

# Research Paper: Health Responses During the COVID-19 Pandemic: An International Strategy and Experience Analysis



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## ABSTRACT

**Background:** Sharing experiences and learning from health measures taken during the outbreak of epidemics is a critical issue that affects the right and timely decisions in health crises. In the present study, an attempt has been made to review the health policies adopted against COVID-19 and extract critical points for resolving the epidemic crisis.

**Materials and Methods:** This article was a comparative study. The study population comprised Canada, Japan, Germany, Korea, Turkey, and Iran. Ten effective indicators in the management of epidemics were extracted by reviewing the literature and interviewing disaster management experts, and the degree of conformity of the research community with them was examined. The study data were collected from articles published in scientific databases (Google Scholar, PubMed, Web of Science, and Scopus search engines) or information from COVID-19 disease management organizations from official sites. The obtained data were processed and analyzed by matrix content analysis.

**Results:** The results showed the importance of 10 effective indicators in the management of epidemics during the outbreak of COVID-19 studied and noticed by the health system of most countries. And the government, local and private organizations have participated in the implementation of the studied indicators according to the conditions of each country's health system. Therefore, the success rate of countries in managing COVID-19 disease varies according to the time, type, and manner of implementation and monitoring of measures.

**Conclusion:** Speed of action in adopting health policies and integration in its implementation, construction of convalescence, adequate training and access to personal protective equipment, prevention of nosocomial contamination, and voluntary assistance are essential issues in the fight against epidemics. These measures should be considered and used as teachings in managing health crises, especially emerging diseases and pandemics.

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## 1. Introduction

The COVID-19 was first detected in December 2019 in Wuhan, China. The virus caused a type of viral pneumonia with the ability to spread rapidly from person to person, which is due to the characteristics of its genome structure. It was classified as Acute Respiratory Syndrome (SARS-2002) and the Middle East Respiratory Syndrome (MERS-2012) [1, 2].

The COVID-19 spread rapidly worldwide and was identified by the WHO as a significant public health concern [3] as of September 15, 2020, 12:02 GMT. It has infected 29475633 people in 215 countries, of whom 933444 died [4]. The death rate from the COVID-19 in most countries was estimated at 3.61% [5], which was more prevalent among the elderly or those with underlying diseases such as diabetes, cardiovascular disease, chronic respiratory disease, blood pressure, and cancer [1].

Over time, examining hospitalized cases showed that children and younger people are also more likely to be infected with the COVID-19 [6, 7]. Furthermore, involvement of the kidneys and other organs in patients with the COVID-19 has also been reported by some researchers [8]. In addition, the cardiovascular system in patients with COVID-19 is severely affected by the virus or drug treatments, and as a result, the mortality rate due to cardiac arrest has increased during the outbreak of the disease [9]. Therefore, efforts to control the disease and prevent its spread are on the agenda of governments; thus, several measures have been taken.

Efforts to reduce the disease transmission have been significantly effective with taken measures such as quarantine, reduction of displacement, increasing social distance, and strict adherence to basic hygiene principles [10, 11]. However, the rapid spread of COVID-19 infection is associated with fundamental changes in the health care system [12]. The high cost of caring for people with COVID-19, the provision of beds, ventilators, and concerns about staff health and personal protective equipment have posed challenges to each country's health and economic system [13].

Many countries take measures such as building new hospitals (China) [1], designing and using a patient tracking application (Singapore) [14], designing and operating a corona screening system (Iran) [15], and implementing quarantine operations along with increasing the capacity of the hospitals (Italy) [16] to minimize the challenges of the treatment system. In addition, new

vaccines were designed and tested for the COVID-19 in various countries worldwide [17]. But what is important here is to share successful experiences fighting the virus to disrupt the epidemic chain as soon as possible.

