

## Review

# The risks encountered by healthcare professionals in the global COVID-19 outbreak: the importance of protection

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## Abstract

The Novel Coronavirus Disease (COVID-19), which started on the 31<sup>st</sup> of December 2019, with the notification of cases of unknown pneumonia in Wuhan City, Hubei Province, China, was declared as a pandemic in order to increase the general protective measures in terms of its spreading rate and its effect on human health, and entered the group of pandemic diseases in history. COVID-19 infected 25 million people in about 220 countries during this 8-month period, and it became the 21<sup>st</sup> century's most life-threatening epidemic, being responsible for the death of 852.758 people (at the time of writing). The number of infected medical personnel in the COVID-19 outbreak is unprecedented in modern history due to the high amount of data (10%) that only includes this 4-month period. Problems such as the healthcare professionals being at the forefront of the fight against the epidemic, a lot of uncertainty at the beginning of the epidemic and the intense stress created by it, delay of measures to be taken, problems in the implementation of these measures, intense working hours, lack of information and lack of equipment are some of these risks. It is very important for healthcare professionals to protect their own health principally in order to fight this epidemic. This review has been prepared to draw attention to the risks faced by healthcare professionals in the COVID-19 outbreak, the repercussions of the infection, and to highlight the protection of healthcare professionals from infection.

**Keywords:** COVID-19, healthcare workers, risk, protective factors

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# **Küresel COVID-19 salgınında sağlık profesyonellerinin karşılaştığı riskler; korunmanın önemi**

## **Öz**

Çin'in Hubei Eyaleti, Wuhan Şehrinde, 31 Aralık 2019'da etiyolojisi bilinmeyen pnömoni vakaları bildirimini ile başlayan Yeni Koronavirüs Hastalığı (COVID-19), yayılma hızına ve insan sağlığı üzerindeki etkisine bakıldığında genel çapta koruyucu önlemlerin artırılmasını sağlamak amacıyla pandemi ilan edilerek, tarihteki pandemi yapan hastalıklar grubuna girdi. COVID-19, aradan geçen bu 8 aylık süre zarfında yaklaşık 220 ülkede 25 milyon insanı enfekte etti ve 852.758 insanın ölümünden sorumlu olarak 21. yy en çok can kaybına yol açan salgın hastalığı oldu. COVID-19 salgınındaki enfekte olmuş tıbbi personel sayısı, sadece bu 4 aylık süreyi içeren verinin (%10) yüksekliği nedeniyle, modern tarihte benzersizdir. Sağlık uzmanlarının salgınla mücadelede ön planda olmaları, salgının başlangıcında çok fazla belirsizlik ve bunun yarattığı yoğun stres, alınacak önlemlerin gecikmesi, bu önlemlerin uygulanmasındaki sorunlar, yoğun çalışma saatleri, bilgi eksikliği ve ekipman eksikliği bu risklerden bazılarıdır. Sağlık çalışanlarının öncelikle kendi sağlıklarını korumaları bu salgınla mücadele çok önemlidir. Bu derleme, COVID-19 salgınında sağlık profesyonellerinin karşılaştığı risklere, enfeksiyonun yansımalarına dikkat çekmek ve sağlık çalışanlarının enfeksiyondan korunmasını vurgulamak için hazırlanmıştır.

**Anahtar kelimeler:** COVID-19, sağlık çalışanları, risk, koruyucu faktörler

## **Introduction**

SARS-CoV emerged in 2003 as the first international emergency health condition of the 21st century. 10 years after this epidemic, MERS-CoV emerged in September 2012. These outbreaks have infected thousands of people. They have been responsible for the deaths of hundreds of people, and have been taken under control without spreading around the world. On December 31, 2019, the World Health Organization (WHO) China Country Office reported pneumonia cases of unknown etiology in Wuhan, China. On January 7, 2020, a new Coronavirus, previously unknown in humans, was identified as COVID-19. Later, the name of 2019-nCoV disease was accepted as COVID-19, the virus was named as SARS-CoV-2 due to its close resemblance to SARS CoV.<sup>1</sup> WHO Secretary General Tedros Adhanom Ghebreyesus, who held the press conference for the first time on COVID-19 disease in China on December 31, 2019, announced that 118 thousand cases were seen in 114 countries and 4

thousand 291 people died as of March 11. WHO reported that COVID-19 was declared a pandemic disease due to the speed of virus spread, its severity, and the lack of necessary precautions.<sup>2</sup> According to the WHO, COVID-19 Status Report of 2 September 2020, a total of 25.602.625 cases of 852.758 deaths were made worldwide.<sup>3</sup>

