BIBLIOMETRIC ANALYSIS: front-line HEALTH PROFESSIONALS AND COVID-19: STUDIES FOR 2020-2021

ANÁLISE BIBLIOMÉTRICA: PROFISSIONAIS DA FRENTE DE LINHA DA SAÚDE E COVID-19 - ESTUDOS DO PERÍODO 2020-2021

ANÁLISIS BIBLIOMÉTRICO: PROFESIONALES DE PRIMERA LÍNEA DE SALUD Y COVID-19 ESTUDIOS DEL PERÍODO 2020-2021

Giovanna Melissa dos Santos[1], Felipe Augusto Alves Sanches[2], Rozangela Verlengia[3]

ABSTRACT
Objective: To conduct a bibliometric analysis of the peer-reviewed literature to identify publication trends about the front-line healthcare workers. **Methods**: Bibliometric review, the data were extracted from the Web of Science database, published between 2020 and 2021. **Results**: A total of 281 documents were found, with an annual increase rate of 57,8%. The most common type of document identified by the analysis were original articles (n = 226) followed by review documents (n = 37). Keywords network analysis revealed a high predominance of topics such as anxiety, depression, stress, personal protective equipment, burnout, insomnia and post-traumatic stress disorder. **Conclusion**: The findings reveal that the mental health of COVID-19 front-line healthcare workers was an important topic in the first years of the pandemic and indicate a need to provide psychological support of these professionals.
Descriptors: Coronavirus, pandemic, mental health, healthcare workers, bibliometrics.

[1] Physiotherapy student at the Methodist University of Piracicaba (UNIMEP). PIBIC Scientific Initiation Scholarship. Methodist University of Piracicaba – UNIMEP. https://orcid.org/0000-0001-5067-4511
[2] Graduating in Dentistry at the Methodist University of Piracicaba (UNIMEP) Lins campus. PIBIC scholarship holder. Methodist University of Piracicaba (UNIMEP). https://orcid.org/0000-0002-1266-6606
[3] Post-Doctorate at the Institute of Biomedical Sciences I at USP, Department of Physiology and Biophysics Post-Doctorate at the Institute of Biomedical Sciences I at USP, Department of Physiology and Biophysics. Professor and advisor of the Stricto Sensu Postgraduate Program - Master's in Physical Education and Master's and Doctorate in Human Movement Sciences at the Methodist University of Piracicaba, linked to the research line Physiology and Sports Training. Methodist University of Piracicaba (UNIMEP). https://orcid.org/0000-0001-8626-0476

RESUMO
Objetivo: Realizar uma análise bibliométrica da literatura revisada por pares para identificar tendências das publicações sobre os profissionais da saúde da linha de frente da COVID-19. **Métodos**: O presente estudo é uma revisão bibliométrica. Para tanto, realizou-se busca na base de dados *Web of Science* de documentos publicados entre 2020 e 2021. **Resultados**: Foram encontrados 281 documentos, com uma taxa de aumento anual de 57,8%. Os tipos mais comuns de documentos foram artigos originais (n= 226) seguidos por documentos de revisão (n =37). As análises de rede das palavras-chave revelaram alta predominância de temáticas como ansiedade, depressão, estresse, equipamento de proteção individual, excesso de trabalho (*burnout*), insônia e estresse pós-traumático. **Conclusão**: Os achados revelam que a saúde mental dos profissionais da saúde na linha de frente da COVID-19 foi um tópico importante nos primeiros anos de pandemia e indicam uma necessidade de suporte psicológico a esses profissionais.
Descritores: coronavírus, pandemia, saúde mental, profissionais da saúde, bibliometria.

RESUMEN
Objetivo: realizar un análisis bibliométrico de la literatura revisada por pares para identificar las tendencias de publicación sobre los trabajadores de la salud de primera línea. **Métodos**: Los datos fueron extraídos de la base de datos Web of Science, publicados entre 2020 y 2021. **Resultados**: Se encontraron un total de 281 documentos, con una tasa de incremento anual de 57,8%. El tipo de documento más común identificado fueron los artículos originales (n = 226), seguidos de los documentos de revisión (n = 37). El análisis de redes de palabras clave reveló un alto predominio de temas como ansiedad, depresión, estrés, equipo de protección personal, agotamiento, insomnio y trastorno de estrés postraumático. **Conclusión**: La salud mental de los trabajadores de salud de primera línea de COVID-19 fue un tema importante en los primeros años de la pandemia e indican la necesidad de brindar apoyo psicológico a estos profesionales.
Descriptores: coronavirus, pandemia, salud mental, trabajadores de la salud, bibliometría.

