Revisión / Review

Occupational health in the framework of the COVID-19 pandemic: a scoping review

Seguridad y salud en el trabajo en el marco de la pandemia por COVID-19: una revisión exploratoria

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ABSTRACT

Objective To collect the available evidence related to occupational health in the face of the introduction of the new SARS-CoV-2 coronavirus pandemic.
Methods Scoping review developed from the Arksey and O'Malley framework. The search was performed in the databases PubMed, Academic Search Complete, Science Direct, Medline, Scopus, Web of Science and Google Scholar. Documents on COVID-19 and its relationship with occupational health published in English, Portuguese and Spanish were included. The review, selection and characterization of the studies was carried out by five reviewers.
Results The search and selection identified 43 documents published between December 2019 and April 2020. The topics covered include occupational exposure, protection measures, psychosocial affectations of workers, particularly health, as well as conditions of work organization that can influence contagion.
Conclusions Health workers are the most exposed workforce. Accompaniment, coaching and training in relation to patient care and the use of personal protection equipment are essential to reduce contagion among health personnel. In other work activities, social distancing is the standard measure for the mitigation of transmission, as well as the continuous disinfection of workplaces.

Key Words: COVID-19; occupational health; coronavirus; health personnel; occupational exposure (*source: MeSH, NLM)*.

RESUMEN

Objetivo Recopilar la evidencia disponible relacionada con la salud laboral frente a la introducción de la nueva pandemia por el coronavirus SARS-CoV-2.
Métodos Revisión exploratoria desarrollada a partir del marco de Arksey y O´Malley. La búsqueda se realizó en las bases de datos PubMed, Academic Search Complete, Science Direct, Medline, Scopus, Web of Science y Google Scholar. Se incluyeron documentos sobre COVID-19 y su relación con la salud ocupacional publicados en inglés, portugués y español. La revisión, selección y caracterización de los estudios fue desarrollada por cinco revisores.
Resultados La búsqueda y selección identificó 43 documentos publicados entre diciembre de 2019 y abril de 2020. Las temáticas abordadas incluyen exposición ocupacional, medidas de protección, afectaciones psicosociales de los trabajadores, particularmente de la salud, así como condiciones de la organización del trabajo que pueden influir en el contagio.
Conclusiones Los trabajadores de la salud son la fuerza laboral más expuesta. El acompañamiento, entrenamiento y la capacitación en relación con la atención de pacientes y el uso de elementos de protección personal son fundamentales para disminuir el contagio entre personal de salud. En otras actividades laborales el distanciamiento social es la medida estándar para la mitigación de la transmisión, así como la desinfección continua de los lugares de trabajo.

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Palabras Clave: Infecciones por coronavirus; salud laboral; síndrome respiratorio agudo grave; personal de salud; exposición profesional (*fuente: DeCS, BIREME*).

The SARS-CoV-2 pandemic poses significant challenges for public health in general and for occupational health in particular (1). The most widely used measure to avoid a rapid spread is social distancing (2), nonetheless, a wide range of jobs involve direct contact or physical proximity between people. Some occupations can be carried out at home, which significantly reduces the number of contacts (1). Health workers who provide general health care to sick individuals in hospitals and clinics are at increased risk of exposure to SARS-CoV-2. However, not only health workers can be affected, estimates indicate that between 40% and 70% of the world population could be infected (3).

The international emergency caused by the coronavirus outbreak poses enormous challenges to the first responders and health workers in the face of the pandemic (4). Protecting health and establishing safety conditions for these workers is essential, as is maintaining the greatest amount of human resources available to guarantee the continuity of health service provision in the midst of an emergency (5).

The International Labor Organization (ILO) has also proposed protecting workers. Its proposals include actions aimed at improving safety and health measures at work, promoting flexible forms of employment that include telework, preventing discrimination and exclusion of workers (6), ensure universal access to health for all, as well as expand access to benefits and sick leave (7).

METHODS

Methodological framework

The protocol for the development of the scoping review is taken from what is proposed by Arksey & O'Malley. Five steps are proposed for the development of this review: (I) definition of the question to be answered; (II) identification of studies; (III) selection of studies; (IV) charting the data; and, (V) synthesis of the information collected and its dissemination (8).

Research question

This review was conducted on the question: What aspects of occupational safety and health have been addressed in the context of the health emergency generated by COVID-19? The review seeks to synthesize the published literature on occupational health and its relationship with this disease.

