	Age (years)	Gender (M/F)	Workplace	Probable Contamination
Alma T et al., 2020[13]	41 to 50	21/79	Hospital	NS
Chen et al., 2020[14]	Average 55	NS	Hospital	Out-of-hospital
Eric J et al., 2020[15]	Average 43	11/37	Hospital	Workplace
Guan et al., 2020[16]	Average 47	NS	Hospital	Out-of-hospital
Guo X et al., 2020[17]	Average 36	23/1	Hospital	Workplace
Heinzerling et al., 2020[18]	NS	20/101	Hospital	Workplace
Jiaojiao C et al., 2020[19]	Average 47	36/18	Hospital	NS
Keeley et al., 2020[20]	NS	NS	Hospital	NS
Li Q et al., 2020[21]	Average 59	15/0	NS	Out-of-hospital
Liu, M et al., 2020[22]	Average 35	10/20	Hospital	Workplace
McMichael et al., 2020[23]	43 to 62	39/112	Hospital	Workplace
Qi Z et al., 2020[24]	NS	14/30	Hospital	Workplace
Sun H et al., 2020[25]	22 to 56	4/28	Hospital	Workplace
Wang F et al., 2020[26]	Average 33	F	Hospital	Workplace
Reusken et al., 2020[27]	Average 56	NS	Hospital	Workplace
Ying-Hui et al., 2020[28]	Average 35	39/64	Hospital	Workplace
Yu X et al., 2020[29]	Average 50	M	Hospital	Workplace
Escribese M et al., 2020[30]	NS	21/29	Hospital	Workplace
Marra M et al., 2021[31]	Average 46	29/76	Hospital	Workplace
Ying- Hui J et al., 2020[32]	Average 35	39/64	Hospital	Workplace
Fwoloshi S et al., 2020[33]	20 to 39	222/438	Hospital	NS
Lombardi A et al., 2020[34]	30 to 60	57/82	Hospital	Workplace
Lahner E et al., 2020[35]	Average 41	F	Hospital	Workplace and Out-of-hospital
Al-Kuwari MG et al., 2021[36]	Average 36	711/488	Primary care	NS
Liu J et al., 2021[37]	Average 33	32/69	Hospital	Workplace
Abdelmoniem R et al., 2020[38]	Average 31,7	13/16	Hospital	Workplace
Rodriguez A et al., 2021[39]	Average 42	F	Hospital	Workplace

Table 2. (cont.)

Study	Age (years)	Gender (M/F)	Workplace	Probable Contamination
Alkurt G et al., 2021[40]	Average 36,2	39/80	Hospital	NS
S. Mandić R et al., 2020[41]	Average 44	73/99	Hospital	Workplace
Schwartz K et al., 2020[42]	30 to 70	F	NS	NS

Source: Self elaborated, 2021.

M = Male, F = Female, NS = Not specified.

Regarding the professional category of workers affected by Covid-19, it was evident that nurses and physicians were the most exposed to the disease, as shown in *table 3*.

Table 3. Distribution of health professionals affected by Covid-19, investigated in the selected studies, by professional category (N=10,760). Brazil, 2021

Professional category	n	%
Nursing professionals*	2,939	27.3
Physicians**	1,422	13.2
Other health professionals ***	582	5.4
Not identified	5,817	54.1
Total	10,760	100

Source: Self elaborated, 2021.

*Includes nursing workers not separated by professional category/hierarchy, such as nurses and registered nurses, common nomenlature in the US.

**Includes physicians and resident physicians.

***It includes physiotherapists, pharmacists, occupational therapists, psychologists, dentists and support workers.

As for pre-existing diseases among health professionals affected by Covid-19, studies (n=16; 53.3%) showed that, before being contaminated, they had comorbidities such as Diabetes Mellitus (DM), Systemic Arterial Hypertension (SAH), Chronic Obstructive Pulmonary Disease (COPD) and obesity. About the clinical characteristics of the manifestation of Covid-19, 18 (60%) studies stated that the most recurrent symptoms among health workers were fever, cough, fatigue, myalgia, diarrhea and sore throat. The studies showed that health professionals had some type of disease severity (n=4; 13.3%) and (n=3; 10%) reported that professionals needed intensive care.

Discussion

The number of sick health professionals has increased during the pandemic. Transmission is favored by close and unprotected contact with secretions or excretions from infected patients, mainly through salivary droplets. Other body fluids are not clearly implicated in the transmission of the new coronavirus, but it is considered that unprotected contact with blood, feces, vomit and urine can put the professional at risk of contamination[1].