INTRODUCTION

Coronavirus Disease, also known as COVID-19, was declared a pandemic disease by the World Health Organization (WHO) on March 11, 2020, when alarming levels of transmission and severity were observed.[1]

The COVID-19 outbreak has placed pressure on health systems around the world and in Brazil, caused by additional demand resulting from high rates of infection, hospitalization, as well as the significant increase in beds in Intensive Care Units (ICUs), assisted ventilation equipment, use of personal protective equipment (PPE), among other aspects.[2]

Health professionals, especially those in direct contact with patients infected by COVID-19, were vulnerable to possible health consequences due to work-related factors, such as: intense work overload, psychological pressure, discomfort due to the use of PPE for long periods of time. periods, lack of materials and shortage of PPE, insufficient training on protective measures and biosafety habits against the disease, isolation of family members, lack of support network, discrimination due to

working directly with patients infected by the virus and high rates of virus infection.[3-6]

According to the WHO, health professionals working on the front line are at high risk of infections and death from COVID-19.[7] When compared to the general population, these professionals may have an approximately 12 times greater risk of becoming infected by the disease.[8]

The COVID-19 outbreak resulted in a significant amount of scientific work being produced and disseminated quickly. Research has been carried out globally, seeking to understand the virus and the consequences of the disease in numerous aspects.[9]

In view of this, it is important to know what the scientific literature brings about this subject, mainly about the impact on front-line health professionals in the treatment of patients with COVID-19, to provide better working conditions, as well as improve the personal support (health and psychological) for these professionals.

The activity and productivity of scientific research can be evaluated by bibliometric analysis, an analytical method capable of analyzing a large volume of scientific data from a field of knowledge through the organization and systematization of information, which can be used for decision-making in the scientific field.[10-12] Therefore, the present study aimed to perform a bibliometric analysis of peer-reviewed literature to identify trends in publications about COVID-19 front-line healthcare professionals.

METHODOLOGY

This is an exploratory study with a quantitative approach of peer-reviewed literature on front-line healthcare workers and COVID-19. The data were extracted from studies indexed in the Web of Science, chosen because it is considered one of the largest peer-reviewed multidisciplinary databases and provides several parameters that allow more extensive bibliometric analyses.

The data search was carried out in February 2021 and the descriptors used were "healthworkers", "front-line" and "COVID-19". The results were limited to the publication period (2020 and 2021), without restrictions on the type of document, language and location of study.

The bibliometric indicators were processed in the R software, version 4.1.213, using the bibliometrix package, version 3.2.114: a) published documents; b) citations; c) authors; sources; d) keywords; e) institution and country. The construction of network maps from bibliometric co-occurrence indicators were processed using VOSviewer, version 1.6.18.[15]

RESULTS

Table 1 shows the data on bibliometric indicators obtained from the Web of Science database. 281 documents published in the period 2020 and 2021 were found. In the period 2020, 109 studies were published and in the year 2021, 172 articles representing an annual increase rate of 57.8%.

The studies were published by 210 sources, had an average of 25 citations per document and presented 7,614 bibliographic references. The most common types of documents found in the analysis were original articles (n=226) followed by review documents (n=37), editorials (n=8), letters (n=8), conference abstracts (n=1) and conference article (n=1).

The number of keywords identified by the authors and databases (Keyword Plus) was 712 and 386, respectively. A total of 1,772 authors contributed to the 281 publications, of which 14 authors presented single-author documents. The average number of documents per author was 0.16, the average number of co-authors per document was 6.54 and the collaboration index was 6.58.

Table 1. Summary of bibliometric indicators on front-line healthcare workers and COVID-19 (2020–2021).