Search strategy and sources

The search strategy was developed from the use of key terms: "industrial safety" OR "industrial hygiene" OR "occupational exposure" OR "occupational hazard" OR "occupational risk" OR "occupational safety" OR "occupational health" linked by the Boolean "AND" connector to the terms "COVID" OR "SARS-CoV-2" OR "novel coronavirus" OR "COVID-19" OR "severe acute respiratory syndrome coronavirus 2".

Searches were carried out in the databases: PubMed, Academic Search Complete, Science Direct, Medline, Scopus, Web of Science; additionally, a Google Scholar search was included with the terms in English, including the first 60 results ordered by relevance; a search with the terms in Spanish was carried out in this last source, including the 13 results obtained. More documents were obtained from other sources such as ILO, WHO, PAHO, and the snowball searching strategy was used in the references of the analyzed articles.

Citation management

The selected documents were imported to the bibliographic administrator Mendeley; duplicate citations were removed using the bibliographic manager tool. Other repeated citations were manually removed.

Selection criteria

The search was limited to the period 12/01/2019 until 04/09/2020. As inclusion criteria, the documents (articles, reports, letters to the editor, editorials, opinions and case reports) that addressed aspects related to occupational safety and health at the time of COVID-19 written in English, Spanish and Portuguese were considered; and as exclusion criteria articles that did not record simultaneous interaction of the two events.

Relevance of title and abstract

Each researcher independently reviewed the titles and abstracts of potentially eligible articles; letters, editorials and comments were reviewed in full text. The initial evaluation was carried out by three reviewers to exclude those articles that did not meet the inclusion criteria. A template was created in Excel MS where all the preliminary titles and summaries were related. To guarantee the reliability of the process, it was decided by consensus to select the articles that obtained three agreements. The Fleiss kappa calculation was performed using Excel MS and a value of 0.71 was obtained for the group of evaluators, considering it good according to Altman's interpretation (9).

Data analysis, summary, and synthesis of information

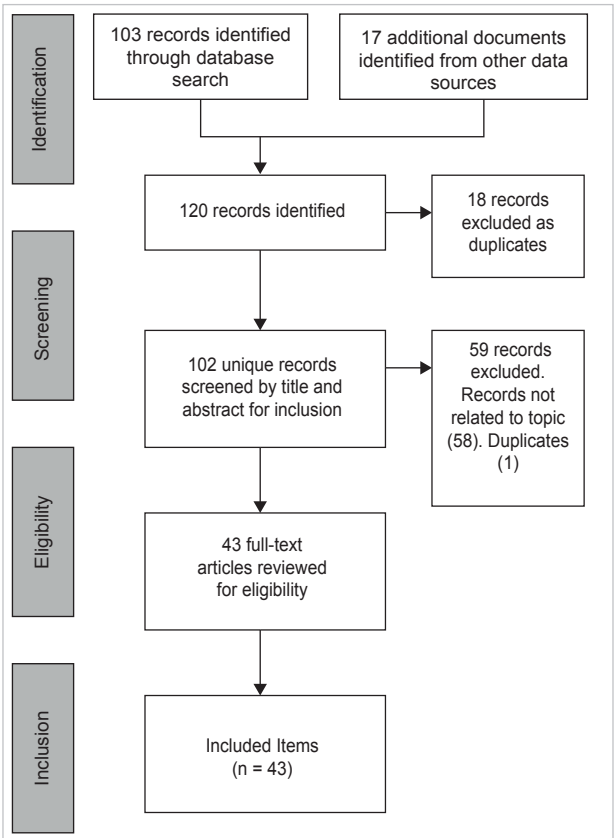
Once the relevant citations were obtained after the title and abstract screening stage, 43 complete articles were ob-

tained for a thorough review. At this stage, five reviewers established the relevance of the information, through the complete reading of the documents, none were excluded at this stage. The data was compiled into Word MS files for summarization in the emerging categories.

RESULTS

A total of 120 documents were identified from the search. They were imported into Mendeley and the duplicate files were removed resulting in 102 unique documents. After reading the title and abstract, 59 articles that did not meet the inclusion criteria or did not provide an answer to the asked question were discarded. Read in full text, none were excluded. The final review was made from 43 articles (Figure 1).

Figure 1. Prisma flowchart of study selection process



Occupational Health and COVID-19

Occupational exposure to SARS-CoV-2, while posing enormous challenges for multiple workers, pays special attention to healthcare workers. The review presented accounts for conditions and factors present in health workers especially, although it also includes brief aspects on other work activities.

