



Preventive actions to minimizing the coronavirus disease 19 (COVID-19) transmissions among health workers: a systematic review

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ABSTRACT

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On mid February 2020, the World Health Organization declared an outbreak of a new type of respiratory disease originated from Wuhan, China, which was identified as coronavirus disease 19 (COVID-19). After a long-standing status of COVID-19-free, on March 2nd, 2020, Indonesia finally broke its first cases. This study aimed to systematically review preventive actions to minimizing the COVID-19 transmissions among health workers. The articles were selected from Google Scholar, World Cat, PROQUEST, PUBMED journal databases published from January to April 2020. The keywords for this review included “COVID-19” or “Corona” and “health behavior” or “health promotion” or “wash hands” or “health workers”. A total of 2,809 articles generated from the databases, the authors identified seven articles of preventing the COVID-19 virus outbreak among the health care workers in the world around 2019-2020. The studies reported that health care workers tried to prevent the COVID-19 transmission by doing social distancing, using the right personal protective equipment (PPE), handwashing, screening for in-person visit, and telemedicine. Health care workers have additional responsibility of protecting the patients and their self. Some issues may be unique to different health care workers departments, the majority of challenges faced by health care workers globally are similar.

ABSTRAK

Pada pertengahan Februari 2020, Organisasi Kesehatan Dunia mendeklarasikan wabah penyakit pernapasan jenis baru yang berasal dari Wuhan, Cina, yang diidentifikasi sebagai *coronavirus disease 19* (COVID-19). Setelah berstatus bebas COVID-19, pada 2 Maret 2020, Indonesia akhirnya mengumumkan kasus pertamanya. Penelitian ini bertujuan secara sistematis mengkaji tindakan pencegahan untuk meminimalkan penularan COVID-19 di antara tenaga kesehatan. Artikel-artikel yang digunakan dipilih dari database jurnal Google Scholar, World Cat, PROQUEST, PUBMED yang diterbitkan dari Januari hingga April 2020. Kata kunci untuk penelitian ini meliputi “COVID-19” atau “Corona” dan “perilaku kesehatan” atau “promosi kesehatan” atau “cuci tangan” atau “petugas kesehatan”. Sebanyak 2.809 artikel dihasilkan dari pencarian awal, penulis mengidentifikasi tujuh artikel untuk mencegah berjangkitnya virus COVID-19 di antara petugas perawatan kesehatan di dunia sekitar tahun 2019-2020. Penelitian melaporkan bahwa petugas layanan kesehatan berusaha mencegah penularan COVID-19 dengan melakukan jarak sosial, menggunakan alat pelindung diri (APD) yang tepat, mencuci tangan, skrining untuk kunjungan, dan *telemedicine*. Petugas kesehatan memiliki tanggung jawab tambahan untuk melindungi pasien dan diri mereka sendiri. Beberapa masalah dapat terjadi secara khas pada instansi pelayanan keesehatan tenaga kesehatan yang berbeda, namun sebagian besar tantangan yang dihadapi oleh petugas kesehatan secara global adalah sama.

Keywords:

COVID-19;
corona;
health behavior;
health promotion;
health workers;

INTRODUCTION

On mid-February 2020, the World Health Organization (WHO) declared an outbreak of a new type of respiratory disease originated from Wuhan, China. The outbreak allegedly started on December 2019 and was immediately considered a public health emergency of international concern after the pandemic took a toll of more than 200,000 infected cases around the world in less than three months and doubled in less than

two weeks. On February 11th, the WHO defined the virus as a new coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that caused coronavirus disease 19 (COVID-19). As per April, the confirmed cases have reached 3.19 million worldwide.¹ As of May 5th, 2020, a total of 3.517.345 people have been reported confirmed for COVID-19 globally. Among these, there have been 243.401 deaths reported due to COVID-19.

TABLE 1. Situation in number by WHO Region

Region	Total cases (new cases in last 24 hours)	Total death (new death in last 24 hours)
Globally	3,517,345 (81,454)	243,401 (3,797)
Africa	32,570 (43,691)	1,112 (27)
Americas	1,477,447 (43,691)	79,590 (1,763)
Eastern Mediterranean	213,376 (7,077)	8,115 (144)
Europe	1,566,684 (22,539)	145,602 (1,615)
South-East Asia	72,688 (5,015)	2,682 (219)
Western Pacific	153,686 (1,096)	6,287 (29)