DESCRIPTION	RESULT
Number of Documents	281
Number of Documents — 2020	109
Number of Documents— 2021	172
Sources	210
Average Citations per Document	25.25
References	7,614
DOCUMENT TYPES	
Article	226
Editorial	8
Letter	8
Congress Summary	1
Article Congress	1
Revision	37
DOCUMENT CONTENT	
Author Keywords	713
Keywords (PLUS)	386
AUTHORS	
Authors	1,772
Author Appearances	1837
Single Authorship	14
Multi-authorship	1758
AUTHOR COLLABORATION	
Documents by Author	0.16
Co-authors per Document	6.54
Collaboration Index	6.58

Source: Authors

The analysis of the most productive scientific journals on the subject, considering the number of publications, citations and H index, reveals that BMJ Open stands out in first place, which presented the highest number of publications (n=9), citations (n=19) and index H 5. Followed by the journals Frontiers in Psychology (8 publications; 31 citations and index H 3) and PlosOne (6 publications; 75 citations; index H 4). Soon after, with 5 publications each, there are the journals BJPsych Open (51 citations, index H 4) and J. Family Med Prim Care (with zero citations and index H 0).

In addition, with four publications each, there are the journals Frontiers in Psychiatry (23 citations and H index 3); Frontiers in Public Health (four citations and H 1 index) and Int J Environ Res Public Health (four citations and H 1 index), followed by other journals with a smaller number of publications. Finally, the journal BMC Public Health presented only three

published documents, however, it presented a total of 109 citations.

Figure 1 illustrates the level of scientific production by country. Publications from 74 countries were identified, covering the African, Asian, European, North American, South American and Oceania continents. The United States ranked first in the number of documents published (62), followed by China (52) and India (32). Brazil ranked seventh with 13 published documents.

Figure 1: Map of scientific production by country.
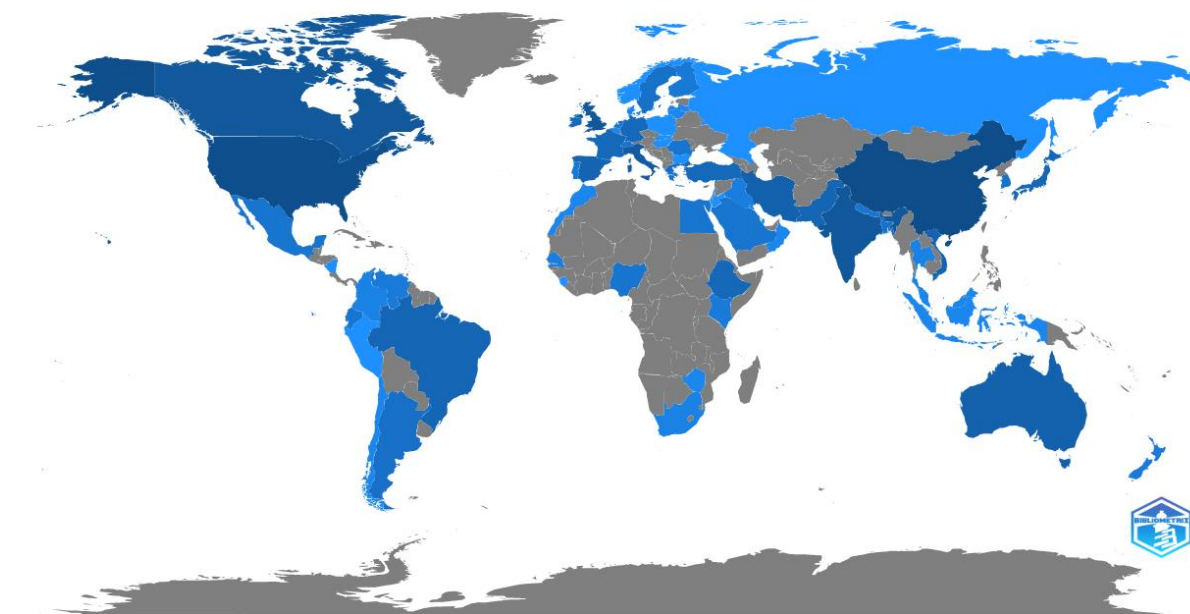
Source: Authors
Subtitle: The blue intensity of the highlighted countries represents the level of production.

