Trabalho, Educação e Saúde
ISSN: 1678-1007
ISSN: 1981-7746
Fundação Oswaldo Cruz, Escola Politécnica de Saúde Joaquim Venâncio

Souza, Tamires Patrícia; Rossetto, Maíra; Almeida, Carlos Podalirio Borges de
Impact of COVID-19 in nursing professionals: systematic review and meta-analysis
Trabalho, Educação e Saúde, vol. 20, e00069176, 2021
Fundação Oswaldo Cruz, Escola Politécnica de Saúde Joaquim Venâncio

DOI: https://doi.org/10.1590/1981-7746-ojs00069

Available in: https://www.redalyc.org/articulo.oa?id=406769893008

Trabalho, Educação e Saúde

ARTIGO

DOI: 10.1590/1981-7746-ojs00069

Impact of COVID-19 in nursing professionals: systematic review and meta-analysis

Impacto da Covid-19 em profissionais de enfermagem: revisão sistemática e meta-análise

Impacto del Covid-19 en los profesionales de enfermería: revisión sistemática y metanálisis

Tamires Patrícia Souza[1] Maíra Rossetto[2]
Carlos Podalirio Borges de Almeida[3]

[1] Universidade Metodista de Piracicaba, Faculdade de Ciências da Saúde, Piracicaba, Brasil. tamirespatriciasouza@gmail.com

[2] Universidade Federal da Fronteira Sul, Chapecó, Brasil. mairarossetto@gmail.com

[3] Universidade Federal do Sul e Sudeste do Pará, Instituto de Estudos em Saúde e Biológicas, Marabá, Brasil. carlos.almeida@unifesspa.edu.br

Abstract

Nursing work is in increasing demand, becoming strenuous especially during the COVID-19 pandemic. Thus, the objective of the study was to assess the impacts of the COVID-19 pandemic on the health of nursing professionals through a systematic review of the literature with meta-analysis, including studies published in 2020 in Web of Science, PubMed and SciELO. Regarding the systematic review, we included 25 studies with a cross-sectional design, from 12 countries. The participants were mostly nurses or nursing teams. Mental impacts such as anxiety, depression, discouragement and a feeling of obligation to work were frequently reported by study participants. The meta-analyses included psychological distress variables, and no association was found between psychological distress and being a frontline healthcare professional (OR 0.94; 95% CI 0.33–2.67). The mental health of nursing professionals has been negatively impacted by the Covid-19 pandemic. The main symptoms presented were anxiety, depression and discouragement, and many nurses felt obliged to work on the front lines of the fight against the pandemic; although they suffer emotional impacts and work overload in health services.

Keywords: COVID-19; coronavirus; healthcare workers; mental health.

Como citar: SOUZA, Tamires P.; ROSSETTO, Maíra; ALMEIDA, Carlos P. B. Impact of COVID-19 in nursing professionals: systematic review and meta-analysis. *Trabalho, Educação e Saúde*, Rio de Janeiro, v. 20, 2022, e00069176. DOI: 10.1590/1981-7746-ojs00069

Recebido: 04/08/2021
Aprovado: 09/02/2022

Resumo

O trabalho de enfermagem possui uma demanda crescente, tornando-se extenuante especialmente durante a pandemia de Covid-19. Assim, o objetivo do estudo foi avaliar os impactos da pandemia de Covid-19 na saúde dos profissionais de enfermagem por meio de uma revisão sistemática da literatura com meta-análise, incluindo estudos publicados em 2020 na Web of Science, PubMed e SciELO. Em relação à revisão sistemática, incluímos 25 estudos, com desenho transversal, de 12 países. Os participantes eram em sua maioria enfermeiras ou equipes de enfermagem. Impactos mentais como ansiedade, depressão, desânimo e sentimento de obrigação de trabalhar foram frequentemente relatados pelos participantes dos estudos. As meta-análises incluíram variáveis de sofrimento psicológico, e nenhuma associação foi encontrada entre sofrimento psíquico e o fato de ser um profissional de saúde de linha de frente (OR 0,94; IC 95% 0,33–2,67). A saúde mental dos profissionais de enfermagem foi impactada negativamente pela pandemia de Covid-19. Os principais sintomas apresentados foram ansiedade, depressão e desânimo, e muitas enfermeiras se sentiram obrigadas a trabalhar na linha de frente do combate à pandemia; embora sofram impactos emocionais e sobrecarga de trabalho nos serviços de saúde.

Palavras-chave Covid-19; coronavírus; profissionais de saúde; saúde mental.

Resumen

El trabajo de enfermería tiene una demanda cada vez mayor y se vuelve extenuante, especialmente durante la pandemia de Covid-19. Así, el objetivo del estudio fue evaluar los impactos de la pandemia de Covid-19 en la salud de los profesionales de enfermería a través de una revisión sistemática de la literatura con metanálisis, incluidos los estudios publicados en 2020 en Web of Science, PubMed y SciELO. En cuanto a la revisión sistemática, se incluyeron 25 estudios, con un diseño transversal, de 12 países. Los participantes eran en su mayoría enfermeras o equipos de enfermería. Los impactos mentales como ansiedad, depresión, desánimo y un sentimiento de obligación de trabajar fueron referidos con frecuencia por los participantes de los estudios. Los metanálisis incluyeron variables de sufrimiento psicológico y no se encontró asociación entre el sufrimiento psíquico y el hecho de ser un profesional de salud de primera línea (OR 0,94; IC 95%: 0,33-2,67). La salud mental de los profesionales de enfermería se ha visto afectada negativamente por la pandemia de Covid-19. Los principales síntomas presentados fueron ansiedad, depresión y desánimo, y muchas enfermeras se sintieron obligadas a trabajar en la primera línea de lucha contra la pandemia; aunque sufren impactos emocionales y sobrecarga de trabajo en los servicios de salud.

Palabras clave Covid-19; coronavirus; profesionales de la salud; salud mental.

Introduction

Nurses and midwives constitute approximately 50% of the health workforce, which represents 20.7 million people worldwide (World Health Organization – WHO, 2021). These professionals work in various sectors, be they public, private, philanthropic, or educational institutions. Although it is a traditional profession, with significant influence in science and health care work, nursing professionals often face heavy challenges in their daily work such as low prestige, poor public perception, low financial recognition, work overload, stressful working conditions, and the lack of professional gratification. In addition to the shortage of nursing staff and the poor quality of training and education (Mishra, 2015).

This situation became even more evident during the coronavirus pandemic. Nursing professionals stood out by acting on the front line of patient care, which exposes them to extremely stressful situations (Lam et al., 2020). The outbreak of cases with the consequent collapse of the health services overwhelms all health care workers, especially the nursing team (Lam et al., 2020). The impact on workload has led to longer hours and nurses being more tired from work (Cotrin et al., 2020; Irshad et al., 2020; Labrague and Los Santos, 2020a). In Brazil, there are currently about 583,682 nurses, and more than 1,379,000 nursing technicians, assistants, and attendants (Solidarity Research Network, 2021). In the context of the pandemic, a total of 49,86 reported cases of COVID-19 were observed among nursing

professionals. The lethality rate was 2.31%, which corresponds to one third of COVID-19 deaths worldwide (Conselho Federal de Enfermagem – COFEN, 2021; Sant'ana, 2020).

For these reasons, nursing work has been extremely demanding, with a significant increase in the magnitude and intensity of it, requiring healthcare workers to learn and adapt new health protocols, and constant changes in disease management (Lam et al., 2020). This source of insecurity and anxiety is exacerbated as more healthcare workers are affected by the disease, requiring them to be in quarantine (Gómez-Durán, Martin-Fumadó and Forero, 2020).

Recognizing this atmosphere can create significant stress and can affect health and well-being, this systematic review and meta-analysis aimed to assess the health impacts of the COVID-19 pandemic on nursing professionals.

Methods

We included studies that evaluated the health impacts of the COVID-19 pandemic on nursing professionals.

Eligible study designs were randomized clinical trials, cohort and/or case-control, and cross-sectional. Studies that did not fulfill inclusion criteria, such as qualitative studies, articles only related to methodological research, and those that did not involve human beings were not included.

Studies were identified by searching the databases Web of Science, PubMed, and SciELO. Papers published in English, Portuguese, Spanish, and French were included. The publication period was the year 2020, and the search was performed between December 2020 and January 2021.