Source: National authorities by 10:00 CEST, May 5th, 2020

COVID-19 or medically identified as 2019-nCoV belongs to a similar viral group as two deadly known respiratory viruses i.e. Middle East respiratory syndrome (MERS) and SARS-CoV-1 (SARS). These viruses share similar pathogenesis and are zoonotic (live in both human and animal hosts). There are seven strands of coronaviruses known to inhabit humans. Scientists believe that said virus transmits from human to human via respiratory droplets which often deposited on to non-living surfaces considering the route of transmission, WHO recommends frequent hand and surfaces sanitizing with antiseptic products as well as individual distancing on the minimum of <2m (six feet). To date, existing medications or vaccines are yet to be acknowledged to treat or prevent COVID-19. Therefore, the

implementation of preventive actions is necessary to withstand its further spread.²

After a long-standing status of COVID-19-free, on March 2nd, 2020, Indonesia finally broke its first cases.³ By March 31st, 2020, there have been 1,528 confirmed COVID-19 cases in Indonesia and 136 deaths related to the disease. The nation's case fatality rate (CFR) is also much higher than that of People's Republic of China (8.9% vs 4%). The attempt to understand the virus and invent the vaccine has been rigorous. Medical experts have examined histopathologic pattern for the virus structures and the immune system cells by autopsying specimens from the heart, lung, kidney, liver, stomach, intestine, thyroid, pancreas, bone marrow, spleen, and skin. Changes of the heart, liver,

kidney, and vascular system were shown in the infection, although specific skin changes were not discussed. Mucous membranes such as mouth, nose, trachea and lungs have been identified as the most typical entry for the infection, though eyelids and optic canal have the lowest risk of transmission. Nevertheless, it does not rule out the possibility of skin-transmitted infection occurred by iatrogenic or medical treatment contraction.¹

Without legitimate information, this fundamental pursuit of media sources

shows that 486 HCPs with an average age (SD) of 59 years have died from COVID-19 (TABLE 2), equal to an expected loss of life of 0.36% of HCPs comparative with all enlisted COVID-19 deaths in the world. Because of constrained information and conceivable underreporting, the genuine size of deaths among HCPs stays obscure. As portrayed in the table, there is a tremendous hole between the most noteworthy detailed loss of life among HCPs in the Philippines (7.16%) and the lowest in France (0.11%).⁴

TABLE 2. Data on COVID-19 deaths in most affected countries with more than 10 HCP mortality

Country	Total mortality	Mortality of HCP	HCP's death toll (%)	Death of report
Italy	21,645	120	0.55	April 7, 2020 ^a
Iran	4,777	95	1.99	April 16, 2020
USA	26,047	66	0.25	April 15, 2020 ^b
UK	12,107	41	0.34	April 14, 2020 ^c
Spain	14,792	26	0.18	April 8, 2020 ^d
Philippines	335	24	7.16	April 15, 2020 ^b
China	1,665	22	1.32	February 15, 2020 ^e
Indonesia	459	17	3.70	April 15, 2020 ^b
Brazil	1,532	17	1.11	April 15, 2020 ^b
France	13,197	15	0.11	April 15, 2020 ^f

^ahttps://edition.cnn.com/world/live-news/coronavirus-pandemic-04-07-20/h_b7583ec9fa05d053f6faca9b164817eb; ^bhttps://www.medscape.com/viewarticle/927976#vp_1; ^c<https://www.telegraph.co.uk/news/0/nhs-workers-died-coronavirus-frontlinevictims/>; ^dhttps://cadenaser.com/ser/2020/04/08/sociedad/1586325379_363621.html; ^ewww.businessinsider.com/why-coronavirus-killed-young-chinese-doctors-2020-2; ^f<https://www.20.minutes.fr/sante/2758699-20200410-coronavirus-parmivictimes-COVID-19-france-professionnels-sante-paient-lourd-tribu>

On April 18th, 2020, the Indonesian Doctors Association declared that the country's death toll from COVID-19 has possibly reached 1,000, almost double the respectable figures of 535 disclosed. This number continues to increase, on April 23rd, the Government of Indonesia published that 7,775 persons infected COVID-19, 647 died and 960 recovered from COVID-19, throughout all 34 provinces (WHO, 2020). If use the percentage of health workers coming

from Malaysia to the United States 5.8%, it is estimated that in Indonesia on 6 May, this means that 721 to 2,488 health workers have been infected. This number might be higher if the records are recorded properly.⁵

It is essential that governments see health workers not just as pawns to be sent, however as human people. In the worldwide reaction, the security of health workers must be guaranteed. While institutional guidelines for

restarting in man or woman activities will vary, institutions surveyed constantly said implementation of personal protective equipment (PPE) standards, social distancing approaches, plans to transform the consent method and evaluations to tele-/video/online administration where conceivable, as well as sanitization procedures.⁶