The ten documents that received the highest number of citations are listed in table 2. Five original studies[8, 16-19], four review studies[20-23] and one letter to the editor[24] are among the most cited documents.

Table 2. The ten publications with the highest number of citations on physical activity and COVID-19 (2020–2021).

Authors (Year)	Title	Citations
Lai J *et al*. (2020)	Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019	2604
Nguyen LH *et al*.(2020)	Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study	466
Lima CKT *et al*.(2020)	The emotional impact of Coronavirus 2019-nCoV (new Coronavirus disease)	393
Troyer EA *et al*.(2020)	Are we facing a crashing wave of neuropsychiatric sequelae of COVID-19? Neuropsychiatric symptoms and potential immunologic mechanisms	360
Sun NN *et al*.(2020)	A qualitative study on the psychological experience of caregivers of COVID-19 patients	317
Que J *et al*.(2020)	Psychological impact of the COVID-19 pandemic on healthcare workers: a cross-sectional study in China	164
Rowan NJ *et al*.(2020)	Challenges and solutions for addressing critical shortage of supply chain for personal and protective equipment (PPE) arising from Coronavirus disease (COVID19) pandemic – Case study from the Republic of Ireland	154
Pollock A *et al*.(2020)	Interventions to support the resilience and mental health of frontline health and social care professionals during and after a disease outbreak, epidemic or pandemic: a mixed methods systematic review	115
Vizheh M *et al*.(2020)	The mental health of healthcare workers in the COVID-19 pandemic: A systematic review	103
De Kock JH *et al*.(2021)	A rapid review of the impact of COVID-19 on the mental health of healthcare workers: implications for supporting psychological well-being	94

Source: Authors

Figure 2 shows the tree map of the 20 keywords most used by authors. The most frequently found keywords were: COVID-19 (n=175), anxiety (n=35), mental health (n=33), depression (n=31) and healthcare workers (n=26). Figure 3 illustrates the formation of five clusters resulting from the keyword co-occurrence network analysis (n=36).

The terms highlighted on the network map are: mental health (23 connections, red cluster), anxiety (19 connections, green cluster), depression (19 connections, green cluster), stress (16 connections, green cluster), nurses (12 connections , red cluster), insomnia (9 links, blue cluster), psychologicaldistress (9 links, purple cluster) and posttraumaticdistress (ptsd) (9 links, green cluster).

Figure 2: Treemap of the keywords most used by authors (n=20).

Source: Authors

Figure 3: Map of authors' keyword network on studies of healthcare professionals on the front-lines of COVID-19.

Source: Authors
Subtitle: A minimum of four occurrences of keywords to be considered in the figure. The size of the node represents the frequency of occurrence and the distance between two items reflects their strength of association. The size of the line reflects the link strength between terms.

DISCUSSION

The present study used bibliometric analysis to review peer-reviewed literature studies related to front-line health professionals in the fight against COVID-19 from 2020 to 2021. The data indicated that an increase of more than 50% in publications involving the theme was observed from 2020 to 2021, which reveals the scientific community's concern about the impact of COVID-19 on front-line healthcare professionals.

As this is a pandemic situation, health professionals, especially those on the front line, were placed under great pressure and stress resulting from high rates of hospitalizations and hospitalizations due to the disease, as well as facing problems such as low quality of work, high weekly workloads and shortage of PPE.[22] This fact demonstrates the importance of publications in this line of knowledge.

The data indicates that there was a high prevalence of original articles followed by review documents. This high number of original documents may be due to the urgency of knowledge about the global pandemic due to the coronavirus and indicates a rapid response from the academic community in the search for understanding the consequences of the pandemic on front-line health professionals, and, despite recently, the presence of review articles is observed, also reflecting the high publication rates in this period.

An interesting feature that should be highlighted was the large number of magazines that published articles on the topic with open access online. In the analysis, all the journals that published the most (BMJ OPEN, Frontiers inPsychology, PlosOne, BJPsych Open, J Family Med Prim Care, Frontiers in Psychiatry, Frontiers in Public Health, Int J Environ Res Public Health) have open access online. These vehicles of scientific information favor rapid dissemination due to the fact that they are free, increasing the reach of this information in general.