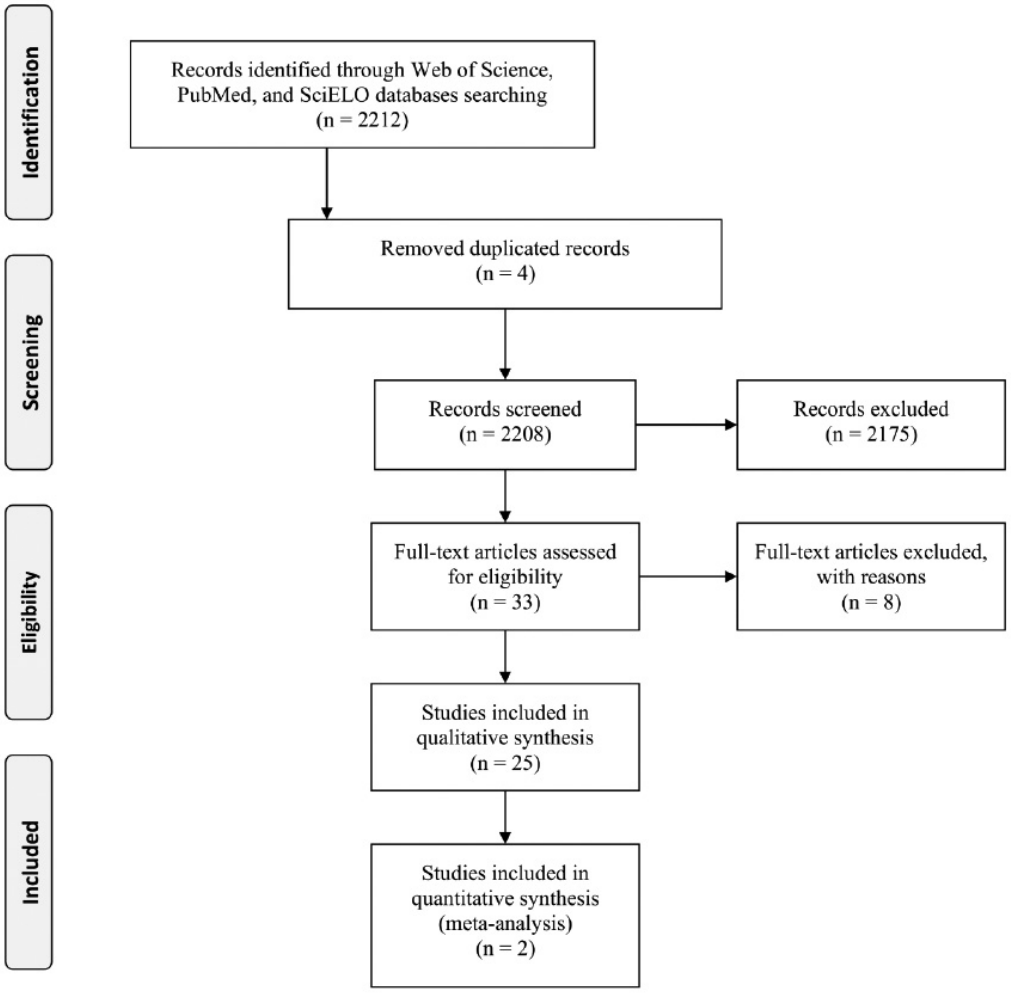
Following search terms were used: ("COVID-19" OR "coronavirus" OR "sars-cov-2") AND ("nurse" OR "nurs*") AND ("health impacts" OR "health outcomes" OR "outcomes"), using the Boolean operators according to the databases used.

In the first phase, a data search was performed by the author TPS using the selected databases and keywords. In the second phase, the authors CPBA and MR analyzed the title, abstracts, and objectives of the studies, selecting those that fit the inclusion criteria. In concluding this phase, the authors met to compare their findings, and discussed the disagreement with the author TPS to help the final decision. The degree of agreement between the authors for the selection of the studies was >0.80, which indicates an almost perfect agreement (Landis and Koch, 1977).

In the third phase, all the authors read independently the studies in full and, subsequently, they met again to compare their findings. The degree of agreement between the authors for the third phase was >0.61, which indicates substantial agreement (Landis and Koch, 1977). And, finally, in the fourth phase, CPBA and MR extracted the data into a data set. Duplicate articles were excluded, and the disagreements were discussed to reach a consensus. The study selection process is illustrated in supplementary I.

The authors extracted the following data from the selected studies: Authors; Year; Country; Title; Objective; Study design; Participants; Sample size; Results; How was the risk reported (OR/RR/HR); Journal and Impact Factor (Table 1 and Table 2). The process of study selection was performed by using the methods according to the PRISMA guidelines, presented in the flow diagram (Figure 1).

Figure 1. Flow diagram of study selection *corpus*.



Source: Prepared by the authors.

We executed a meta-analysis for all variables that were reported by more than one study. The BioEstat software was used to perform the analysis, and the association of binary variables and psychological distress was assessed by odds ratios (ORs) and 95% Confidence Interval (CI). We used fixed-effects models (Mantel-Haenszel and odds ratio) for all meta-analyses. We used data from the most fully adjusted model when the study presented more than 1 regression model. The heterogeneity for all pooled estimates was performed through visual inspection of forest plots because statistical tests of heterogeneity can be delusive when sample sizes are large and CIs are therefore squeezed (Rucker et al., 2008).

For meta-analyses with at least 10 studies, we assessed publication bias by visual assessment of asymmetry of the funnel plot and performed the Begg rank correlation test (Begg and Mazumdar, 1994). The risk of bias and quality of the evidence in included studies was assessed by The Newcastle-Ottawa scale, modified for cross-sectional design (Supplementary II) (Wells et al., 2000).

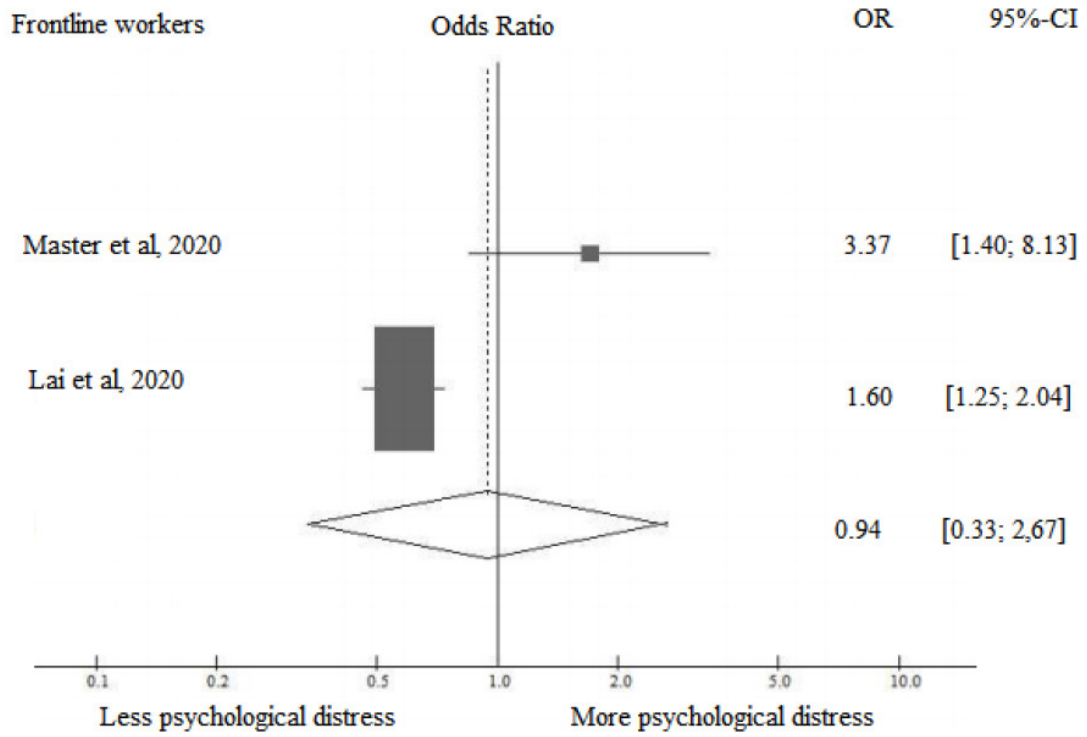
We used the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach to summarize the quality of evidence for all meta-analyses (Atkins et al., 2004). We categorized the confidence in estimates (quality of evidence) as high, moderate, low, or very low, based on the risk of bias (Guyatt et al., 2011a), imprecision (Guyatt et al., 2011b), indirectness, inconsistency (Guyatt et al., 2011c) and publication bias (Guyatt et al., 2011d). We used GRADE evidence profiles to provide a succinct, easily digestible presentation of the quality of evidence and magnitude of associations (Atkins et al., 2004).

This study is based on published data, and therefore ethical approval was not a requirement. This systematic review and meta-analysis are expected to serve as a basis for evidence to improve health quality between nursing professionals, and as a guide for future research based on identified knowledge gaps. It is anticipated that findings from this review will be useful for informing policy, practice, and research priorities, improving the management of nursing professionals' health. We also plan to update the review in the future to monitor changes and guide health services and policy solutions.

Results

In this study, we assessed the impact of the COVID-19 pandemic on the nursing professionals' health. The initial search identified 2,212 possible articles which were transferred to Mendeley®. We excluded four duplicates and at the screening stage, 2,175 articles were removed considering the inclusion criteria. At the eligibility evaluation phase, out of the remaining 33 studies, eight articles were removed after the examination of their full text, by considering the inclusion and exclusion criteria. A PRISMA diagram detailing the study retrieval process is shown in Figure 1. We considered for meta-analysis the results of 2 articles (Figure 2).

Figure 2. Association between frontline workers and psychological distress among nursing professionals.



Source: Prepared by the authors.

All studies included were published in 2020 and have a cross-sectional design. Twenty studies, which correspond to 80% of publications were from Asia, being 13 from China, two from the Philippines, and one publication from each of the following countries: Korea, Nepal, Turkey, Israel, and Pakistan. Studies from Europe represent 12% of our analyses, being one from Germany and Malaysia, one from Croatia, and one from Spain. In Latin America, Brazil had two publications, corresponding to 8% of the total.

Regarding study participants, 68% were nurses or nursing teams, and 32% were other health professionals attending COVID-19 patients. In the sample size of each study, 52% were composed of up to 500 participants, 20% were composed of 500 to 1,000 participants, and 28% were composed of over 1,000 participants, thus totaling 36,665 participants included in the review. A summary of the characteristics of the studies is presented in Table 1.

According to the scope of the journal chosen for the author of each study, 56% were in the nursing field, 32% in the medical field, and 12% in the public health field. The impact factor of the journals ranged from 0.20 to 45.0, with a median of 2.10.

Table 1. Publication profile according to authors, local of study, year of publication, study design, participants, sample size, journal, and impact factor.