Health Workers

Occupational exposure to SARS-CoV-2

Health workers are the first line of defense against SARS-CoV-2 and at the same time they are considered the highest risk occupational group (1,10-14). For example, activities related to chest kinesiotherapy maneuvers, inhalation therapy, cardiopulmonary resuscitation techniques with manual and mechanical ventilation; as well as bronchial hygiene through medical devices such as tracheal gold tubes and tracheotomies, pose a high risk of contagion (15,16). Aerosols produced during these maneuvers are also potentially dangerous for anesthesiologists (17,18).

Some procedures performed by otolaryngologists involve direct contact with the mucosa of the respiratory tract, and basic examination of the airways can induce coughing or sneezing in patients, which increases the possibility of SARS-CoV-2 infection by microdroplet inhalation.

Ophthalmologists are also at high risk due to direct and prolonged contact with patients. Although infection through the eye is still uncertain, ocular transmission of the virus may be likely given the presence of ACE2 receptors on the ocular surface and the ability of the virus to transport itself through the nasolacrimal ducts to the inferior meatus of the nose (13,19), therefore the use of eye protection is required for health workers in close contact with patients diagnosed with COVID-19 (20).

Another occupational group whose work involves direct contact with patients, and because of this they have high vulnerability to COVID-19, are nursing professionals. Therefore, it becomes pertinent to establish specific protocols for the reduction and control of infection during contact with confirmed or suspected patients (11).

Although WHO focused its initial strategy on managing person-to-person transmission of the virus, it later recognized that fomites also played an important role in the spread of SARS-CoV-2, particularly in the hospital setting; however, transmission via this route was unknown and initially underestimated (21).

COVID-19 in health workers

Since January 2020 in China, different institutions reported numbers of infections among health personnel. According to local reports from China, at the end of February, 22 health workers had died, and according to figures from the National Health Commission, in March more than 3,300 had been infected with COVID-19. This evidence indicated that 4% of the infections corresponded to health service workers (11,22-24). Furthermore, the increase in the number of cases in this occupational sector revealed the real magnitude of the pandemic and the initial difficulty in understanding the dynamics of the virus, which was exemplified in the Chinese Province of Hubei,

in which the outbreak arose, and where 88% of the cases of infected health professionals were located (25).

In turn, Italy recorded that 20% of health workers had been infected (23). In this country, initial reports indicated that more than 5,000 health workers were positive for coronavirus, and about 40 workers had died in the first weeks of the outbreak (1).

Regarding Colombia, on April 11, 2020, the first death of a doctor by COVID-19 was confirmed (26). As of April 28, a total of 5949 cases and 269 deaths in the general population was confirmed. The percentage of infected health workers compared to the general population was 7.0% (27).

Psychosocial factors and health workers

Psychosocial factors are highly important in the context of the COVID-19 crisis. In China, as the number of infections increased, panic grew in the population, the capacity of the clinics overflowed, and this situation prevented some confirmed or suspected patients from receiving timely treatment. Circumstances as such, caused that the health personnel in Wuhan hospitals manifested psychological problems, and that the risk of SARS-CoV-2 infection could cause high psychosocial stress in medical personnel (11,12).

The pressure on the health system implies that its workers require attention given the high levels of stress they may face (1). Likewise, the psychological response of health workers is of great importance regarding the defense effect against the epidemic.

Stress and fatigue in medical personnel is caused by long working hours, linked to strenuous demands prompted by a constantly changing practice scenario (28). Aspects that affect workers' mental health were identified in a representative sample of health professionals in China, such as symptoms of depression, anguish, insomnia and anxiety (29,30). In these circumstances, it is the duty of employers to inform workers of changes in the guidelines and practices of patient care, to reduce their anxiety (28).

Regarding the PPE, these generate tension in two forms. On one hand, not having good protection supplies is a source of stress in health workers (12,28). Another source of tension related to PPE is derived from the regular procedures to put on and take off those elements, a situation that generates constant fear in workers (22).

On the other hand, ethical dilemmas in the midst of care are also important for health workers. Workers are under an ever-increasing workload, high risk of occupational exposure, moral dilemmas, and other emotional factors (28). Surveys for health workers have revealed the presence of physical and mental exhaustion in healthcare personnel, as well as high levels of anxiety when they have to make difficult decisions at the time of triage, when they face the pain of losing a colleague or a patient (28), or for fear of passing the infection on to their own family (23).

An additional factor is violence on and off the job, which is a concern for health workers (28). Cases of violence against workers have been reported due to the anxiety and tension of the population, and in Latin America, most of the attacks reported have been directed at female nurses on the streets (31). These workers have been subjected to rejection and harassment by the population (32).

However, even though there has been evidence of stigmatization and rejection of health workers for fear of contagion, it is pertinent to highlight some actions by society. The community has also shown appreciation and admiration for health workers, to the point of being hailed as heroes in the fight against the disease (33).