Analysis of the countries of origin of the documents reveals that there was a concern in understanding the impact of the pandemic present in multiple countries and cultures, as it was a virus with global spread. Therefore, it was necessary to investigate the impact of the pandemic on these professionals in their daily lives and in different contexts that each country faced individually.

In relation to the themes addressed by the most cited articles (Table 2), there is a predominance of investigating the impact on mental health[16-18, 21-24]. Although the scientific community quickly sought to

investigate the impact of COVID-19 on the most varied areas, we can observe care with social distancing, as recommended by health bodies[25] since the acquisition of data from three of the original articles was carried out by through online questionnaires[8,17,18], one did not have participants because it was a case study[19], and only one study did not define whether the questionnaire carried out was applied online.[16]

During the period of this research, the study published in the journal "JAMA Network Open" and entitled "Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019" authored by Lai et al. (2020)[16] received the highest number of citations. This study aimed to provide an assessment of the mental health burden of Chinese healthcare professionals. To this end, it investigated the mental health of 1257 healthcare professionals on the front-line of COVID-19 from 34 hospitals in various regions of China. The study identified a high prevalence of negative mental health symptoms among participants, indicating that 50.4%, 44.6%, 34% and 71.5% of the sample presented symptoms of depression, anxiety, insomnia and anguish, respectively. Furthermore, study results demonstrated that symptoms were more prevalent in women, nurses and those working in Wuhan province.

Furthermore, this was a study in which data collection for the study was carried out in January and February 2020, the initial period of the COVID-19 outbreak. Because of this, it is possible that this was an important factor in the large number of citations during the period of this research.

The study by Sun et al.[17] focused on exploring psychological aspects of nurses caring for hospitalized COVID-19 patients. The interview was carried out online, with questions about the main psychological feelings that the interviewed population felt, their perceptions of the scenario and coping strategies. The findings showed that negative and positive emotions coexisted during the period; however, negative emotions predominated in the first days of the pandemic, while positive emotions gradually appeared in the professionals investigated.

Que et al.[18] used an anonymous online questionnaire, with the Chinese version of three validated questionnaires to measure the degree of severity of symptoms of anxiety, depression and insomnia, in addition to collecting a series of information about exposure to COVID-19 from these professionals. The majority of survey participants (69.06%) were women. The majority were doctors (37.64%), resident doctors (39.96%), nurses (9.10%), technicians (7.83%) and public health professionals (5.47%).

Regarding the population investigated in the original articles, four studies focused on health professionals in general (doctors, nurses, resident doctors, technicians, public health professionals)[8], [16], [18], [19], while one focused only on nurses from the front line.[17] It is possible to observe that the different sectors of the health sector were under the stress imposed by the COVID-19 pandemic process, with greater concern for front-line professionals in the nursing and doctors' area.

In relation to the review articles, Pollock et al.[21] identified barriers and facilitators and evaluated the effects of interventions aimed at supporting the resilience and mental health of front-line health and social care professionals in times of pandemic (SARS; Ebola, MERS and COVID-19), such as improving equipment and psychological support strategies. Studies were included in which participants were health and social care professionals who worked on the front line during outbreaks of infectious diseases categorized as epidemics or pandemics by the WHO since 2002.

In the systematic review carried out by Vizheh et al.[22], the mental health situation of healthcare professionals during the COVID-19 outbreak was assessed. Finally, in the review by De Kock et al.[23] they analyzed the psychological impact of the COVID-19 pandemic on health professionals and social assistance professionals, investigating risk and protective factors associated with the mental health of this population.

Regarding the aspects of the review articles, one review article included cross-sectional studies[22], one included observational and experimental studies[23], one article did not define inclusion and exclusion criteria, without specifically reviewing studies, but generally reviewing neuropsychiatric aspects of COVID-19[20], and a review included primary studies (randomized clinical trials, non-randomized clinical trials, controlled before and after studies and interrupted time series studies.[21] It can be observed that different designs and types of studies were addressed[26], indicating the importance of valuing knowledge and its dissemination in the search for understanding the different discounts imposed by COVID-19.

Vihzeh et al.[22] included studies from December 2019 to April 12, 2020, with cross-sectional studies in English that assessed the psychological well-being of healthcare professionals during the pandemic. They included eleven articles.