It was observed in this review that there was a predominance of studies carried out in China. This is probably related to the fact that this country was considered the first epicenter

of the disease, where the cases originated. Also, as the precursors of the disease, in December 2019, there was more time to organize such information and disseminate it to the scientific community, as has been happening with countries in Europe and the USA; and, more contemporarily, Brazil and other Latin American countries.

Despite the temporality of the disease, it is also prudent to conjecture that there was greater speed in the production and dissemination of knowledge from China and the USA, as they are recognized world powers, with global scientific prominence. More Latin American studies should be produced, as the pandemic advances in these locations, requiring epidemiological records, as well as other investigations that can explain this condition of interest to global public health.

The prevalent cross-sectional design among the researches recruited in this review was already expected, due to its momentary sectional characteristic (thus, faster execution) of a given reality, which emerges as necessary and/or relevant in this crisis scenario, including, to describe the phenomena and also to further explain the factors associated with Covid-19. In these surveys and in other studies, the RT-PCR diagnostic method was also unsurprising evidence, as it has been considered the reliable standard for the diagnosis of Covid-19[1].

In Brazil alone, until the month of June 2021, more than 200 thousand cases of health workers affected by Covid-19 had been registered, which caused around 17 thousand deaths[5,46]. This allusion refers to the evident consideration that the total number of workers affected by Covid-19 compiled in this review (n=10,760) is drastically underestimated given the reality of the pandemic. On the other hand, it is also prudent to reflect that this number represents an approximation to what permeates the scientific literature, and, therefore, has its importance in terms of deepening and highlighting the knowledge produced.

The contamination and illness of professionals involved in the care of infected patients is a worrying reality. It is important to highlight that the data is updated daily, and that there are health professionals who were contaminated, but who did not develop symptoms, and also those who were not tested. It is suggested that such professionals should be screened to Covid-19 as soon as possible in order to protect their health, as well as to contribute in containing the pandemic[10].

Given the panorama of professional categories contaminated by Covid-19 verified by this literature review, the greater exposure of the nursing staff (27.3%) and physicians (13.2%) is evident, which is similar to recent results that presented a quantity of presence of contaminated professionals[47]. This finding is probably anchored to the fact that they are categories of uninterrupted contact (especially nursing) and direct contact with infected patients.

Even though they corresponded to a combination of several professions and in a lower concentration, the other professional categories, such as physiotherapists, pharmacists, occupational therapists, psychologists, dentists and support workers, were also exposed to the disease, which demonstrates that all workers were susceptible to contamination by Covid-19. This refers to the high transmissibility of this new coronavirus, as well as the importance of systemic measures for its containment in health services.

In the scenario of the Covid-19 pandemic, the nursing team has often been referred to as highly exposed to its effects, however, a protagonist in coping with it. This mark of the profession based on human care reflects the need and importance of a substantial increase in working conditions for the performance of its indispensable function. However, Covid-19 seems to have exposed many flaws in the dynamics of organization, management and valorization of this professional category, permeating a challenge to the sustainability of health systems[7].

The results of this study and the findings in the literature show that both the exercise of work activities and working conditions can be potential sources of exposure to the virus. In turn, this work situation is Covid-19's dissemination territory. Therefore, it is important to understand how activities and working conditions can contribute to the dissemination and, above all, to the establishment of strategies to fight the pandemic[19-24].

With regard to the workplace and possible contamination, 27 (90%) studies showed that professionals contaminated by Covid-19 worked in a hospital environment, and 20 (66.6%) stated that the contamination occurred during contact with patients affected by the virus, that is, in the work environment. The probability of a health professional tested positive for Covid-19 having become contaminated in a hospital environment is high, because, in these spaces, patient care takes place 24 hours a day, especially the uninterrupted vigil of nursing workers[48].

The contamination of professionals during care work for patients confirmed with Sars-CoV-2 was also verified in other scientific investigations[18,22,26]. To this end, government managers and leaders of health entities must strengthen prevention and mitigation strategies aimed at the transmission of Covid-19 and other pathogens in health services, as well as in long-term care facilities, which include screening and restricted access policies for visitors and non-essential staff[48].

The overcrowding of health facilities, the lack of hospital beds and care equipment, such as mechanical respirators; frequent and prolonged exposure to potentially contaminated patients; the intensification of working hours and the greater complexity of work tasks, in addition to the reduction in rest breaks, are problems in the organization of work that have had an impact on the health of professionals working to fight the pandemic. In addition to these issues, it is urgent to draw attention to failures in the protection of workers and the scarcity of Personal Protective Equipment (PPE) that have been a reality observed in work environments in the pandemic scenario[49,50].