Faced with the emotional and psychosocial demands of health workers, institutions must process their consequences (6). Health effects such as insomnia, exhaustion, depression, stigma, physical violence, and post-traumatic stress must be addressed (1,14). For example, members of the National Nurses United, expressed that workers who received frequent, updated and evidence-based information indicated less anxiety concerning their own health and that of their relatives and close ones (34).

Work organization

Health workers can face long working hours amid the outbreak crisis (25). Maintaining adequate work and rest schedules is important (11,14). The extension of the day has been associated with an increase in the risk of contagion in health personnel (25,35). Therefore, establishing schedules in the workplace can be essential to preserve human talent in health, in addition to rationalizing equipment, PPE, and reducing the physical and mental burden on workers. Continuous uninterrupted six-hour shifts can lead to pressure of physiological limits, being unable to go to the bathroom when using PPE in the isolation area (11).

Shift work and overlapping 1 hour allows, among other things, nurses to support each other in tasks that would require assistance, such as taking blood samples and giving injections to children, changing sheets or disinfect the terminal rooms (11).

Prevention and protection of health workers

The prevention measures to be adopted in the workplace are focused on physical distance, which represents a challenge for work processes that require proximity (33). However, distancing is not the only mechanism to prevent contagion in the workplace.

Health centers have adopted measures such as limiting the number of access doors, establishing control points for taking temperature, reducing the number of patients

per room, controlling the number of visits and restricting the number of times that patients leave the medical procedure room (19). Furthermore, the infection control system should include actions such as: preparation and distribution of materials, training on infection prevention measures, as well as the reorganization of departments and rooms (36,37).

Disinfection of rooms and sterilization of equipment is also important (38). Studies indicate that SARS-CoV-2 can be destroyed by applying ethyl alcohol solutions with a concentration between 62% and 71%, 0.5% hydrogen peroxide, or 0.1% sodium hypochlorite (17).

Amidst hospital settings, it is not possible to eliminate the source of transmission of the pathogen found in an infected person, therefore, the implementation of environmental controls becomes relevant. It is recommended that the facilities used have high-efficiency particulate air filters (HEPA), with negative pressure, and that the equipment have plastic covers to reduce the biological load on these surfaces (17).

As additional measures, health institutions should adopt teleworking and telemedicine organizational strategies to reduce the attendance of patients with comorbidities in the care centers and avoid overloading the hospital network (13,24,39). The reduction in the number of appointments, as well as the rescheduling of these, makes it possible to reduce the chance of infection. Similarly, health workers over 65 years of age may suspend outpatient activities (36). Particular attention is required by pregnant health workers, although there is no evidence of greater susceptibility in them, there may be a risk of restriction in the growth of the fetus; as well as premature delivery if the mother becomes seriously ill (40).

Personal protection equipment

The PPE have become essential supplies in health care centers (41,42). However, during the pandemic, a critical factor has to do with the shortage of PPE, even when medical personnel have priority (1,23,25). Healthcare personnel in many countries are waiting for protective equipment, even if they care for possibly infected patients, and in other cases, the protection elements they receive do not meet the expected requirements (22). The shortage of PPE at the start of the outbreak in China increased the spread of the disease among visitors, patients and health personnel (25).

The shortage has led to the development of processes that allow the useful life of N95 masks to be extended. This respiratory protection is key to the care of patients with COVID-19; therefore, it is imperative to equip workers with them (43).

On the other hand, training is essential as an administrative measure to avoid contagion (7,25). Workers must receive ongoing training and education on the correct way to use, withdraw, and discard PPE (11,13-15).

Additionally, the proper use of PPE can be altered when health workers feel exhausted or stressed. Despite their training, they may not be fully aware of their exposure when caring for patients. Therefore, an observation of medical personnel can be made through a computer or monitor in a separate area, or directly verify the correct placement and removal of PPE (11).

COVID-19 and workers from other productive sectors

Although health workers pay special attention due to their level of exposure and the need to keep an indispensable active workforce for global heath, other sectors of the economy also require preventive measures when presenting occupational exposure to SARS-CoV-2 (12).

In Thailand, the diagnosis of COVID-19 was reported in an exposed taxi driver when he transported a group of tourists from China (44). On February 11, 2020, the Singapore Ministry of Health confirmed 47 cases, of which 25 were transmitted locally. Of these 25, 17 were related to occupational exposure in tourism and hotel industry workers, construction workers, transportation, security and domestic workers (2,32). Cruise ship workers and flight crews are also exposed to the virus, as well as emergency responders such as firefighters and police (12).