According to data published on the 2<sup>nd</sup> of September 2020 by the Turkish Ministry of Health, the first COVID-19 positive patient was detected in Turkey on the 11<sup>th</sup> of March. In a short time, this number rose to 273.301 cases and 6.462 deaths.<sup>4</sup>

In this global epidemic, healthcare professionals face different risks due to the nature of their work. According to the Occupational Health and Safety (OHS) Law No. 6331, hospitals are in a very dangerous class due to the excess of risks inherent to the provision of health services.<sup>5</sup>

Healthcare professionals play a central and critical role in the treatment and

care of COVID-19 suspected cases. To ensure that they work in a healthy and safe environment is extremely important not only for them, but also for the patients they care for, their families and society. During the COVID-19 outbreak, healthcare professionals face biological, chemical, physical, mental and environmental challenges. Accordingly, it is imperative to increase the awareness of healthcare professionals on these issues by ensuring occupational health and safety.

## **General Information About COVID-19**

### *1. Coronavirus*

Coronaviruses (CoV) are a large family of viruses that can lead to the occurrence of serious epidemic infection, which are more important than their mild infection symptoms such as the common cold in the community (e.g. Severe Acute Respiratory Syndrome (SARS) in 2003 and Middle East Respiratory Syndrome (MERS) in 2012<sup>1</sup>). The virus responsible for COVID-19 is located under the Sarbecovirus subspecies in the genus Betacoronavirus, which also contains SARS-CoV and MERS-CoV. New nomenclature of the virus has been considered as SARS-CoV-2.<sup>1</sup>

### *2. Epidemiology*

Cases of pneumonia of unknown etiology were reported on December 31, 2019 in Wuhan City, Hubei Province, China. On January 7, 2020, it was identified as a new Coronavirus that had not been previously detected in humans. After the initial reports, the number of infected cases increased rapidly worldwide. Worryingly, the virus has disproportionately affected health personnel working on the front lines. The virus has spread rapidly due to the human-to-human transmission feature. The first importer case detected was a 61-year-old Chinese woman reported from Thailand on January 13, 2020. While the number of countries reporting cases has gradually increased over the past period, countries with domestic contamination have emerged in the last weeks of February.<sup>1</sup>

While the number of cases detected in China as of the first weeks of March has

decreased, COVID-19 cases and related deaths increase rapidly in countries such as USA, Spain, Italy, Germany, France, and Iran.

According to WHO's April 26 COVID-19 report, 2,804,796 cases and 193,710 deaths were reported worldwide.<sup>3</sup> The first COVID-19 case in our country was detected on the 11<sup>th</sup> of March 2020<sup>1</sup>, and according to the Turkish Ministry of Health, 273.301 cases and 6.462 deaths were reported to WHO as of September 2, 2020 in Turkey.<sup>4</sup>

### *3. Origin and Contagion*

While the original source of the virus remains uncertain, available data suggests that the origin may be the wild animals sold in the Huanan Seafood Wholesale Market. The disease is transmitted mainly through droplets produced by sick individuals through coughing and sneezing, as well as contact with infected surfaces.<sup>1</sup> When the epidemiological characteristics of the cases in China were examined, it was observed that the average incubation period was 5-6 days, with a possible range between 2 to 14 days. The infectious time of COVID-19 is not exactly known. It is thought that it starts 1-2 days before the symptomatic period and ends with the disappearance of the symptoms. Coronaviruses are generally viruses that are not very resistant to the external environment. Today, the exact contamination time and the duration of the virus' survival time in the external environment are unknown.<sup>1</sup>