De Kock[23] ran the search strategy on April 23, 2020 and again on May 6, 2020. They included observational and experimental studies that reported psychological effects on healthcare professionals during the COVID-19 pandemic.

In addition, the topic addressed by the letter to the editor[24] was to review in general the impact that the COVID-19 pandemic had on the mental health of the population, including health professionals.

Other topics discussed in the studies found were: analysis of the risk of COVID-19 infection in front-line healthcare professionals compared to the general population in the UK and USA[8], understanding the challenges and searching for solutions regarding the shortage of PPE among front-line professionals in Ireland[19], and discussion of neuropsychiatric sequelae related to COVID-19 infection.[20]

The results point to a predominant theme in the studies, of specific mental health traits such as anxiety and depression in front-line health professionals. This predominance may have occurred due to the emotional stress that these professionals experienced in the workplace, resulting from the significant rate of dissemination, hospitalizations and the emergence of variants of the SARS-CoV-2 virus, bringing in some cases greater dissemination and lethality.[27, 28]

Based on the bibliometric analysis carried out in the present study, the results are in agreement with the findings of other review studies that followed publications on health professionals in the context of the COVID-19 pandemic, of which the most frequently found themes were lethality

infection in healthcare professionals, lack of PPE and psychological changes in these professionals.[3- 6, 21-23]

To our knowledge, this is the first bibliometric review study focused exclusively on studies with healthcare professionals during the COVID-19 pandemic.

Network analyzes of keywords revealed a high predominance of themes such as anxiety, depression, stress, EPI, overwork (burnout), insomnia and post-traumatic stress. This indicates attention to the mental health of these professionals, followed by variables that can somatize psychological and health aspects during the pandemic.

As this is a bibliometric review study, these data become important to systematize the information available on studies with front-line professionals during the COVID-19 pandemic and better elucidate the scenario of scientific literature on the topic, pointing to the main research focuses and possible decisions to be taken in the scientific field.

Knowledge of trends in scientific literature provides health institutions with the chance to improve aspects of fragility to which these professionals are exposed, such as psychological issues and weaknesses in biosafety.

Therefore, it is important to create care strategies for front-line professionals, such

as constant access to continued training from the perspective of global diseases, especially those with a high rate of dissemination, as well as providing psychological support to these professionals.

CONCLUSION

The main findings of the present study reveal that there was an increase of more than 50% in publications involving the topic between 2020 and 2021, and a significant number of countries on all continents contributed to the publications during the period investigated. Furthermore, analysis of keywords related to the studies included in the review revealed a high predominance of mental health themes among health professionals. Therefore, these data indicate a need for psychological support for healthcare professionals on the front lines of COVID-19.

This study's limitation is the fact that the data analysis only included journals indexed in the Web of Science database, which despite being a broad database, may have a limited access to all available scientific evidence.

REFERENCES
1 World Health Organization. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020 [Internet]. Geneva: WHO; 2020 [cited in 28 nov 2021]. Available at: https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

2 Noronha KV, Guedes GR, Turra CM, Andrade MV, Bote L, Nogueira D, et al. Pandemia por COVID-19 no Brasil: análise da demanda e da oferta de leitos hospitalares e equipamentos de ventilação assistida segundo diferentes cenários. Cad Saúde Pública [Internet]. 2020 jun [cited in 10 mar 2022]; 36(6):e00115320. Available at: https://www.scielo.br/j/csp/a/MMd3ZfwYstDqbpRxFRR53Wx/?format=pdf&lang=pt

3 Mesquita FBM, Morato Filho PC, Lessa RT, Fonseca LANS, Vidal DM, Souza DJM, et al. Impactos da COVID-19 sobre os profissionais de saúde no contexto pandêmico: uma revisão integrativa da literatura. Revista Eletrônica Acervo Saúde [Internet]. 2020 out [cited in 9 mar 2022]; 12(10):e4398. Available at: https://acervomais.com.br/index.php/saude/article/view/4398/2696