Author/ Local/ Year	Title	Study design	Participants	Sample	Journal	Impact factor
An et al. China 2020	Prevalence of depression and its impact on quality of life among frontline nurses in emergency departments during the COVID-19 outbreak	Cross-sectional	Nurses	1,103	Journal of Affective Disorders	4.084
Aksoya & Koçak Turkey 2020	Psychological effects of nurses and midwives due to COVID-19 outbreak: The case of Turkey	Cross-sectional	Nurses and midwives	758	Archives of Psychiatric Nursing	1.266
Cai et al. China 2020	Psychological Impact and Coping Strategies of Frontline Medical Staff in Hunan Between January and March 2020 During the Outbreak of Coronavirus Disease 2019 (COVID-19) in Hubei, China	Cross-sectional observational	Doctors, nurses, and other hospital staff	534	Medical Science Monitor	1.433
Chen et al. China 2020	A cross-sectional study of mental health status and self psychological adjustment in nurses who supported Wuhan for fighting against the COVID-19	Cross-sectional prospective	Frontline nurses	92	Journal of Clinical Nursing	1.972
Cotrin et al. Brazil 2020	Healthcare Workers in Brazil during the COVID-19 Pandemic: A Cross-Sectional Online Survey	Cross-sectional	Health care workers	536	INQUIRY: The Journal of Health Care Organization, Provision, and Financing	0.842
Dal'Bosco et al. Brazil 2020	Mental health of nursing in coping with COVID-19 at a regional university hospital	Cross-sectional observational	Nursing professionals	88	Revista Brasileira de Enfermagem	0.221
Gan et al. China 2020	Willingness of Chinese nurses to practice in Hubei combating the coronavirus disease 2019 epidemic: A cross-sectional study	Cross-sectional	Nurses	11,183	Journal of Advanced Nursing	2.561

>>

Table 1. Publication profile according to authors, local of study, year of publication, study design, participants, sample size, journal, and impact factor. (Continuation)

Huang et al. China 2020	Emotional responses and coping strategies in nurses and nursing students during COVID-19 outbreak: A comparative study	Cross-sectional	College students and first-line nurses	850	PLOS ONE	2.740
Irshad et al. Pakistan 2020	How perceived threat of COVID-19 causes turnover intention among Pakistani nurses: A moderation and mediation analysis	Cross-sectional	Nurses	117	International Journal of Mental Health Nursing	2.383
Khanal et al. Nepal 2020	Mental health impacts among health workers during COVID-19 in a low resource setting: a cross-sectional survey from Nepal	Cross-sectional	Health workers	475	Globalization and Health	3.031
Labrague & Santos Philippines 2020b	COVID-19 anxiety among frontline nurses: predictive role of organizational support, personal resilience and social support	Cross-sectional	Nurses	325	Journal of Nursing Management	2.243
Labrague & Santos Philippines 2020a	Fear of COVID-19, psychological distress, work satisfaction and turnover intention among frontline nurses	Cross-sectional	Frontline nurses	261	Journal of Nursing Management	2.243
Lai et al. China 2020	Factors Associated with Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019	Cross-sectional	Health care workers	1,257	JAMA: The Journal of the American Medical Association	45.540
Li et al. China 2020	Intention to response, emergency preparedness and intention to leave among nurses during COVID-19	Cross-sectional	Nurses	1,646	Nursing Open	1.363
Nie et al. China 2020	Psychological impact of COVID-19 outbreak on frontline nurses: A cross-sectional survey study	Cross-sectional	Frontline nurses	263	Journal of Clinical Nursing	1.158
Nienhaus & Hod Germany/ Malaysia 2020	COVID-19 among Health Workers in Germany and Malaysia	Cross-sectional	Staff working in medical facilities	12,393	International Journal of Environmental Research and Public Health	2.849
Salopek-Žih et al. Croatia 2020	Differences in Distress and Coping with the COVID-19 Stressor in Nurses and Physicians	Cross-sectional	Healthcare workers in General Hospital Nasice	124	Psychiatria Danubina	0.764
García-Sierra et al. Spain 2020	Descriptive study of the health service workers of a Primary Care Department confined by COVID-19	Cross-sectional	Professionals who required confinement	1,418	Revista Española de Salud Pública	0.530

>>

Table 1. Publication profile according to authors, local of study, year of publication, study design, participants, sample size, journal, and impact factor. (Continuation)

Si et al. China 2020	Psychological impact of COVID-19 on medical care workers in China	Cross-sectional	Medical care workers	863	Infectious Diseases of Poverty	4.110
Sperling Israel 2020	Ethical dilemmas, perceived risk, and motivation among nurses during the COVID-19 pandemic	Cross-sectional Descriptive	Nurses	231	Nursing Ethics	1.957
Wu et al. China 2020	Factors associated with nurses' willingness to participate in care of patients with COVID-19: A survey in China	Cross-sectional	Nurses	1,176	Journal of Nursing Management	2.243
Xie et al. China 2020	Investigation of the Psychological disorders in the healthcare nurses during a coronavirus disease 2019 outbreak in China	Cross-sectional	Nurses	159	Medicine	2.133
Yang et al. Korea 2020	Psychological impact of COVID-19 on hospital workers in nursing care hospitals	Cross-sectional	Workers at three nursing care hospitals	54	Nursing Open	1.363
Zhang et al. China 2020	The role of workplace social capital on the relationship between perceived stress and professional identity among clinical nurses during the COVID-19 outbreak	Cross-sectional	Nurses	308	Japan Jornal Nursing Science	0.319
Zhao et al. China 2020	Caring for the caregiver during COVID-19 outbreak Does inclusive leadership improve psychological safety and curb psychological distress? A cross-sectional study	Cross-sectional	Nurses	451	International Journal of Nursing Studies	3.783

Source: Prepared by the authors.

The studies presented approximately 73% of non-risk bias. The Newcastle-Ottawa results are shown in supplementary II. The meta-analysis of psychological distress variables is shown in Figure 2.

Problems related to the mental health of nursing workers

Mental health disorders were estimated in 15 studies (Aksoya and Koçak, 2020; An et al., 2020; Cai et al., 2020; Chen et al., 2020; Cotrin et al., 2020; Dal'Bosco et al., 2020; Huang et al., 2020; Irshad et al., 2020; Khanal et al., 2020; Lai et al., 2020; Nie et al., 2020; Salopek-Žih et al., 2020; Si et al., 2020; Xie et al., 2020. Yang et al., 2020). The characteristics of the main results and conclusions of each study can be found in Table 2.

Table 2. Objective, main results, and conclusions of each study included.

Author (Year)	Objective	Main results	OR/RR/HR	Main conclusions
An et al. 2020	To examine the prevalence of depressive symptoms and their correlates, and the association between depression and quality of life (QoL) in Emergency Department (ED) nurses during the COVID-19 pandemic in China.	Overall prevalence of depression: 43.61% (95% CI: 40.68–46.54%). Of the depressed ED nurses (N=481): 305 (27.7%) = mild depression 95 (8.6%) = moderate depression 58 (5.3%) = moderate-to-severe depression 23 (2.1%) reported severe depression. PHQ-9 scale: 4.90 (SD=5.40). Univariate analysis revealed depression was significantly associated with: Type of hospital (P=0.019) Direct care with confirmed COVID-19 patients (P=0.006) Current smoking (P<0.001) Years of work experience (P=0.039) QOL (P<0.001).	Higher risk of depression: Nurses working in tertiary hospitals (OR=1.647, P=0.009), Clinical services for COVID-19 patients (OR=1.421, P=0.018), Current smokers (OR=3.843, P<0.001)	Depression was common among ED nurses. Considering the negative impact of depression, a heightened awareness of, and early treatment for depression for frontline ED nurses should be provided.
Aksoya & Koçak 2020	To determine the psychological impact levels of nurses and midwives due to the COVID-19 outbreak.	Participants: 56.9% of nurses & 43.1% midwives. 48.8% contacted patient with suspected COVID-19 29.8% provided care to the patient with COVID-19 52.75 (SD 9.80) State Anxiety 44.87 (SD 7.92) Trait Anxiety Inventory 35.16 (SD 9.42) Intolerance of Uncertainty Scale 54.5% had worsening of life since the outbreak 62.4% had difficulties in dealing with the uncertain situation 42.6% wanted psychological support 11.8% had alienated from their profession. There was a difference between scale scores and difficulties in work, family and private life due to COVID-19.	No	Midwives and nurses have high psychological effects due to the COVID-19 outbreak. It is necessary: to implement special interventions immediately; a secure fast information network; continuing education; easy access to protective equipment and psychological support
Cai et al. 2020	To investigate the psychological impact and coping strategies of frontline medical staff in Hunan province, adjacent to Hubei province, during the COVID-19 outbreak between January and March 2020.	Participants age: 18–30 years (42.4%) & 31–40 years (60.7%) 90% were doctors and nurses 79% were married 76.6% had children 14.5 years of clinical experience on average 64.4% had a postgraduate degree Felt social and professional obligation to continue working long hours. Were anxious regarding their safety and the safety of their families Psychological effects from reports of mortality from COVID-19 infection.	No	The COVID-19 outbreak in Hubei resulted in increased stress for medical staff in adjacent Hunan province. Continued acknowledgement of the medical staff, provision of infection control guidelines, specialized equipment and facilities for the management of COVID-19 infection should be recognized as factors that may encourage medical staff to work during future epidemics.