### *4. Clinical Features*

Common symptoms of infection are respiratory symptoms, fever, cough, and dyspnea. In more serious cases, pneumonia, severe acute respiratory infection, kidney failure, and even death may develop.<sup>1</sup> The fatality rate was 9.6% in the SARS outbreak<sup>6</sup>, and 34% in MERS-CoV<sup>7</sup>, while SARS-COV2 fatality rate was reported as 7% according to WHO's April 26 COVID-19 report.<sup>3</sup>

### *5. Treatment and Vaccination*

Currently, there are no specific treatments or vaccines for COVID-19 which have been proven safe and effective. Treatments are directed to symptoms.<sup>1</sup>

**6. Evaluation of the Contacting Healthcare Professionals**

Those who are most at risk of getting this disease are those who are in contact with patients or who take care of the patients. Therefore, healthcare professionals who care for these patients are at high risk for this

infection, and protection of healthcare professionals is considered one of the top priorities.<sup>1</sup> Assessment of Healthcare Professionals' Contact Status with COVID-19 Patient is shown in Table 1.

Table 1. Assessment of Healthcare Professional's Contact Status with COVID-19 Patient

	<b>Healthcare Professional's Use of Personal Protective Equipment (PPE)</b>	<b>Contact Risk</b>
<b>Medical (Surgery) Wearing a mask Intense contact with the COVID-19 patient</b>	No PPE Used	Medium
	Did not use a medical mask or N95 or use a medical mask in case of an N95 indication	Medium
	No eye protection	Low
	No gloves or apron used	Low
	PPE is used appropriately	Cannot be considered risky
<b>Medical mask not worn Intense contact with the COVID-19 patient</b>	No PPE Used	High
	No medical mask or N95 used	High
	Use of a medical mask in case of N 95 indication	Medium
	No eye protection	Medium
	No gloves or apron used	Low
	PPE is used appropriately	Cannot be considered risky

*(Turkish Ministry of Health. General Directorate of Public Health. COVID-19 Guide Scientific Committee Study)*

In addition, short speeches at the triage desk, short-term entrances to the patient room without contact with the patient, and entry to the patient's room who is discharged are not considered risky. The healthcare worker who accompanies the patient during walking, does not come in contact with the patient's excreta, and who does not enter the patient room is not considered at risk. There is no risk of contact in healthcare workers who do not directly contact the patient, do not enter the rooms where the patient is actively treated, and comply with routine safety measures.<sup>1</sup>

Intense contact with COVID-19 patients takes place during respiratory tract sampling, intubation, aspiration of respiratory secretions, non-invasive

ventilation, during high flow oxygen therapy, cardiopulmonary resuscitation, nebulizer use, endoscopic procedures, bronchoscopy, videosingoscopy, dentistry applications, mouth-throat-nose examination, ophthalmological examinations, and central catheter insertion.<sup>1</sup>

**Risks for health care professionals**

Although the risk factors that threaten the occupational health and safety of healthcare workers are different for each health institution, there are biological, chemical, psychological, physical and environmental, mechanical and biomechanical risk factors that threaten the healthy and safe working

environment in general.<sup>8</sup> These risk factors are shown in Table 2.

### *Reflections of Outbreaks on Healthcare Professionals*

While there are a total of 8096 cases and 774 deaths (9.6% mortality) associated with SARS reported worldwide by WHO between November 1, 2002 and July 31, 2003, 21% of these cases (1706 people) were healthcare professionals.<sup>6</sup> On the other hand, in the MERS epidemic that emerged in 2012, 2519 cases and 866 deaths (34% mortality rate) related to MERS, which have been approved by 27 country laboratories worldwide, have been reported to WHO. The majority of these incidents have been reported from Saudi Arabia (2121 cases related to MERS, 788 deaths, 37.1% case death rate), and 19.1% (405 people) of MERS cases in Saudi Arabia were healthcare professionals.<sup>7</sup>