In health care, hand hygiene of all professionals must be performed immediately before and after touching masks and other facial protection, in addition to other occasions when this attitude is necessary for the protection of the patient and the worker. Masks should be changed whenever they become dirty, damp or make breathing difficult. This frequent exchange of PPE and the potential discomfort due to its prolonged use may correspond to factors that contribute to the high number of workers contaminated by Covid-19 in their work environment verified in this bibliographic survey, in addition to, of course, the common deficiency in providing these means of protection and the virulence of the new coronavirus, which are elements previously declared[47,50].

All healthcare professionals entering a patient's room with suspected or confirmed Covid-19 should wear PPE to reduce the risk of exposure. Standard PPE for patients with suspected or confirmed Covid-19 include the use of a gown, gloves, N95/PFF2 mask or surgical mask, in addition to eye or face protection (face shield)[50]. In the ICU environment, the members of the multidisciplinary team must also remove their personal clothes and only wear clothes provided by the institution. Furthermore, it is recommended that professionals shower at the hospital at the end of their shift[50,51].

In the set of data listed in this review, among health professionals with Covid-19, females predominated, which is similar to other studies carried out in this area. This event is related to the historical factor of these professions and the growing representation of women in the labor market and in society, in addition to nursing being an eminently female profession[18,25,26] and the second with the highest number of recruited workers, by segmentation, in this review.

With regard to comorbidities, it is noteworthy that chronic diseases are multifactorial, occurring throughout life and having prolonged duration or even no cure. In some studies (n=16; 53.3%), it was evidenced that

professionals already had chronic comorbidities before being affected by Covid-19, which reinforces the susceptibility of this population to common diseases in contemporary times. It is worth remembering the importance of health professionals taking preventive measures for the most common chronic diseases, as well as lifestyle changes that are compatible with promoting their health[52,53], and this, undeniably, is also a parallel to the measures of health promotion and prevention of work-related illnesses, as this corresponds to an important part of human life.

It is considered that the present study represents an advance in the knowledge needed to fight the pandemic because, while it defines the panorama of workers' illnesses, it also reinforces discussions about precarious working conditions in health. Such conditions seem to be permanent in the sector (in particular, the Brazilian public sector) and are aggravated in situations of sanitary crisis, which determines the need to continually review the planning and management of work in the segment.

Finally, it is worth considering that, momentarily, there is a more promising scenario regarding the pandemic, mainly due to the ascending process of mass immunization. However, the deleterious legacy of Covid-19 to health systems, services and workers is evident and deserves to be remembered. In this sense, the study described herein can contribute to this.

Final considerations

It is concluded that the characteristics of health workers affected by Covid-19, according to the scientific literature, lead to a profile concentrated by the nursing staff and physicians working in the hospital environment, who became contaminated at work. RT-PCR testing was the main diagnostic method. Some studies reported previous comorbidities among workers, and the main symptoms of Covid-19 were fever, cough, fatigue, myalgia and diarrhea. This panorama was built especially by cross-sectional surveys carried out in China, the USA and Italy.

Search strategies conducted only by a restrictive Boolean operator permeate a limitation of this study. It is also prudent to clearly point out that the total number of health workers affected by Covid-19 extracted by the integrative review does not represent the reality of infection in this population, however, it is an approximation reflected by the scientific literature produced in the pandemic scenario. That said, it is believed that the study contributes to the reflection on the importance of investments in health working conditions, given the significant number of professionals who have been contaminated in the hospital environment, for example, and the possibility of establishing itself as technical-scientific record of the historicity of the Covid-19 pandemic in the context of health workers' health.

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Collaborators

Rocha RPS (0000-0002-2295-5321)*, Oliveira JLC (0000-0002-1822-2360)* and Carvalho ARS (0000-0002-2300-5096)* contributed to the planning, conception, analysis, interpretation of the data, writing, relevant critical review and final approval of the version to be published. Silva GKT (0000-0001-7988-7553)* contributed to the collection, analysis and interpretation of data and final approval of the version to be published. Matos BAB (0000-0003-1987-9687)*, Mufato LF (0000-0002-8693-5637)* and Ribeiro AC (0000-0003-1607-3215)* contributed to the relevant critical review of the intellectual content, final approval of the version to be published. ■

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