>>

Table 2. Objective, main results, and conclusions of each study included. (Continuation)

Chen et al. 2020	To evaluate the mental health status, stressors and self-adjustment of nurses in isolation wards at different periods in Wuhan, China.	T1: 92 respondents; T2: 86 respondents. Mental health problems: T1: 26.09%, T2: 9.3%% - significant difference Main factors influencing mental health: Self-perceived stress and only child status. Most common stressors: T1: large infected population, high infectivity; concerned about family's health status; high mortality if not treated in time. T2: long duration of the epidemic, separate from family for a long time Self-adjustment: T1: 97.83%; T2: 88.04% Avoid addressing it: T1: 9; T2: 5 Utilized a professional psychological counselling: T1: 8; T2: 5	No	Mental health problems among frontline nurses fighting COVID-19 need special attention, so administrators should offer timely counselling and strengthen effective psychosocial support to improve their mental resilience.
Cotrin et al. 2020	To compare the impact of COVID-19 pandemic among physicians, nurses, and dentists, about workload, income, protection, training, feelings, behavior, and level of concern and anxiety.	179 physicians (117 female; 62 males), 170 nurses (151 female; 19 male), and 187 dentists (125 female; 62 male). Jobs reduced for all, especially for dentists. Workload and income reduced to all. Most did not receive proper training for treating COVID-19 infected patients. Physicians and nurses were feeling more tired than usual. Most reported difficulties in sleeping.	No	The healthcare workers reported a significant impact of COVID-19 pandemic in their income, workload and anxiety, with differences among physicians, nurses and dentists. Nurses related to having PPE partially following the WHO recommendations. Physicians and nurses were feeling more tired than usual than dentists.
Dal'Bosco et al. 2020	To identify prevalence and factors associated with anxiety and depression in nursing professionals who work to cope with COVID-19 at a university hospital.	48.9% anxiety and 25% depression. The majority were women over 40 years old, married or in a common-law marriage, white, with higher education or graduate degree, with an income above 3,000.00 *reais*, public servants, working 40 hours a week and working in the hospital from 1 to 5 years.	No	Have to consider the impact on mental health nursing caused by COVID-19 and intervene with coping strategies to minimize the suffering of professionals.
Gan et al. 2020	To investigate the willingness of Chinese nurses to practice in Hubei combating the coronavirus disease 2019 and to explore the associated factors.	11,183 nurses participated and most were willing to volunteer to practice in Hubei combating the epidemic. The following characteristics: younger, unmarried, members of the Communist Party of China, with senior professional qualification, working in critical care departments, with support from their families, with adequate training and learning, with good health status and low levels of anxiety.	No	A high proportion of nurses in China were willing to practice in Hubei during the coronavirus disease 2019 epidemic. Adequate training and psychological support would facilitate nurses to volunteer during the outbreak of an infectious disease.

>>

Table 2. Objective, main results, and conclusions of each study included. (Continuation)

Huang et al. 2020	To investigate nurses' emotional responses and coping styles, and conduct a comparative study with nursing college students.	Women showed more severe anxiety and fear than men. Participants from cities exhibited these symptoms more than participants from rural areas. Rural participants experienced more sadness than urban participants. The nearer a COVID-19 zone, the stronger the anxiety and anger.	No	The COVID-19 outbreak has placed immense pressure on hospitals and those nurses at the frontline are more seriously affected. Hospitals should focus on providing psychological support to nurses and training in coping strategies.
Irshad et al. 2020	To develop and validate a scale for the perceived threat of COVID-19, and to investigate outcomes, underlying mechanism, and boundary condition of the perceived threat of COVID-19.	Perceived threat of COVID-19 increases psychological anxiety (b = 0.30, P <0.001) and turnover intention among nurses (b = 0.35, P <0.001).	Perceived threat of COVID-19 and turnover intention (indirect effect =0.13, LL = 0.05, UL = 0.23). Turnover intentions was negative and significant (b = 0.33, P <0.001)	The ideological contract as an important factor that can reduce turnover intention caused by anxiety among nurses.
Khanal et al. 2020	To identify factors associated with anxiety, depression and insomnia among health workers involved in COVID-19 response in Nepal.	41.9% had symptoms of anxiety; 37.5% had depression symptoms; 33.9% had symptoms of insomnia.	Stigma *versus*: anxiety (OR: 2.47; 95% CI: 1.62–3.76); depression (OR: 2.05; 95% CI: 1.34–3.11); insomnia (OR: 2.37; 95% CI: 1.46–3.84). History of medication for mental health problems *versus*: higher likelihood of experiencing symptoms of anxiety (OR: 3.40; 95% CI:1.31–8.81); depression (OR: 3.83; 95% CI: 1.45–10.14); insomnia (OR: 3.82; 95% CI: 1.52–9.62); Inadequate precautionary measures in the workplace *versus*: anxiety (OR: 1.89; 95% CI: 1.12–3.19); depression (OR: 1.97; 95% CI: 1.16–3.37). Nurses (OR: 2.33; 95% CI: 1.21–4.47) were more likely to experience anxiety symptoms than other health workers.	High proportion of anxiety, depression and insomnia symptoms. Health workers facing stigma, those with history of medication for mental health problems, and those reporting inadequate precautionary measures in their workplace were more at risk of developing mental health outcomes.

>>

Table 2. Objective, main results, and conclusions of each study included. (Continuation)

Labrague & Santos 2020b	To examine the relative influence of personal resilience, social support and organizational support in reducing COVID-19 anxiety in frontline nurses.	123 (37.8%) were found to have dysfunctional levels of anxiety.	COVID-19 anxiety *versus*: social support (β = -0.142, p = 0.011); personal resilience (β = -0.151, p = 0.008); organisational support (β = -0.127, p = 0.023)	Resilient nurses and those who perceived higher organisational and social support were more likely to report lower anxiety related to COVID-19.
Labrague & Santos 2020a	To examine the relative influence of fear of COVID-19 on nurses' psychological distress, work satisfaction and intent to leave their organisation and the profession.	Score of the fear of COVID-19 scale was 19.92. Job role and attendance of COVID-19-related training predicted fear of COVID-19. Increased level of fear of COVID-19 was associated with decreased job satisfaction, increased psychological distress, and increased organisational and professional turnover intentions.	No	Frontline nurses who reported not having attended COVID-19-related training and those who held part-time job roles reported increased fears of COVID19. Addressing the fear of COVID-19 increased job satisfaction, decreased stress levels and lower intent to leave the organisation and the profession.
Lai et al. 2020	To assess the magnitude of mental health outcomes and associated factors among health care workers treating patients exposed to COVID-19 in China.	68.7% was the participation rate. 64.7% were aged 26 to 40 years. 76.7% were women. 60.8% were nurses. 39.2% were physicians. 60.5% worked in hospitals in Wuhan. 41.5% were frontline health care workers. A considerable proportion of participants reported symptoms of: depression (50.4%); anxiety (44.6%); insomnia (34.0%); distress (71.5%). Nurses, women, frontline health care workers, and those working in Wuhan, China, reported more severe degrees of all measurements of mental health symptoms than other health care workers.	Participants from outside Hubei province *versus* lower risk of experiencing symptoms of distress: OR 0.62; 95% CI, 0.43-0.88; P = .008). Frontline health care workers engaged in direct with COVID-19 *versus*: higher risk of symptoms of depression: OR, 1.52; 95% CI, 1.11-2.09; P = .01; anxiety (OR, 1.57; 95% CI, 1.22-2.02; P < .001); insomnia (OR, 2.97; 95% CI, 1.92-4.60; P < .001); distress (OR, 1.60; 95% CI, 1.25-2.04; P < .001).	Health care workers in hospitals equipped with fever clinics or wards for patients with COVID-19 in Wuhan and other regions in China, participants reported experiencing psychological burden, especially nurses, women, those in Wuhan, and frontline health care workers directly engaged in the diagnosis, treatment, and care for patients with COVID-19.

>>

Table 2. Objective, main results, and conclusions of each study included. (Continuation)

Li et al. 2020	To assess the current level and identify associated factors of intention to response and emergency preparedness of clinical nurses during COVID19 outbreak.	Intention to response was 82.00 (SD 18.17). Emergency preparedness was 64.99 (SD 12.94). Moral consideration, engaged in COVID-19 protection training, had working experience in SARS, and the other eight factors were explained 34.6% of the total model variance in intention to response model ($F = 80.05$, $p < .001$). While, the level of IR, whether the pace of work was affected and above three same factors were explained 21.5% of the total model variance ($F = 91.05$, $p < .001$). Pathway analysis revealed that moral consideration, intention to leave and impacts on work and life mediate the relationship between EP and IR.		The study proved a considerable level of intention to response among nurses accompanied by a moderate level of emergency preparedness. Our findings highlight the effects of social and moral factors on intention to response beyond the previous model.
Nie et al. 2020	To portray the prevalence and associated factors of psychological distress among frontline nurses during COVID-19 outbreak.	25.1% were identified as psychological distress. Multiple logistic analysis revealed that working in the emergency department, concern for family, being treated differently, negative coping style and COVID-19-related stress symptoms were positively related to psychological distress. Perceived more social support and effective precautionary measures were negatively associated with psychological distress.	Presence of psychological distress *versus*: working in ED (OR = 3.378, 95% CI 1.404–8.130); concern for family (OR = 2.171, 95% CI 1.294–3.643) being treated differently (OR = 2.045, 95% CI 1.072–3.891); impact of event (OR = 1.084, 95% CI 1.052–1.117); negative coping style (OR = 1.587, 95% CI 0.712–3.538); social support (OR = 0.960, 95% CI 0.936–0.984); precautionary measures (OR = 0.469, 95% CI 0.235–0.933).	COVID-19 had a significant psychological impact on frontline nurses. Early detection of psychological distress and supportive intervention should be taken according to the associated factors to prevent more serious psychological impact on frontline nurses.
Nienhaus & Hod 2020	To report the cases of SARS-CoV-2 infections and COVID-19 in Germany and Malaysia.	73% were female and 27% male The median age was 41 years; 20 people died, giving rise to a mortality rate of 0.2%. Among the staff 8935 cases are reported 0.5% died. The most reported cases with a known test result pertained to nurses (63.9%). Seven nurses, two physicians and a social worker died.	No	Health workers are facing additional stress and stigma during the pandemic. Systematic supply and use of PPE can effectively protect HW. The spread of SARS-CoV-2 infections among HW remains relatively low.