As it is seen, in the previous coronavirus outbreaks, the average of 20% of the cases consisted of healthcare professionals serving the society. Healthcare professionals and nurses experience emotional stress due to the combination of stressful work, sleep deprivation, freedom of liberty, heavy responsibility and a high degree of cooperation in the fight against infectious diseases.<sup>9-11</sup> Healthcare professionals are vulnerable to many occupational risks. Nurses working with SARS patients have been reported to experience a lot of emotional stress<sup>12</sup> and psychological distress related to their work<sup>13</sup>. Studies have shown that during the epidemic, healthcare workers have a negative attitude towards treatment and avoid looking after patients.<sup>14,15,16,17</sup> In Singapore, 49% of healthcare professionals experienced social stigma due to their jobs during the SARS outbreak.<sup>18</sup>

As of early March, the Chinese National Health Commission, including Dr. Li Wenliang, the Chinese ophthalmologist who announced to the world the next generation of coronavirus, stated that more than 3,300 healthcare workers across the country were infected, and at least 22 health personnel died in February.<sup>19</sup>

In Italy, which became the center of the epidemic after China, as of 24 August 2020, 257,834 cases of COVID-19 and 35,901 deaths were reported. It is reported that approximately 12% (30,526 cases) of these cases were healthcare professionals<sup>20</sup> and 20% of healthcare professionals in the Lombardy region of Italy were infected and some are dead.<sup>21</sup> In Spain, in the latest COVID-19 case report from the Ministry of Health, 16% of COVID-19 cases were healthcare professionals.<sup>22</sup> In a study conducted in the Netherlands, the test of 6% of working health professionals was positive.<sup>23</sup> In Asia and the Pacific region, it was reported that at least 35 doctors died due to reasons related to COVID-19, 3,505 healthcare workers had positive test results and 789 suspected medical personnel were under 14-day quarantine.<sup>24</sup>

In a statement made after the COVID-19 Science Board meeting on April 1, 2020, Fahrettin Koca, Minister of Health of the Republic of Turkey, stated that 15 679 positive cases and 277 related deaths occurred in Turkey. He reported that approximately 4% (601 cases) of the cases were made up of health personnel.<sup>25</sup> While the epidemic process is continuing, in the statement made by the Istanbul Chamber of Physicians on 08.04.2020, it was stated that the number of medical personnel infected with SARS-CoV-2 in Istanbul city exceeded 1.000 and that the medical personnel were at great risk due to the lack of equipment.<sup>26</sup> In the press release of the Minister of Health on September 2, 2020, he stated that 10.1% (29,865 cases) of 273,301 cases related to COVID-19 comprised healthcare personnel and 52 healthcare workers died from COVID-19 disease.<sup>27</sup> There is an increase of 6.1% in the case rates expressed between April 1 and September 2.

Many healthcare professionals have been infected with SARSCoV-2. Main reasons for this are the lack of Personal Protective Equipment (PPE) and lack of training for infection prevention and control.<sup>28</sup> In a study conducted in the early days of the epidemic in Hubei province of China, it was reported that healthcare professionals experienced high levels of depression, anxiety, insomnia and distress.<sup>29</sup> Frontline nurses in the

Philippines have been observed to perceive moderate personal resilience and moderate social and organizational support during the COVID-19 pandemic.<sup>30</sup> During the epidemic period, working in the care of a COVID-19 patient<sup>31</sup> and living in Hubei state were observed to be risk factors for anxiety, stress

and psychological disorders.<sup>32</sup> During the COVID-19 epidemic, in the study conducted on healthcare professionals in Singapore and India, most of the participants reported that they experienced depression, anxiety and stress.<sup>33</sup>

Table 2. Risk Factors in Healthcare Institutions

<b>Risk Class</b>	<b>Risk Definition</b>	<b>Risk Examples for Healthcare Institutions</b>
Biological	Infections / biological agents, bacteria, viruses, fungi, parasites, infectious body fluids	Factors such as HIV, Hepatitis B, Hepatitis C viruses and tuberculosis
Chemical	Various chemicals, solutions, and drugs that poison or irritate the body system	Formaldehyde, gluteraldehyde, dangerous drugs (Cytotoxic agents), ethylene oxide, used anesthetic gases, pentamidine ribavirin
Psychological	When a person is faced with situations or factors that create stress, emotional strain, or other interpersonal problems in matters related to their job or working environment	Work stress, workplace violence, shift work, inadequate personnel, heavy workload and prolonged patients' average recovery time
Physical	Agents that cause tissue injuries in the work environment	Radiation, laser, noise, electricity, very cold or very hot weather, violence at work
Environmental, Mechanical and Biomechanical	Factors causing possible accidents and injuries or distress in the work environment	Stumbling risks, unsafe / negligent equipment, air quality, slippery floors, unsafe areas, irregular or obstacle-free working areas, passageways, improper body postures (posture disorders), vibration, very hot or very cold weather, constantly moving or constantly operating, lifting and moving patients