4 Pavani FM, Silva AB, Olschowsky A, Wetzel C, Nunes CK, Souza LB. COVID-19 e as repercussões na saúde mental: estudo de revisão narrativa de literatura. Rev Gaúch Enferm. [Internet]. 2021 Mar [cited in 10 mar 2022]; 42(N Esp):e20200188. Available at: https://www.scielo.br/j/rgenf/a/YD6WWBggJmkcBY8jNsFypSd/?format=pdf&lang=pt

5 Sant'Ana G, Imoto AM, Amorim FF, Taminato M, Peccin MS, Santana LA, et al. Infecção e óbitos de profissionais da saúde por COVID-19: revisão sistemática. Acta Paul Enferm. [Internet]. 2020 [cited in 11 mar 2022]; 33:eAPE20200107. Available at: https://acta-ape.org/wp-content/uploads/articles_xml/1982-0194-ape-33-eAPE20200107/1982-0194-ape-33-eAPE20200107.x94701.pdf

6 Gómez-Ochoa SA, Franco OH, Rojas LZ, Raguindin PF, Roa-Díaz ZM, Wyssmann BM, et al. Health-care workers: a living systematic review and meta-analysis of prevalence, risk factors, clinical chacteristics, and outcomes. Am J Epidemiol. [Internet]. 2021 Jan [cited in 11 mar 2022]; 190(1):161-175. Available at: https://academic.oup.com/aje/article-pdf/190/1/161/35402746/kwaa191.pdf

7 World Health Organization. The impact of COVID-19 on health and care workers: a closer look at deaths [Internet]. Geneva: WHO; 2021 [cited in 10 mar 2022]. Available at: https://apps.who.int/iris/bitstream/handle/10665/345300/WHO-HWF-WorkingPaper-2021.1-eng.pdf?sequence=1&isAllowed=y

8 Nguyen LH, Drew DA, Graham MS, Joshi AD, Guo CG, Ma W, et al. Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study. Lancet Public Health [Internet]. 2020 Sept [cited in 2 mar 2021]; 5(9):E475-E483. Available at: https://www.thelancet.com/action/showPdf?pii=S2468-2667%2820%2930164-X

9 Carvalho T, Krammer F, Iwasaki A. The first 12 months of COVID-19: a timeline of immunological insights. Nat Rev Immunol. [Internet]. 2021 Apr [cited in 14 mar 2022]; 21(4):245-256. Available at: https://www.nature.com/articles/s41577-021-00522-1.pdf

10 Oliveira OJ, Silva FF, Juliani F, Ferreira LC, Nunhes TV. Bibliometric method for mapping the state-of-the-art and identifying research gaps and trends in literature: an essential instrument to support the development of scientific projects. In: Kunosic S, Zerem E, editors. Scientometrics recent advances [Internet]. London: IntechOpen; 2019 [cited in 10 mar 2022]. Available at: https://www.intechopen.com/chapters/69867

11 Guedes VL, Borschiver S. Bibliometria: uma ferramenta estatística para a gestão da informação e do conhecimento, em sistemas de informação, de comunicação e de avaliação científica e tecnológica. In:

Encontro Nacional de Ciência da Informação [Internet]. Salvador, BA. 2005 [cited in 31 jul 2023]. 18 p. Available at: http://cinform-anteriores.ufba.br/vi_anais/docs/VaniaLSGuedes.pdf

12 Ribeiro HCM. Bibliometria: quinze anos de análise da produção acadêmica em periódicos brasileiros. Biblios [Internet]. 2017 [cited in 12 mar 2022]; 69:1-20. Available at: http://www.scielo.org.pe/scielo.php?script=sci_arttext&pid=S1562-47302017000400001&lng=es&nrm=iso

13 R Foundation The R Project for Statistical Computing. Vienna, Austria: R Foundation; 2020 [cited in 22 fev 2022]. Available at: https://www.R-project.org/

14 Aria M, Cuccurullo C. Bibliometrix: an R-tool for comprehensive science mapping analysis. Journal of Informetrics [Internet]. 2017 Nov [cited in 15 mar 2021]; 11(4):959-975. Available at: https://www.sciencedirect.com/science/article/pii/S1751157717300500

15 Van Eck NJ, Waltman L. Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics [Internet]. 2010 Aug [cited in 15 mar 2021]; 84:523-538. Available at: https://link.springer.com/content/pdf/10.1007/s11192-009-0146-3.pdf?pdf=button