>>

Table 2. Objective, main results, and conclusions of each study included. (Continuation)

Salopek-Žih et al. 2020	To determine the degree of concern about the COVID-19 Pandemic and degree of distress, anxiety and depression in hospital workers and the ways in which hospital workers coped with stress.	11% had moderate to very-severe depression; 17% had moderate to extremely-severe anxiety; 10% for moderate to extremely-severe stress. 67% were worried. No statistically significant differences in the scales of depression, anxiety, and stress between nurses and physicians, but differences were found on Escape-Avoidance and Positive Reappraisal subscales. Nurses used more avoiding coping style and positive reappraisal than doctors. Seeking social support is more pronounced in those over 40 years old, while those under 40 use more avoidable stress management techniques.	No	Monitoring and ensuring the mental health of coronavirus care staff is crucial for global health. The education of medical staff in the field of stress management is a conditio sine qua non of the issue of an adequate relationship with the COVID-19 pandemic.
García-Sierra et al. 2020	To know the epidemiological characteristics of the primary care professionals who required confinement.	78.8% were women. The mean age was 45.2 years. 67.8% were doctors and nurses. 64.1% presented symptoms compatible with COVID-19. Participants described multiple symptoms during confinement. 1,050 diagnostic RT-PCR tests were performed, being positive in 323 cases, of which 33 were in asymptomatic people.	No	The impact of the epidemic by COVID-19 is anticipated in health personnel compared to the general population. The distribution of symptoms in healthcare professionals is similar to that of other studies in the general population. Of the total number of professionals requiring isolation, 22.7% confirmed the diagnosis.
Si et al. 2020	To identify the psychological impact of COVID-19 on medical care workers in China.	40.2% indicated positive screens for significant posttraumatic stress (PTS) disorder symptoms. Extremely severe symptoms: 13.6% depression; 13.9% anxiety; 8.6% stress. Threat and passive coping strategies were positively correlated to PTS and DASS scores; Social support and active coping strategies were negatively correlated to DASS scores. Nurses were more likely to be anxious.	No	Adverse psychological symptoms were prevalent among medical care workers in China during the COVID-19 epidemic. Screening for adverse psychological outcomes and developing corresponding preventive measures would be beneficial in decreasing negative psychological outcomes.

>>

Table 2. Objective, main results, and conclusions of each study included. (Continuation)

Sperling 2020	To examine how Israeli nurses respond to ethical dilemmas and tension during the COVID-19 outbreak, and to what extent this is associated with their perceived risk and motivation to provide care.	68.8% of the respondents had received some form of training about COVID-19. 1/3 feared going to work; 40.9% were scared to care for COVID-19 patients; 74.7% did not believe they have the right to refuse to treat certain patients. 81.4% believed every patient has the right to receive optimal treatment, regardless of their age and medical background.	No	While experiencing significant personal risk and emotional burden, nurses conveyed strong dedication to providing care, and did not regret working in the nursing profession, yet they did seek a supportive climate for their needs and ethical concerns.
Wu et al. 2020	To assess nurses' willingness to participate in care of patients with coronavirus disease 2019 (COVID-19) in China and to identify its associated factors.	1,176 questionnaires were usable for this research. 92.79% of nurses were willing to care for patients with COVID-19. Intensive care unit (ICU) nurses were less willing to participate, while surgical nurses were more willing to participate. Nurses with high positive professional perception scores were more willing to participate than those with low scores.	No	The majority of nurses were willing to participate in care of patients with COVID-19 in China. Surgical nurses and nurses with positive professional perceptions are more likely to be willing to participate in treatment.
Xie et al. 2020	To determine the levels of stress and psychological disorders of nurses who provided nursing care during the COVID-19 outbreak.	Nurses who worked in the non-critical care ward (general ward in which the invasive medical procedure such as mechanical ventilation is absent) scored significantly higher on the traumatization condition.	No	The traumatization condition and stress level of non-critical care ward is more serious than that of critical care ward. Future intervention for preventing the mental crisis among the healthcare nurses needs to be focusing on the individuals in the non-critical care ward.
Yang et al. 2020	To explore coronavirus disease-related psychological stress in hospital workers in nursing care hospitals during the coronavirus disease epidemic.	50% scored ≥5 on the Generalized Anxiety Disorder Scale 11.1% scored ≥10 scores, indicating the presence of depression. Workers who lived with other people with chronic underlying diseases showed significantly higher incidence of the presence of anxiety and depression. Living with persons with chronic underlying diseases, the risk of the presence of depression increased. Higher incidence of depression in occupational therapists compared with physical therapists and nurses.	Presence of a person with an underlying chronic disease in the home: Yes (OR = 7.230, 95% CI 1.788–29.239) Occupation: Physical therapist (OR = 0.115, 95% CI 0.020–0.665) Nurse (OR = 0.050, 95% CI 0.005–0.482) Radiographer (OR = 1.317, 95% CI 0.104–16.709) Administrative workers (OR = 0.686, 95% CI 0.092–5.092)	Hospital workers in nursing care hospitals experience high levels of COVID-19-related psychological symptoms, including anxiety and depression. Measures to assess and reduce the psychological stress are needed. Symptoms should be monitored with vigilance, and further intervention. Hospital workers who are living with people with underlying diseases should be given special attention.

>>

Table 2. Objective, main results, and conclusions of each study included. (Continuation)

Zhang et al. 2020	To explore the potential impact of workplace social capital on the association between perceived stress and professional identity in clinical nurses during the COVID-19 outbreak.	Perceived stress was negatively correlated with professional identity. Workplace social capital was not found to moderate the relationship between perceived stress and professional identity. Mediated that relationship between perceived stress and professional identity.	Perceived stress *versus* professional identity (r = –0.455, p < .001). Workplace social capital *versus* relationship between perceived stress and professional identity (95% CI –0.03 to– 0.06, p = .47 > .05). Mediated that relationship (95% CI –0.61 to –0.19, p < .05), and its mediating effect was –0.37.	A healthy workplace should be provided to clinical nurses to improve their professional identity, while lowering perceived stress.
Zhao et al. 2020	To observe the influence of an inclusive leadership style on psychological distress while assessing the mediating role of psychological safety.	Inclusive leadership is positively associated with psychological safety. Inclusive leaders create a more open and psychologically safe environment for healthcare workers. High level of inclusive leadership behavior among nursing leaders in Wuhan.	No	Inclusive leadership in healthcare is vital in avoiding psychological distress and helps nurses maintain sound mental health. Positive leadership styles, such as inclusive leadership, bring healthcare workers together with sharing and caring behavior. It makes subordinates feel psychologically safe and helps them stay mentally strong to continue fighting.

Source: Prepared by the authors.

The main symptoms presented were depression and discouragement (40%) (An et al., 2020; Dal'Bosco et al., 2020; Khanal et al., 2020; Salopek-Žih et al., 2020; Si et al., 2020; Yang et al., 2020), anxiety (53%) (Aksoy and Koçak, 2020; Dal'Bosco et al., 2020; Huang et al., 2020; Irshad et al., 2020; Khanal et al., 2020; Salopek-Žih et al., 2020; Si et al., 2020; Yang et al., 2020), concern (27%) (Cai et al., 2020; Chen et al., 2020; Huang et al., 2020; Nie et al., 2020), insomnia (13%) (Cotrin et al., 2020; Khanal et al., 2020), and stress (27%) (Nie et al., 2020; Salopek-Žih et al., 2020; Si et al., 2020; Xie et al., 2020).

Assessing nursing professional studies, some results demonstrated the depression symptoms are related to smoking habits, years of work, hospital characteristics, and the work sectors, and direct patient contact (An et al., 2020; Nie et al., 2020; Salopek-Žih et al., 2020; Si et al., 2020; Xie et al., 2020). Nurses presented anxiety more frequently than other health professionals, and this symptom was also more prevalent than others, such as depression and insomnia (Khanal et. al., 2020; Si et al., 2020). The closest contact of a COVID-19 zones, the strongest is the anxiety, anger, and other mental issues, which is more frequent to female participants (Irshad et al, 2020; Huang et al., 2020; Lai et al., 2020; Si et al., 2020). Difficulties to deal with family and personal life due to the COVID-19 pandemic were related to low and moderate anxiety symptoms (Aksoy and Koçak, 2020; Cai et al., 2020; Chen et al., 2020; Nie et al., 2020; Yang et al., 2020). Some studies showed the participants' concerns about being infected with Coronavirus, as well as the risk of their families also being infected (Cai et al., 2020, Chen et al., 2020; Nie et al., 2020).

Based on our methodological criteria, we conducted meta-analyses just for psychological distress variables (Figure 2). Very low-quality evidence showed no association between psychological distress and being a frontline worker (OR 0.94; 95%CI 0.33–2.67) (Table 3).

Table 3 – Grading of Recommendations Assessment, Development, and Evaluation Evidence Profile: association between frontline workers and psychological distress.

Variable/ Time/N. of patients	N. of studies	Risk of bias	Inconsistency	Indirectness	Imprecision	Quality	Relative effect (95% CI)
Frontline workers//At baseline/1520 professionals	2	No serious risk of bias	Serious inconsistency	No serious indirectness	Serious imprecision	Very low	OR 0.94 (0.33-2.6)

Source: Prepared by the authors.

As for work overload and professional evaluation, it has also been identified in studies of social and professional obligation to continue working long hours (Cai et al., 2020) and 74.7% of the professionals did not believe they have the right to refuse to treat certain patients (Sperling, 2020).

Discussion

Regarding the systematic review, we included 25 studies with a cross-sectional design. The studies were carried out across 12 different countries, and the participants were mostly nurses or nursing teams. We submitted the studies to quality and bias analysis to identify their potentiality to be inserted in this review, although they had a cross-sectional design.

From the analysis of the studies, it was identified that the prevalence rates of depression, anxiety, and insomnia of healthcare professionals had increased in this pandemic scenario (Holmes et al., 2020, Pappa et al., 2020). Nursing professionals are the biggest part of the frontline workforce (Teixeira et al., 2020, Fawaz, Anshasi e Samaha, 2020), thus we decided to investigate the health impact specifically on this professional category. The main risks to be considered are exposure to the virus, long working hours, psychological impact, fatigue, professional burnout, stigma, and violence, both physical and psychological (WHO, 2020).