*(Kahn A. P. The Encyclopedia of Work-Related Illnesses, Injuries, And Health Issues, New York: Facts on file. 2004)*

In a case series of 138 patients treated in a hospital in Wuhan, 40 patients (29% of cases) were healthcare professionals. Of the affected employees, 31 (77.5%) were working in the general services, 7 (17.5%) in the emergency room and 2 (5%) in the intensive care unit.<sup>34</sup> It was

stated that healthcare professionals working at the center of the epidemic were faced with the fear of infection.

In addition, healthcare professionals experienced stress, burnout, grief and weakness in the face of long hours of intense

working conditions, the pain of patients and sudden loss of life.<sup>35</sup>

Due to problems such as healthcare professionals being at the forefront of combating the epidemic, delayed precautions and implementation of measures, intense work, lack of information and equipment, and use of common rest area for healthcare professionals, an average of 20% of cases in the previous coronavirus outbreaks, and an average of 10% of cases in the COVID-19 outbreak are healthcare professionals. In Organization for Economic Development and Cooperation (OECD) countries, according to 2018 data, 8 nurses and 3.3 doctors provide services to every 1000 people. In Turkey 2.1 nurses and 1.9 doctors provide services to every 1000 people.<sup>36</sup> When we evaluate the current figures, the burden of healthcare professionals in Turkey is much greater compared to other OECD countries. The rapid spread of COVID-19 poses a great threat to human life and health, due to strong contamination, fatality in severe cases, and no specific treatments. It also has a huge impact on the mental health of the people and causes different degrees of emotional problems in society.<sup>37</sup>

In the COVID-19 (SARS-CoV-2) outbreak, the number of infected medical staff has never been seen in modern history. In addition to physical stress, medical personnel face huge mental burdens. The health sector, including 27.9 million nurses<sup>38</sup> and other healthcare professionals, which constitute 59% of the health workforce globally, is the backbone of community defense to save lives and limit the spread of emerging diseases. Healthcare professionals are at the forefront of the COVID-19 outbreak intervention and are therefore exposed to hazards that put them at risk of infection. Hazards include pathogen exposure, long working hours, psychological distress, fatigue, professional burnout, stigma, and physical and psychological violence.<sup>39</sup>

*Causes of high rates of infection in healthcare professionals:*

-At the beginning of the epidemic, healthcare professionals did not understand the infection factors well and were unaware of

the importance of personal protection.<sup>28</sup> In countries that are relatively late to see the infection as in Turkey, it may be an advantage to be informed by scientific posts from other countries.

-Long-term exposure to large scale infected patients directly increased the risk of healthcare professionals becoming infected.<sup>28</sup> The high proportion of patients per medical staff and busy working hours may have prepared the ground for such epidemics.

-The increase in the need for emergency first aid in different areas of the country has increased the need for personal protective equipment for healthcare workers. Lack of personal protective equipment also increased the risk of infection among healthcare workers.<sup>28</sup>

-The healthcare professionals who encountered patients other than infectious disease specialists were not knowledgeable in the field of infection prevention and control.<sup>28</sup> Republican era of health personnel trained in Turkey indicate work intensively with a sense of ethics and responsibility. Although this devoted work provided low mortality rates, these mortality rates could have been even lower by administrative measures.