16 Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associates with mental health outcomes among health care workers exposed to coronavirus disease 2019. JAMA Netw Open [Internet]. 2020 Mar [cited in 8 mar 2021]; 3(3):e203976. Available at: 10.1001/jamanetworkopen.2020.3976

17 Sun N, Wei L, Shi S, Jiao D, Song R, Ma L, et al. A qualitative study on the psychological experience of caregivers of COVID-19 patients. Am J Infect Control. [Internet]. 2020 June [cited in 9 mar 2021]; 48(6):592-598. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7141468/pdf/main.pdf

18 Que J, Shi L, Deng J, Liu J, Zhang L, Wu S, et al. Psychological impact of the COVID-19 pandemic on healthcare workers:

a cross-sectional study in China. Gen Psychiatr. [Internet]. 2020 June [cited in 9 mar 2021]; 33(3):e100259. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7299004/pdf/gpsych-2020-100259.pdf

19 Rowan NJ, Laffey JG. Challenges and solutions for addressing critical shortage of supply chain for personal and protective equipment (PPE) arising from Coronavirus disease (COVID19) pandemic - Case study from the Republic of Ireland. Sci Total Environ. [Internet]. 2020 July [cited in 8 mar 2021]; 725:138532. Available at: 10.1016/j.scitotenv.2020.138532

20 Troyer EA, Kohn JN, Hong S. Are we facing a crashing wave of neuropsychiatric sequelae of COVID-19? Neuropsychiatric symptoms and potential immunologic mechanisms. Brain Behav Immun. [Internet]. 2020 July [cited in 08 mar 2021]; 87:34-39. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7152874/pdf/main.pdf

21 Pollock A, Campbell P, Cheyne J, Cowie J, Davis B, McCallum J, et al. Interventions to support the resilience and mental health of frontline health and social care professionals during and after a disease outbreak, epidemic or pandemic: a mixed methods systematic review. Cochrane Database Syst Ver. [Internet]. 2020 Nov [cited in 9 mar 2021]; 11(11): CD013779. Available at: https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD013779/full#0

22 Vizheh M, Qorbani M, Arzaghi SM, Muhidin S, Javanmard Z, Esmaeili M. The mental health of healthcare workers in the COVID-19 pandemic: a systematic review. J Diabetes Metab Disord. [Internet]. 2020 Oct [cited in 8 mar 2021]; 19(2):1967-1978. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7586202/pdf/40200_2020_Article_643.pdf

23 De Kock JH, Latham HA, Leslie SJ, Grindle M, Munoz SA, Ellis L, et al. A rapid review of the impact of COVID-19 on the mental health of healthcare workers: implications for supporting psychological well-being. BMC Public Health [Internet]. 2021 Jan [cited in 10 mar 2022]; 21:104. Available at: https://bmcpublichealth.biomedcentral.com/counter/pdf/10.1186/s12889-020-10070-3.pdf

24 Lima CK, Carvalho PM, Lima IA, Nunes JV, Saraiva JS, Souza RI, et al. The emotional impact of coronavirus 2019-nCoV (new Coronavirus disease) [carta]. Psychiatry Res. [Internet]. 2020 May [cited in 8 mar 2021]; 287:112915. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7195292/pdf/main.pdf

25 Centers for Disease Control and Prevention. How to protect yourself & others [Internet]. Atlanta, Geórgia: CDC; 2022 [cited in 11 fev 2023]. Available at: https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html

26 Sullivan B, Cambrom JA. Overview of clinical research study designs. 2008. Ch. 5. Appraising the literature overview of study designs. Available at: https://nuhs.edu/media/4132/5.1AppraiseStudyDesignOverviewStudyGuidePages.pdf

27 Centers for Disease Control and Prevention. Estimated COVID-19 burden [Internet]. Atlanta, Geórgia: CDC; 2021 [cited in 18 mar 2022]. Available at: https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/burden.html

28 Centers for Disease Control and Prevention. SARS-CoV-2 Variant classifications and definitions [Internet]. Atlanta, Geórgia: CDC; 2022 [cited in 18 mar 2022]. Available at: https://www.cdc.gov/coronavirus/2019-ncov/variants/variant-classifications.html