Migrant workers are in a particularly vulnerable condition, due to difficulties in accessing health services (31), in addition to the loss of income associated with mandatory isolation measures imposed by governments (7). Therefore, it is necessary to ratify the International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families, in the search for global equity in access to health, improving existing systems in the face of future pandemics and disasters (7,45).

Extra-labor factors and individual conditions in the workforce, from communities with multiple deprivations, high population density, generalized poverty, malnutrition, high prevalence of HIV and tuberculosis, as well as non-communicable underlying diseases (diabetes, high blood pressure, cardiovascular problems, chronic respiratory disease and cancer), potentiate the risk of spreading COVID-19 in the workplace (33).

Psychosocial factors, meanwhile, are not unaware to other workers. In Hong Kong, for example, after a mandatory 33-day isolation (January 8th - March 2nd, 2020), during which more than 80% of organizations implemented measures such as work at home, stress levels in workers shot up in fear of infection as they resumed face-to-face work activities. In turn, prolonged telecommuting

can lead to health problems due to lack of interaction with peers in the workplace (12).

WHO established recommendations to deal with COVID-19 in the workplace; measures that should be considered before the economic reactivation on different countries after lifting the mandatory isolation or quarantine. Such measures include: frequent cleaning of workplaces, promotion of hand hygiene among workers and of a cough and sneeze label, teleworking or work at home, and the definition of an action plan when a positive case is presented in the workplace, which may include articulation with other employers in what constitutes a mutual aid plan (46,47).

In turn, the response of employers in the sectors of the economy that continue to function or that are reactivating must be based on three principles: I) the moral duty to provide workspaces that do not affect mental health, safety and the well-being of its workers, II) maintaining the well-being of workers is essential to ensure business continuity, productivity and thus its sustainability and profitability, and III) the legal obligation to control the hazards present in the workplace, which includes biological agents such as the new coronavirus (33).

The resumption of office work and the social activities inherent in these, without clear guidelines from national governments and responsible measures, may create a threat to a second wave of COVID-19 worldwide. Therefore, safety and health in the workplace and tripartite involvement (governments, employers and workers) is the key to long-term success in containing the pandemic.

Business preparation for COVID-19 should also focus on emergency response, since public and private entities must continue their production processes or provide their services; therefore, there must be an integration of the companies together with the governmental health contingency plan following the guidelines of the WHO and the ILO. Likewise, it is essential that all health professionals, including occupational health and safety professionals, participate in the development and implementation of recommendations for companies and their environments (6,48). The companies' occupational health team must carry out training on disease prevention, good hygiene practices, food provisioning, rest periods and report on family and psychological support (12,22).

DISCUSSION

The literature review showed an important interest in recording, in particular, the exposure and effects on health for health personnel. However, other groups of workers were also mentioned, albeit with little depth. The COVID-19 pandemic will have short and long-term effects on society, health systems, workplaces and people (1). This essentially means thinking about new approaches to safety and health at work and a strengthening of the importance and need for proper management that protects the health and life of individuals.

COVID-19 may be the first new occupational disease described in this decade. This will imply challenges for occupational safety and health in the medium and long term, not only for workers in the health sector but for a large number of occupations (32). The effect of the pandemic on the workforce will continue to intensify and impact the global health system and the health of health personnel due to the risk of infection (24). However, not only healthcare workers will be affected. Telework is presented as an opportunity to face the need for social distancing in other economic activities and will promote new dangers that workers in their homes will have to face.

Similarly, the effects of the economic crisis will aggravate the situation of vulnerable workers (31), such as informal workers and some migrant workers. Likewise, workers with less qualified, poorly paid, precarious jobs will also feel more strongly the impact of the pandemic. Loss of employment, even temporarily, will also affect workers (12). The inequalities and vulnerability of millions of workers can generate an exacerbated deterioration of mental health, as well as expand the number of individuals in precarious jobs.

Workers at risk must have the full support of the health system, in addition to the support of society (32). Strictly applied social distancing measures will contribute to a reduction in the spread of the virus and will allow maintaining an optimal response from the health system and an adequate burden for the personnel responsible for caring for people.

It is of utmost importance to pay attention to the psychological tolerance of health workers, particularly those who are in the first line of care. Due to the pandemic, healthcare systems are and will be operating for longer at a maximum capacity, and healthcare workers cannot be at a 100% for long periods of time compared to wards or equipment (23).

It will be necessary to accelerate research processes on the exposure and health effects of COVID-19, both in health workers and other workers at risk of infection (12). Although the crisis affects the entire population, it is necessary to collect, manage and analyze data on the particular risks for workers in their workplaces ♣

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