*What Health Care Professionals Should Do to Increase Their Psychological Resilience in Combating the COVID-19 Outbreak?*

In the face of the risks imposed on care professionals by the epidemic conditions, these workers must maintain their professional duties and provide care in the face great personal and professional challenges. A strong performance is required to manage these adverse conditions by healthcare professionals. At this point, it is important to increase the resilience of healthcare professionals to psychological problems.<sup>40</sup>

The strategies of health care professionals to improve resilience are as follows<sup>41-46</sup>;

- Observe a work and life balance during the epidemic,

- Follow sleep patterns, nutrition and exercise programs,
- Strive to rest whenever possible, and observe feelings of hunger and thirst,
- Accept help among social groups when needed,
- Practices such as writing, meditation and yoga should be tried to strengthen psychological endurance,
- Pay attention to spiritual needs and be aware of business and personal goals without neglecting self-care,
- Take an active role in relationships with family and friends,
- Do not avoid problems and try to approach issues with a solution-oriented, positive perspective,
- Despite very painful events, individuals should attempt to maintain positive expectations for life.

Among the recommendations of the US Center for Disease Control and Prevention to increase resilience are; eating adequate amounts of health-beneficial foods, exercising at regular intervals, getting enough daily sleep, avoiding addictive alcohol and drugs, avoiding information pollution and positive thinking about COVID-19 in the media.<sup>46</sup>

*The measures that the World Health Organization (WHO) should take to protect healthcare professionals from infection in combating the COVID-19 epidemic*

The central role played by WHO in global coordination is very important. National intervention strategy changes in many countries. These strategies are gathered in the title of contact tracing and self-isolation or quarantine procedures. It includes the promotion of public health measures, including hand washing, respiratory etiquette and social removal. It includes the preparation of health systems to prevent the increase of severe diseases requiring isolation, oxygen and mechanical ventilation. It includes strengthening infection prevention and control in health facilities with special attention to nursing home facilities and postponing or canceling large-

scale public meetings.<sup>47,48</sup> WHO continues to support countries in their epidemiological research by providing clear and comprehensive protocols to achieve these goals.

*WHO has prepared the following in its guidelines to help maintain Primary Health Care during the COVID-19 epidemic:*

WHO has prepared a disease commodity package that contains an important list of biomedical equipment, medicines, and supplies needed to care for COVID-19 patients. This package includes gloves, gowns, medical masks, surgical masks (at least n95), face protectors, glasses, liquid soap, and alcohol-based hand antiseptic.<sup>47,48</sup>

Healthcare professionals should pay attention to hand hygiene before and after contact with the patient. For this purpose, soap and water or alcohol based hand antiseptics can be used. If the hands are noticeably dirty, soap with water should be used instead of hand antiseptics. Healthcare professionals should wear gloves, isolation gowns, goggles or face protection and medical masks during treatment and personal care.<sup>49</sup>

Healthcare professionals should use personal protective materials when entering the room of patients who are under treatment for noninvasive or invasive respiratory support. These are gloves, gowns (non-sterile, preferably liquid impermeable and long sleeve), medical mask, at least N95 / FFP2 mask, face shield, goggles or face shield.<sup>47-49</sup>

Healthcare professionals should apply standard infection prevention and control measures in health institutions for rapid identification, diagnosis and management of cases, identification and monitoring of contacts, prevention and control of infection in health care. In addition, the application of contact and droplet protection measures should be continued until the patient becomes asymptomatic. Leading healthcare professionals in isolation areas must first pass the Nucleic Acid Amplification (NAT) test, a diagnostic technique used to detect viruses or bacteria for SARS-CoV-2 when



they finish their work in isolation and return to normal life.<sup>47-49</sup>

### *Conclusion and recommendations*

Although it is necessary to identify and isolate cases quickly to stop the spread of the disease, the most important measures will be self-measures by increasing the awareness of individuals. It is also very important that healthcare professionals protect their health first and then inform the people, their families and society about the measures to be taken. During the epidemic, healthcare professionals often neglect the emotional and physical needs of themselves and their families, while dealing with the care and treatment of suspected or definitively diagnosed cases.

Establishing and activating the psychological counseling and social support systems for health professionals will have beneficial results for patients, other healthcare professionals, healthcare institutions and the country. Considering the roles that healthcare professionals assume in the provision of health services in this period, it becomes evident that creating healthy and safe working conditions for healthcare professionals is a priority.

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