Presently, healthcare workers are the most vulnerable in the emerging threats. As the front line of the COVID-19 outbreak response, healthcare workers and their family are at risk of infection. To prevent exposing others to health and safety risks, health workers follow strict safety and health procedures that entail long working hours, fatigue, and psychological distress, adding to the hazards. The utilization of safety equipment such as eye protection, N95 or FFP3 masks, gowns and gloves is of utmost importance as a precaution to pathogen transmission.¹³ Now, every healthcare worker is expected to self-monitor for signs of illness and self-isolate to protect themselves and loved ones against the severe and imminent danger of COVID-19 transmission.¹⁴

MATERIALS AND METHODS

Study design

This systematic review was based on the preferred reporting items for systematic reviews and PRISMA guidelines.⁷ The study was conducted from March to April 2020. A systematic review was carried out by searching for articles from Google Scholar, World Cat, PROQUEST, ScienceDirect, and PUBMED. Keywords to search for this article include: “COVID-19” OR Coronavirus OR “Corona virus” OR Coronaviruses OR “2019-nCoV” OR “SARS-CoV” OR “MERS-CoV” AND “Health Care Workers” OR Health care workers AND “Prevention”

Inclusion and exclusion criteria

Inclusion criteria for articles were

articles in English or Indonesian language and published or in press article about COVID-19, focusing in the preventive action among Health care workers. The articles using language rather than English or Indonesian were excluded. The manuscript that was currently in the proofreading stage was not included because it has the possibility of changes that occur in the results of research reporting.

Data extraction

A total of 2,809 articles were collected from Google Scholar, World Cat, ScienceDirect, and PubMed databases using Mendeley program. The articles selected using Preferred Reporting Items for Systematic Reviews and PRISMA method. A total of 7 articles were included for this study.

Data analysis

Study articles were systematically reviewed and analyzed qualitatively.

RESULTS

Of 2,809 articles generated from the initial search on Google Scholar, World Cat, ScienceDirect, and PUBMED, the authors identified seven articles of preventing the COVID-19 virus outbreak among the health care workers in the world around 2019–2020. Full-text articles identified published as an in press article was identified and included. The detailed selection process is illustrated in FIGURE 1.

Seven papers described or evaluated the preventive actions undertaken in response to the prevention behavior in the COVID-19 virus outbreak among health care workers in the world. Seven manuscripts reported prevention behavior among health workers in different departments, such as pharmacist, radiology, oncology, and community health center.

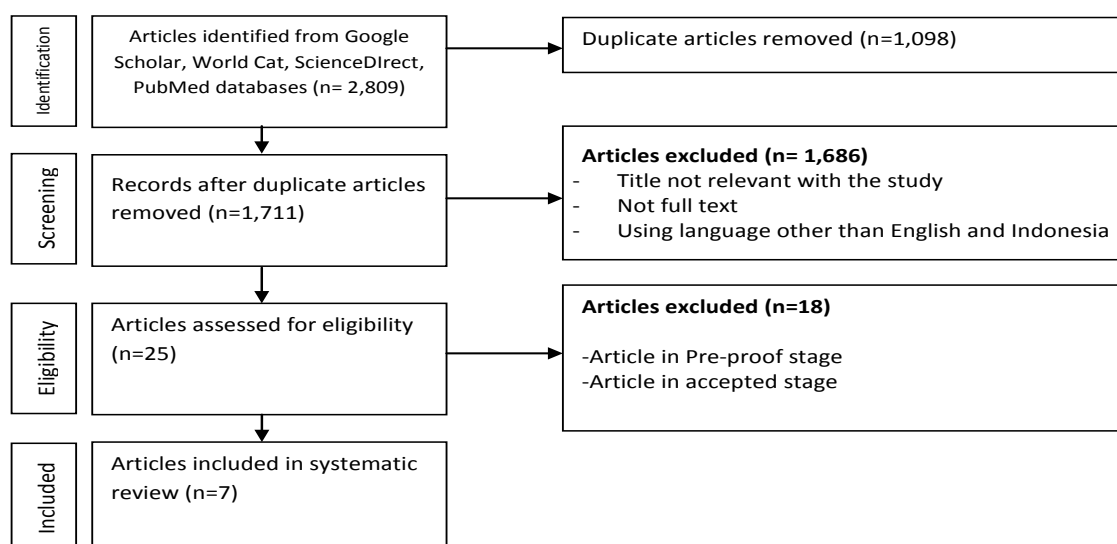


FIGURE 1. PRISMA flow diagram

Social distancing

Social distancing is the standard preventive approach applied by many countries during the earlier stage of the outbreak. Social distancing is a form of non-pharmaceutical interventions (NPIs) which involve reducing direct physical contacts between individuals and the environment.¹⁶ The approach itself is practiced within any confine of social environments: public places, government institutions, working places, etc. Everywhere waiting-room chairs are placed six-feet apart, face-mask is compulsory to the infected and non-infected individuals, hand-soap and sanitizers are available in every public place. Suppressive social distancing measure should be applied wherever possible.⁸