Nurses from the surgical units and those with good professional perceptions were more willing to participate in fighting the pandemic than those professionals who do not have a good perception of the profession (Woo et al., 2020). The psychological well-being and satisfaction of nursing professionals can also act positively in the inclusive leadership role and in fighting the pandemic (Zhao, Ahmed e Faraz, 2020), being another important characteristic of the profession. Another positive impact of the pandemic was the recognition of the profession worldwide (Missel et al., 2020). The year 2020 had been elected as the year of Nursing and several movements were being organized to give visibility to the profession, but it was the pandemic that made these professionals so notable (Treston, 2020).

However, according to our results, the mental health of nursing professionals was extremely affected by the COVID-19 pandemic, increasing depression, discouragement, anxiety, and other mental issues (An et al., 2020; Aksoya and Koçak, 2020; Cai et al., 2020; Chen et al., 2020; Cotrin et al., 2020; Dal'Bosco et al., 2020; Gan et al., 2020; Huang et al., 2020; Irshad et al., 2020; Khanal et al., 2020; Labrague and Santos, 2020a; Labrague and Santos, 2020b; Lai et al.; 2020, Li et al., 2020; Nie et al., 2020; Nienhaus and Hod, 2020; Salopek-Žih et al., 2020; García-Sierra et al., 2020. Si et al., 2020; Sperling, 2020; Wu et al., 2020; Xie et al., 2020; Yang, Kwak e Chang, 2020; Zhang et al., 2020. Zhao et al., 2020). The results are reinforced by studies suggesting that medical and nursing staff were more suitable to present high

levels of anxiety and depressive symptoms (Bohlken et al., 2020). Burnout syndrome, anxiety, and mental exhaustion were also described in healthcare workers (Cheung, Fong and Bressington, 2021).

This impact is not only felt by front-line workers, as was identified by our meta-analysis (Nie et al., 2020; Lai et al., 2020). Nursing professionals from other departments and healthcare workers from other specialties are also suffering from mental distress caused by the COVID-19 pandemic, including surgeons, anesthesiologists, and dentists (Cotrin et al., 2020; Xu et al., 2020).

Nurses had assumed several professional roles that encompass direct patient care, educational and epidemiological practices, and health services management (Treston, 2020). And situations already experienced by them worsened, leading to extreme fatigue and overload during the work process (Kang and Shin, 2020; Teixeira et al., 2020). They frequently feel overwhelmed and undervalued in their work environment, and the consequences of these factors are often severe, affecting the way people work and live, and because they account for a complex network of activities (Missel et al., 2020). The expected profile of the profession, even today, seems to be that of the early days of Nursing, with professionals feeling a social and professional obligation to continue working for long periods (Cai et al., 2020).

The increase in workloads may be linked to the precariousness and deficits in the work environment, materials, and equipment, added to the numerical deficit of the workforce and excessive demand for caring people (Biff et al., 2020). Overwork increases the risk of high rates of turnover, absenteeism, and burnout syndrome, which already affect a high parcel of nursing professionals (Silveira et al., 2016; Duarte and Pinto-Gouveia, 2017; Woo et al., 2020). It has also been associated with decreased job satisfaction (Labrague and Santos, 2020a). Job satisfaction is a complex phenomenon, and it can be influenced by several aspects related to work, such as aspirations, sadness, and happiness of the individuals, thus affecting their attitude towards themselves, their family, and the organization (Oliveira et al., 2019). It is also important to point out that there is a negative association between job satisfaction and work overload, that is, as one increases the other decreases (Dias and Furegato, 2016). Thus, being dissatisfied with work overload and its precarious conditions often leads to physical and mental exhaustion, influencing productivity, performance, absenteeism, turnover, organizational citizenship, health and well-being, life satisfaction, and user satisfaction (Suyantiningsih, Haryono and Zami, 2018).

As the pandemic progressed, access to adequate personal protective equipment (PPE) became a concern worldwide, which exposed healthcare workers to the imminent risk of contracting the disease in their workplaces (Silva et al., 2020; Khanal et al., 2020; Sperling, 2020). The rapid spread of the new coronavirus around the world has also increased the need for health services to be prepared to protect health workers in the performance of their duties since they are potential sources of disease dissemination (Edwards, Tomba and Blasio, 2016; Baker, Peckham e Seixas, 2020; Miranda et al., 2020, Teixeira et al., 2020). In Brazil, the situation of nursing professionals is worrying and may be related to the lack of structure of health services to face pandemic situations. The existence of public and free *Sistema Único de Saúde* (SUS) guarantees universal access to all levels of care and support in critical situations. However, the ceiling on public spending and management problems at the federal level have generated underfunding of SUS and caused a dire situation in the assistance of coronavirus. In addition to ever-increasing numbers of cases and deaths, lack of intensive care beds, the collapse of the SUS at all levels of care, illness, and lack of professionals (Noronha et al., 2020; Teixeira et al., 2020).

There is a need for commitment of the institutions with their workers. The organizational support offered by the institution can prevent anxiety, with the supply of materials, equipment, and training related to COVID-19 reducing stress and fear (Labrague and Los Santos, 2020b). Training to face moments of crisis is important to decrease anxiety and give greater satisfaction in the work environment (Labrague and Los Santos, 2020b; Li et al., 2020). And situational analysis would be a determining factor in preventing the illness of these professionals since it could help manage the risks for contamination by the new coronavirus (Baker, Peckham and Seixas, 2020).

It is necessary to conduct thorough planning, considering the mechanism of contamination, illness, and also mortality due to this exposure (Silva et al., 2020). This planning should consider serological screening, quarantine systems, guidance on the proper use of PPE, including in situations where asymptomatic patients are seen, and also organization for the reduction of horizontal transmission among workers, and also through their families (Silva et al., 2020). It must be emphasized that the safety of health care workers is critical to being able to serve people in need of health interventions (Huh, 2020). In situations of health crises like the ones we are experiencing, public health care policies should be considered as priorities, those professionals with an increased risk of becoming contaminated due to environmental exposure to the pathogen, especially health care professionals (Baker, Peckham and Seixas, 2020).

Although the results of the analysis provided good insight into the impacts of COVID-19 on nursing professionals during the pandemic, our study has some limitations. Some of them are related to the selection of only primary studies, in only three databases and with a final sample of publications in English (although they could be selected in Portuguese, Spanish and French).

In conclusion, the COVID-19 pandemic has negatively impacted the mental health of nursing professionals. The main symptoms presented were anxiety, depression, and discouragement. Moreover, many nurses felt obliged to work in the front line of fighting the pandemic; although they suffer from emotional impacts and work overload in the health services. The pandemic also revealed weaknesses in the organization and planning of health services in several countries around the world. The number of cases of infection and deaths may denounce the absence of planning, the lack of personal protective equipment, and the little investment in the qualification of nursing professionals.

Informações do artigo

Authors' contributions

TPS, MR, CPBA designed the study, performed the literature search, and equally contributed to the writing of the manuscript and preparation of the tables and figures.
CPBA executed the meta-analysis. All authors contributed to the revision and approval of the final manuscript.

Financing

None.

Conflict of interests

None.

Ethical aspects

Not applicable.

Previous presentation

None.

Acknowledgements

The authors thank all healthcare workers, especially nursing professionals, for their valuable contribution and dedication in fighting to defeat this pandemic.

References

AKSOY, Yasemin E.; KOÇAK, Vesile. Psychological effects of nurses and midwives due to COVID-19 outbreak: the case of Turkey. *Archives of Psychiatric Nursing*, v. 34, n. 5, p. 427-433, 2020. DOI: 10.1016/j.apnu.2020.07.011

AN, Ying *et al.* Prevalence of depression and its impact on quality of life among frontline nurses in emergency departments during the COVID-19 outbreak. *The Journal of Affective Disorders*, v. 1, n. 276, p. 312-315, nov. 2020. DOI: 10.1016/j.jad.2020.06.047.

ATKINS, David *et al.* Grading quality of evidence and strength of recommendations. *The BMJ*, v. 328, n. 7.454, p. 1.490, 2004. DOI: 10.1136/bmj.328.7454.1490

BAKER, Marissa G.; PECKHAM, Trevor K.; SEIXAS, Noah S. Estimating the burden of United States workers exposed to infection or disease: a key factor in containing risk of COVID-19 infection. *Plos One*, v. 28, n. 15, e0232452, 2020. DOI: 10.1101/2020.03.02.20030288.

BEGG, Colin B.; MAZUMDAR, Madhuchhanda. Operating characteristics of a rank correlation test for publication bias. *Biometrics*, v. 50, n. 4, p. 1.088-1.101, 1994. Available from: https://www.jstor.org/stable/2533446?seq=2#metadata_info_tab_contents. Accessed on: Nov. 13, 2020.

BIFF, Daiane *et al.* Cargas de trabalho de enfermeiros: luzes e sombras na estratégia saúde da família. *Ciência & Saúde Coletiva*, Rio de Janeiro, v. 25, n. 1, p. 147-158. 2020. DOI: 10.1590/1413-81232020251.28622019.

BOHLKEN, Jens *et al.* COVID-19 pandemic: stress experience of healthcare workers: a short current review. *Psychiatrische Praxis,* v. 47, n. 4, p.190-197, 2020. DOI: 10.1055/a-1159-5551.

CAI, Haozheng *et al.* Psychological impact and coping strategies of frontline medical staff in hunan between january and march 2020 during the outbreak of coronavirus disease 2019 (COVID-19) in Hubei, China. *Medical Science Monitor*, v. 15, n. 26, e924171, 2020. DOI: 10.12659/MSM.924171. D

CHEN, Huijuan *et al.* A cross-sectional study of mental health status and self-psychological adjustment in nurses who supported Wuhan for fighting against the covid-19. *Journal of Clinical Nursing*, v. 29, p. 4.161- 4.170, 2020. DOI: 10.1111/jocn.15444.