Social distancing is also required within clinics and hospitals. Patients are seated six feet apart, doctors should wear a surgical mask and scrub hands with soap and water and use an alcohol-based disinfectant after each patient interaction, and intradepartmental staff interactions are be limited.⁹ Healthcare workers are following strict safety and health protocols while treating patients. Interdepartmental interactions,

although unscheduled and impossible to monitor, should be limited as well to prohibit infection transmission.¹⁰ Interdepartmental interactions include scan requests, doctors' discussion and other schedules interactions.

Screening for in-person visits

Body-temperature screening has been conducted in various places from public areas, stations/airports to public healthcare. Individuals with a temperature above thirty-eight degrees Celsius would not be allowed to enter and required to undergo further assessment. In the hospital, visitation has been under careful scrutinize, allowing limited to zero visitations to patients deemed positive with the COVID-19.¹¹ Glass and plastic barriers are installed at every station to limit direct contact between staffs and all visitors.

At this triage point, all patients are treated for possible COVID-19 infections, even those who are still suspected. Suspects are patients with fever and breathing problems associated with coronavirus symptoms, travel history to hotspot countries/areas, or exposure to COVID-19 patients but yet declared infected. Suspects and the infected must

be isolated and treated in different wards, in some cases even separate locations and by distinct designated medical teams.¹²

All treatments and procedures to cure coronavirus patients are tended individually with a stringent protocol. Medical staffs will survey all patients' symptoms to date before undergoing specific procedures. When a new patient arrives at the hospital, the medical worker in-charge will lead arrival protocol and identify the risk of COVID-19 exposed. Similar triage protocols also applied to patient transfer between hospitals. If a patient is referred by a different healthcare facility, an identical approach is delivered via phone call the same day before the patient leaves the facility.¹³

Hand washing

Frequent hand-washing and the use of alcohol rub are advised by the World Health Organization. All medical care workers, both clinical and administrative, should be instructed to wash hands or use hand-sanitizer upon entering the facility. It is also advisable to do incremental measures such as doing temperature screening to patients, staff, and visitors. Upon arriving and leaving the department, nurses should guide patients and visitors to wash hands or rub the hands with provided antiseptic available inside the hospital.

Interdepartmental movement should also be reduced to avoid accidental contagion among different departments. All staff should follow occupational safety and health procedure, self-monitor for infective symptoms, report to managers if found symptomatic, and self-isolate.¹⁴

The COVID-19 outbreak enhanced the hygiene standards for healthcare staffs. After all direct/indirect patient interaction, contact with potentially infectious sources, and before putting on and on the removal of personal protective equipment, hand-washing

or hand-sanitizing is compulsory. The minimal arrangement of a set of PPE for personnel in endoscopy should be altered according to risk stratification.¹³

Telemedicine

The advancement of technology has given more access to indirect health consultation. Although the initial examination might still need private visits, the follow-up assessment can be carried out through telephone calls, application or telemedicine where technology is available. It has been assumed successfully in patients with cancer, even in advanced cases. Follow-up assessment via telephone call has proven possible to observe patients with different cancer settings and different stage of illness such as colorectal, endometrial, lung and prostate cancer. The method is highly convenient for patients with travel difficulties and guaranteed higher patient satisfaction.^{15,16}

Telemedicine practices will also help to prevent human-to-human transmission. Since public transportation has been suspended in many regions to reduce COVID-19 virus transmission, online health services have allowed easy and safe access to healthcare. People with mild symptoms might get help via online and telephone consultation. In the case of extremely limited medical care resources, this method can improve the effectiveness of resource allocation by allowing only acute patients treated in hospitals, while mild patients can self-isolate and acquire limited drug therapy. Telehealth consultation can actively provide medication education and psychological counselling to the public as well.¹⁷

Personal protective equipment recommendations

Personal protective equipment is procedural protective gear worn to

reduce exposure to haphazard that cause occupational injuries and illness. The tools include goggles, face shields, gloves, gowns and respiratory protective equipment. Healthcare workers must wear procedural masks, eye protection, gowns and gloves when giving treatment to COVID-29 patients.¹¹

Healthcare workers in charge of examining infected patients must constantly wear PPE all the time during their shift. The standard facial mask might protect them from large-particle droplets and splashes, but it has its weakness. By design, the standard face mask does not guarantee complete protection from germs and contaminants and is not able to filter or block aerosol particles that passed on via coughs, sneezes or certain medical procedures.¹³

Adequate precautions to lower the risk of COVID-19 disease transmission should be adopted by all hospital departments, especially those prone to transmission by medical procedures such as radiation oncology department. These policies may vary according to national directives, local infection control procedures and availability and access to PPE.

During the SARS outbreak in 2003, it was found that the combination of hand-washing, wearing mask, gloves and protective gown indeed increased the effectiveness of stopping virus contamination by 91%; compared to only washing-hand ten times/day (55%), wearing procedural masks (68%) and gloves (about the same amount of protection as frequent hand-washing).¹⁸ Protection levels for healthcare staff described as follow¹⁹ 1) The minimum requirement for protective gears includes surgical caps, disposable gloves and disposable surgical masks; 2) The protective gears to treat suspected COVID-19 case include eye protection (goggles or visor), disposable surgical caps, disposable surgical masks,

disposable gloves, insulating protective gown, and disposable shoe covers. After the sanitation procedures, hand-washing and rigorous application of hand-sanitizer gel are of immense importance; 3) The protective gears to treat confirmed COVID-19 include case eye protection (goggles or visor), disposable surgical caps, disposable surgical masks, disposable gloves, insulating protective gown, and disposable shoe covers. If aerosol-generating procedures performed on COVID-19 patients, respirator such as N95/99 or FFP2/3 is required. After the sanitation procedures, hand-washing and rigorous application of hand-sanitizer gel are of immense importance.¹⁹

DISCUSSION

The likelihood of the COVID-19 to reach large-scale demise of the global population, especially health care workers, has driven the emergence of research findings. The response from local, state, and national governments is in a constant state of flux as more information about COVID-19 is being discovered and released daily, even hourly in some instances. It is of immense significance for citizens to not only adapt and respond to these updates but to anticipate the healthcare and daily needs weeks in advance and to develop schemes capable of meeting those needs during this crisis. Healthcare workers have additional responsibility besides treating patients infected by COVID-19, which is protecting themselves against coronavirus infection while also offering emotional and psychological support to both patients and fellow staffs dealing with psychological distress. Emotional exhaustion can be as impairing as physical fatigue. Both are endangering in terms of human errors, burnout and

increased infection. Supportive and empathic actions are critical, especially during pandemics when social distancing measures cut down emotional support from inside and outside the hospital (food, childcare, entertainment, etc.).²⁰

There are three challenges posed by recommendations on healthcare infection control in early 2020 i.e. 1) Adopting the lesson-learned from the previous pandemic and inter-pandemic periods; 2) Swiftly expanding apprehension of the risk of infection dispersion for COVID-19; 3) A need to be commensurate concerning protective equipment utilization during a pandemic.²¹ Most of the relevant previous studies use social distancing models as a prevention action, although other strategies have been ruminated. The choice of prevention strategy is likely related to the condition of the healthcare workers and their respective departments.

This study offers categories of preventive measures for healthcare staffs to ensure safety among themselves, patients and all individuals within medical facilities. Naturally, the most effective strategy for COVID-19 contagion is to reduce infection rates. Within healthcare perimeters, all medical staffs should always wear protective gear and perform hand-sanitary routine orderly. All personnel, including technical support and cleaning staffs, must be explicitly trained in the professional cleaning and sanitation of potentially contaminated surfaces. All governments and international health organizations have regularly updated directives on social distancing, self-isolation, and quarantine rules and these will proceed to expand during the pandemic.¹⁴

There are some limitations in this systematic review study. Most of the included studies are qualitative, descriptive, etc., with a low level of statistical evidence. Due to the rapid evolution of the COVID-19, some studies

have not been published. This study uses the in press article with the consideration that COVID-19 study is still new and many studies are ready to be published but it still takes time to publish according to the schedule set by each journal.

CONCLUSION

Health care workers have an additional responsibility of protecting the patients and themselves. It is imminent to maintain infection control measures using written protocols stringently. The infection contagion deterrence is highly depended on healthcare workers' commitment to advised safety and health procedures. Although some challenges may be unique to distinctive healthcare facilities, the majority of issues faced by medical workers globally are similar.

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