CHEUNG, Teris; FONG, Tommy K. H.; BRESSINGTON, Daniel. COVID-19 under the SARS Cloud: mental health nursing during the pandemic in Hong Kong. *Journal of Psychiatric and Mental Health Nursing*, v. 28, n. 2, p.115-117, 2021. DOI: 10.1111/jpm.12639.

CONSELHO FEDERAL DE ENFERMAGEM (COFEN). *Observatório da Enfermagem.* 2021. Available from: http://observatoriodaenfermagem.cofen.gov.br/. Accessed on: Nov. 13, 2020.

COTRIN, Paula *et al.* Healthcare workers in Brazil during the covid-19 pandemic: a cross-sectional online survey. *Inquiry:* The Journal of Health Care, v. 57, p.1-11, 2020. DOI: 10.1177/0046958020963711.

DAL'BOSCO, Eduardo B. *et al.* Mental health of nursing in coping with COVID-19 at a regional university hospital. *Revista Brasileira de Enfermagem*, Brasília, v. 73, e20200434, 2020. Suplemento 2. DOI: 10.1590/0034-7167-2020-0434.

DIAS, Giselle C.; FUREGATO, Antonia R. F. Impacto do trabalho e satisfação da equipe multiprofissional de um hospital psiquiátrico. *Revista Enfermagem UERJ*, Rio de Janeiro, v. 1, n. 24, p. 203-212, 2016. DOI: 10.12957/reuerj.2016.8164.

DUARTE, Joana; PINTO-GOUVEIA, José. The role of psychological factors in oncology nurses' burnout and compassion fatigue symptoms. *European Journal of Oncology Nursing*, v. 28, p. 114-121, 2017. DOI: 10.1016/j.ejon.2017.04.002.

EDWARDS, Christina H.; TOMBA, Gianpaolo S.; BLASIO, Birgitte F. Influenza in workplaces: transmission, workers' adherence to sick leave advice and European sick leave recommendations. *European Journal of Public Health*, v. 26, n. 3, p. 478-485, 2016. DOI: 10.1093/eurpub/ckw031.

FAWAZ, Mirna; ANSHASI, Huda; SAMAHA, Ali. Nurses at the front line of COVID-19: roles, responsibilities, risks, and rights. *American Journal of Tropical Medicine and Hygiene*, v. 103, n. 4, p. 1.341-1.342, 2020. DOI: 10.4269/ajtmh.20-0650.

GAN, Xiaoqing *et al.* Willingness of Chinese nurses to practice in Hubei combating the coronavirus disease 2019 epidemic: a cross-sectional study. *Journal of Advanced Nursing*, v. 76, p. 2.137- 2.150, 2020. DOI: 10.1111/jan.14434.

GARCÍA-SIERRA, Rosa M. *et al.* Descriptive study of the health service workers of a primary care department confined by COVID-19. *Revista Española de Salud Pública*, Espanha, v. 94, n. 3, e202009106, 2020. Disponível em: https://pubmed.ncbi.nlm.nih.gov/32880381/. Accessed on: Nov. 13, 2020.

GÓMEZ-DURÁN, Esperanza L.; MARTIN-FUMADÓ, Carles; FORERO, Carlos G. Psychological impact of quarantine on healthcare workers. *Occupational and Environmental Medicine,* v. 77, p. 666-674, 2020. DOI: 10.1136/oemed-2020-106587.

GUYATT, Gordon H. *et al.* Grade guidelines: 4. rating the quality of evidence-study limitations (risk of bias). *Journal of Clinical Epidemiology*, v. 64, n. 4, p. 407-415, 2011a. DOI: 10.1016/j.jclinepi.2010.07.017.

GUYATT, Gordon H. *et al.* Grade guidelines: 6. rating the quality of evidence-imprecision. *Journal of Clinical Epidemiology*, v. 64, n. 4, p. 1.283-1.293, 2011b. DOI: 10.1016/j.jclinepi.2011.01.012.

GUYATT, Gordon H. *et al.* Grade guidelines: 7. rating the quality of evidence-inconsistency. *Journal of Clinical Epidemiology*, v. 64, n. 4, p. 1.294-1.302, 2011c. DOI: 10.1016/j.jclinepi.2011.03.017.

GUYATT, Gordon H. *et al.* Grade guidelines: 5. rating the quality of evidence: publication bias. *Journal of Clinical Epidemiology*, v. 64, n. 4, p. 1.277-1.282, 2011d. DOI: 10.1016/j.jclinepi.2011.01.011.

HOLMES, Emily A. *et al.* Multidisciplinary research priorities for the covid-19 pandemic: a call for action for mental health science. *Lancet Psychiatry*, v. 7, n. 6, p. 547-560, 2020. DOI: 10.1016/S2215-0366(20)30168-1.

HUANG, Long *et al.* Emotional responses and coping strategies in nurses and nursing students during covid-19 outbreak: a comparative study. *PLoS One,* v. 7, n. 8, p. 237-303, 2020. DOI: 10.1371/journal.pone.0237303.

HUH, Sun. How to train health personnel to protect themselves from SARS-CoV-2 (novel coronavirus) infection when caring for a patient or suspected case. *Journal of Educational Evaluation for Health Professions,* v. 17, p. 10, 2020. DOI: 10.3352/jeehp.2020.17.10.

IRSHAD, Muhammad. Withdrawn: how perceived threat of Covid-19 causes turnover intention among Pakistani nurses: a moderation and mediation analysis. *International Journal of Mental Health Nursing,* v. 30, n. 1, p. 350, 2020. DOI: 10.1111/inm.12775.

KANG, Younhee; SHIN, Kyung R. COVID-19: Korean nurses' experiences and ongoing tasks for the pandemic's second wave. *International Nursing Review*, v. 67, n. 4 p. 445-449, 2020. DOI: 10.1111/inr.12644.

KHANAL, Pratik *et al.* Mental health impacts among health workers during covid-19 in a low resource setting: a cross-sectional survey from Nepal. *Global Health*, v. 16, n. 89, 2020. DOI: 10.1186/s12992-020-00621-z.

LABRAGUE, Leodoro J.; LOS SANTOS, Janet A. A. L. Fear of COVID-19, psychological distress, work satisfaction and turnover intention among frontline nurses. *Journal of Nursing Management,* v. 29, n. 3, p. 395-403, 2020a. DOI: 10.1111/jonm.13168.

LABRAGUE, Leodoro J.; LOS SANTOS, Janet A.A. COVID-19 anxiety among front-line nurses: predictive role of organisational support, personal resilience and social support. *Journal of Nursing Management.* v. 28, n 7, p. 1.653-1.661, 2020b. DOI: 10.1111/jonm.13121

LAI, Jianbo *et al.* Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Network Open*, v. 3, n. 3, e203976, 2020. DOI: 10.1001/jamanetworkopen.2020.3976.

LAM, Stanley K. K. *et al.* A qualitative descriptive study of the contextual factors influencing the practice of emergency nurses in managing emerging infectious diseases. *International Journal of Qualitative Studies on Health and Well-being*, v. 14, n. 1, p. 162-179, 2020. DOI: 10.1080/17482631.2019.1626179.

LANDIS, J. Richard; KOCH, Gary G. The measurement of observer agreement for categorical data. *Biometrics*, v. 33, n. 1, p. 159-74, 1977. DOI: 10.2307/2529310.

LI Jiaying *et al.* Intention to response, emergency preparedness and intention to leave among nurses during COVID-19. *Nursing Open*, v.7, p. 1.867-1.875, 2020. DOI: 10.1002/nop2.576.

MIRANDA, Fernanda M. D. *et al.* Condições de trabalho e o impacto na saúde dos profissionais de enfermagem frente a COVID-19. *Cogitare Enfermagem*, Paraná, v. 25, 2020. DOI: 10.5380/ce.v25i0.72702.

MISSEL, Malene *et al.* A stoic and altruistic orientation towards their work: a qualitative study of healthcare professionals' experiences of awaiting a COVID-19 test result. *BMC Health Services Research*, v. 20, p. 1.031, 2020. DOI: 10.1186/s12913-020-05904-0.

MISHRA, Sundeep. Respect for nursing professional: silence must be heard. *Indian Heart Journal,* v. 67, n. 5, p. 413-415, 2015. DOI: 10.1016/j.ihj.2015.07.003.

NIE Anliu *et al.* Psychological impact of COVID-19 outbreak on frontline nurses: a cross-sectional survey study. *Journal of Clinical Nursing*, v. 29, p. 4.217- 4.226, 2020. DOI: 10.1111/jocn.15454.

NIENHAUS, Albert; HOD, Rozita. COVID-19 among health workers in Germany and Malaysia. *International Journal of Environmental Research and Public Health*, v. 17, n. 13, p. 4.881, 2020. DOI: 10.3390/ijerph17134881.

NORONHA, Kenya V. M. S. *et al.* The COVID-19 pandemic in Brazil: analysis of supply and demand of hospital and ICU beds and mechanical ventilators under different scenarios. *Cadernos de Saúde Pública*, Rio de Janeiro, v. 36, n. 6, e00115320, 2020. DOI: 10.1590/0102-311X00115320.

OLIVEIRA, Jacqueline F. *et al.* Satisfação profissional e sobrecarga de trabalho de enfermeiros da área de saúde mental. *Ciência & Saúde Coletiva,* Rio de Janeiro, v. 24, n. 7, p. 2.593-2.599, 2019. DOI: 10.1590/1413-81232018247.20252017.

PAPPA, Sofia *et al.* Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *ANZ Journal of Surgery*, v. 91, n. 3, p. 276-281, 2020. DOI: 10.1016/j.bbi.2020.05.026.

RUCKER, Gerta *et al.* Undue reliance on I(2) in assessing heterogeneity may mislead. *BMC Medical Research Methodology*, v. 8, n. 79, 2008. Available from: https://bmcmedresmethodol.biomedcentral.com/articles/10.1186/1471-2288-8-79. Accessed on: Nov. 13, 2020.

SALOPEK-ŽIHA, Darija *et al.* Differences in distress and coping with the COVID-19 stressor in nurses and physicians. *Psychiatria Danubina*, v. 32, n. 2, p. 287-293, 2020. DOI: 10.24869/psyd.2020.287.

SANT'ANA, Geisa. Risco ocupacional: contaminação por COVID-19 em profissionais de saúde é mais frequente nas enfermarias do que UTIs. *SciELO em Perspectiva*: Press Releases, 9 out. 2020.

SI, Ming-Yu *et al.* Psychological impact of COVID-19 on medical care workers in China. *Infectious Diseases of Poverty*, v. 9, n. 113, 2020. DOI: 10.186/s40249-020-00724-0.

SILVA, Luiz S. *et al.* Condições de trabalho e falta de informações sobre o impacto da COVID-19 entre trabalhadores da saúde. *Revista Brasileira de Saúde Ocupacional*, São Paulo, v. 45, 2020, e24. DOI: 10.1590/2317-6369000014520.

SILVEIRA, Ana L.P. *et al.* Síndrome de Burnout: consequências e implicações de uma realidade cada vez mais prevalente na vida dos profissionais de saúde. *Revista Brasileira de Medicina do Trabalho,* v. 14, n. 3, p. 275-284, 2016. DOI: 10.5327/Z1679-443520163215.

SOLIDARITY RESEARCH NETWORK. *Rede de Pesquisa Solidária.* 2021. Available from: https://redepesquisasolidaria.org/en/publications/political-and-institutional-perils-of-brazils-covid-19-crisis/. Accessed on: Dec. 09, 2020.

SPERLING, Daniel. Ethical dilemmas, perceived risk, and motivation among nurses during the COVID-19 pandemic. *Nursing Ethics*, v. 28, n. 1, p. 9-22, 2020. DOI: 10.1177/0969733020956376.

SUYANTININGSIH, Tri; HARYONO, Siswoyo; ZAMI, Alex. Effects of Quality of Work Life (QWL) and Organizational Citizenship Behaviour (OCB) on job performance among community health centre paramedics in Bekasi City, Indonesia. *Journal of Economics and Sustainable Development,* v. 9, n. 6, 54-65, 2018. Available from: https://www.iiste.org/Journals/index.php/JEDS/article/view/41684/42905. Accessed on: Nov. 13, 2020.

TEIXEIRA, Carmen F. S. *et al.* The health of healthcare professionals coping with the COVID-19 pandemic. *Ciência & Saúde Coletiva*, Rio de Janeiro, v. 25, n. 9, p. 3.465-3.474, 2020. DOI: 10.1590/1413-81232020259.19562020.

TRESTON, Carole. COVID-19 in the year of the nurse. *Journal of the Association of Nurses in AIDS Care*, v. 31, n. 3, p. 359-360, 2020. DOI: 10.1097/ JNC.0000000000000173.

WELLS, George A. *et al.* The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses. *The Ottawa Hospital*, 2000. Available from: http://www.ohri.ca/programs/clinical_epidemiology/oxford.asp. Accessed on: Nov. 13, 2020.

WOO, Tiffany *et al.* Global prevalence of burnout symptoms among nurses: a systematic review and meta-analysis. *Journal of Psychiatric Research*, v. 123, p. 9-20, 2020. DOI: 10.1016/j.jpsychires.2019.12.015.

WORLD HEALTH ORGANIZATION (WHO). Coronavirus disease (COVID-19) outbreak: rights, roles and responsibilities of health workers, including key considerations for occupational safety and health. 2020. Available from: https://www.who.int/docs/default-source/coronaviruse/who-rights-roles-respon-hw-covid-19.pdf. Accessed on: Nov. 13, 2020.

WORLD HEALTH ORGANIZATION (WHO*). Global Strategic Directions for Strengthening Nursing and Midwifery nursing and midwifery 2016-2020.* 2021. Available from: https://www.who.int/hrh/nursing_midwifery/global-strategic-midwifery2016-2020.pdf. Accessed on: Nov. 13, 2020.

XIE Hongling *et al.* Investigation of the psychological disorders in the healthcare nurses during a coronavirus disease 2019 outbreak in China. *Medicine,* Baltimore, v. 99, n. 34, e21662, 2020. DOI: 10.1097/MD.0000000000021662.

YANG, Seoyon; KWAK, Sand G.; CHANG, Min C. Psychological impact of COVID-19 on hospital workers in nursing care hospitals. *Nursing Open*, v. 8, p. 284-289, 2020. DOI: 10.1002/nop2.628.

ZHANG, Yu-Dong *et al.* The role of workplace social capital on the relationship between perceived stress and professional identity among clinical nurses during the COVID-19 outbreak. *Japan Journal of Nursing Science*, v. 18, p. e12376, 2020. DOI: 10.1111/jjns.12376.

ZHAO, Fuqiang; AHMED, Fawad; FARAZ, Naveed A. Caring for the caregiver during COVID-19 outbreak: does inclusive leadership improve psychological safety and curb psychological distress? A cross-sectional study. *International Journal of Nursing Studies*, v. 110, p.103.725, 2020. DOI: 10.1016/j.ijnurstu.2020.103725.

Supplementary I

Question: What are the impacts of COVID-19 on the health of nursing professionals? Population: Nursing professionals of all categories Intervention: Impacts of COVID-19 on the health of nursing professionals Comparator: Among the professional categories Outcomes: The impacts of COVID-19 on the health of nursing professionals	
Type of study: Randomized clinical trial, cohort and/or case-control study, cross-sectional study	
Protocol for Systematic Review - COVID-19 Health Impacts on Nursing Professionals	
1. Research question	**What are the impacts of COVID-19 on the health of nursing professionals?**
2. Bases	Web of Science, PubMed e SciELO
3. Inclusion criteria	Studies that evaluated nursing professionals contaminated by COVID-19. Studies that evaluated the COVID-19 impact of nursing professionals. Type of study: Randomized clinical trial, cohort and/or case-control study, cross-sectional study
4. Exclusion criteria	Studies that not fulfilling inclusion criteria, articles only related to methodological research and those that did not involve human beings were not included in this study. Qualitative studies
5. Ways to include the article	Stage one: title Stage two: abstract Stage three: full text
6. Language	English, Portuguese, Spanish, and French
7. Keywords	covid-19 OR coronavirus OR sars-cov-2 AND nurse OR nurs* AND health impacts OR health outcomes OR outcomes
8. Using the PRISMA checklist	yes
PubMed: Search:(((((((covid-19) OR (coronavirus)) OR (Sars-CoV-2)) AND (nurse)) OR (nurs*)) AND (health impacts)) OR (health outcomes)) OR (outcomes). Filters applied: Free full text, Journal Article, Humans, English, French, Portuguese, Spanish, MEDLINE, Nursing journals, Adult: 19+ years, Adult: 19-44 years, Middle Aged + Aged: 45+ years, Middle Aged: 45-64 years, Young Adult: 19-24 years, from 2020/1/1 - 2020/12/31.	
Web of Science: Search: TOPIC: (((((((covid-19) OR (coronavirus)) OR (Sars-CoV-2)) AND (nurse)) OR (nurs*)) AND (health impacts)) OR (health outcomes)) OR (outcomes)) Refined By: Open Access: (OPEN ACCESS) AND PUBLICATION YEAR: (2020) AND ARTICLE TYPE (ARTICLE) AND LANGUAGES: (ENGLISH OR SPANISH OR FRENCH OR PORTUGUESE) AND Open Access: (Full Open Access) AND WEB OF SCIENCE INDEX: (WOS.SCI) AND DOCUMENT TYPES: (ARTICLE) AND CATEGORIES OF THE WEB OF SCIENCE: (NURSING) stipulated time: Accumulated in the year. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.	
SciELO: (covid-19) OR (coronavirus) AND (nurse) OR (nurs*) AND (health impacts) OR (health outcomes) OR (outcomes).	

Supplementary II. Modified Newcastle-Ottawa quality assessment scale.

Studies/Year	Modified Newcastle-Ottawa quality assessment scale			Total score	Score rate (%)
	Selection	Comparability	Outcome		
An *et al.* 2020	****	*	**	7	70
Aksoya and Koçak 2020	****	*	**	7	70
Cai *et al.* 2020	**	**	**	6	60
Chen *et al.* 2020	****	*	**	7	70
Cotrin *et al.* 2020	****	**	**	8	80
Dal'Bosco *et al.* 2020	***	*	**	6	60
Gan *et al.* 2020	****	**	**	8	80
Huang *et al.* 2020	****	**	**	8	80
Irshad *et al.* 2020	****	*	**	7	70
Khanal *et al.* 2020	***	*	**	6	60
Labrague and Santos 2020a	****	**	**	8	80
Labrague and Santos 2020b	*****	**	**	9	90
Lai *et al.* 2020	*****	**	**	9	90
Li *et al.* 2020	****	**	**	8	80
Master *et al.* 2020	****	**	**	8	80
Nienhaus and Hod 2020	***	**	**	7	70
Salopek-Žih *et al.* 2020	**	*	**	5	50
Sierra *et al.* 2020	***	*	**	7	70
Si *et al.* 2020	*****	**	**	8	80
Sperling 2020	***	*	**	6	60
Wu *et al.* 2020	*****	**	**	9	90
Xie *et al.* 2020	**	*	**	5	50
Yang *et al.* 2020	****	*	**	7	70
Zhang *et al.* 2020	****	*	**	7	70
Zhao *et al.* 2020	*****	**	**	9	90
				Mean	72.8