Hick and Biddinger argued that countries should not act as an island in the face of epidemics and pandemics and should take steps to prevent the spread of disease by sharing health data [18]. However, learning from the measures taken in different countries is a relatively new subject that can effectively achieve the right policy to deal with future epidemics. In 2015, the World Health Organization (WHO) launched the Global Learning Laboratory (GLL) to be used as a space for sharing lessons and tools focused on Universal Health Coverage [19]. Therefore, in this article, we decided to review the measures taken in selected countries to combat the COVID-19 and analyze international policies and experiences to develop appropriate health guidelines to deal with the inevitable health threats of the future.

## 2. Materials and Methods

A comparative study method was used to evaluate and explain the experiences of COVID-19 disease management in selected countries of the world. The study population includes Canada, Japan, Germany, Korea, Turkey, and Iran, which are not only among the leading countries in the management of COVID-19 disease but also have been affected mainly by this disease. In selecting these countries, we attempted to study at least one country from each continent. Initially, 10 effective indicators in the management of COVID-19 epidemic disease were extracted using literature review and interviews with professors and epidemiology management experts. Then, the outcome of the indicators was done to extract the differences and similarities between health systems strategies in different countries. Thus, the differences and similarities between different countries were compared and applied in the next step.

The study data were collected from articles published in scientific databases (Google Scholar, PubMed, Web of Science, and Scopus databases) or online reports of government agencies or COVID-19 disease management bodies and based on specified search strategies. The data from each country were collected based on the indicators of current research in the management of COVID-19 and were written separately for each country. The inclusion criteria were experiences based on defined indicators and access to information, and exclusion criteria were complete lack of access to information or information in languages other than English and Persian.

The matrix content analysis method was used to analyze the obtained data. In this method, content analysis was conducted with indicators, and the models obtained from the studies were placed in the designed matrix. Finally, the extracted indices were analyzed.

### 3. Results

#### Germany

Germany, with more than 83 million population (September 15, 2020, 12:34 GMT), with 263407 infected, 9437 dead, and 237550 recovered, ranked 22nd in the world in terms of COVID-19, and only 1% of their patients have been reported in critical condition [20]. Germany responded to the COVID-19 outbreak by implementing a national program at the federal level by the Robert Koch Institute (RKI). The low rate of fatalities versus the high rate of infected patients indicates the successful policies of the country's health system, which includes rapid measures such as a large number of screening tests (500000 tests per week), rapid implementation of social prevention methods, high bed-to-patient ratio (56000 beds for people with coronary artery disease), € three billion budget allocation to 1000-bed hospital by the German army and forced to wear a mask. Other practical measures of the German health system included initial contact with a family doctor or 115 emergencies and providing medical information, if necessary, initial examination and quarantine of the patient at home or hospitalization, and use of innovative facilities of drive-through testing.

#### Iran

A country with more than 84 million population (September 15, 2020, 12:34 GMT) is ranked 12th globally in terms of COVID-19 disease, with 407353 infected, 23453 dead, 349984 recovered, and 11% have reported comorbid malignancies [20]. Iran, by creating the National Headquarters for Corona, took health-oriented decisions in various areas of the country, and by stopping unnecessary services in hospitals (selective surgeries) and allocating IRR 1000 billion budget for the credit of the treatment system in the first phase be ready, as well as increasing the capacity of hospitals to provide services, took adequate steps to combat the spread of the disease. On the other hand, measures such as screening at the entrances of cities by Red Crescent volunteer forces, minimizing hospital visits, setting up a telemedicine system to care for patients and necessary treatment measures, plasma therapy, appointing a spokesperson for the National Corona Management Headquarters, launching Hot Line 4030, to answer frequent questions about the

corona, launched the Corona Disease Self-Assessment System, developed and launched the Tuck application (nutrition, safety, and corona) to diagnose the disease in the shortest possible time.

#### Turkey

Turkey, with more than 84 million population, was ranked 19th in the world for COVID-19 on September 15, 2020, at 12:34 GMT. To date, 292878 people have been infected, 7119 have died, and 260058 have recovered [20]. Despite the similarity between Turkey's population and cultural structure with Iran, the overall number of patients with this disease is less reported than in Iran [20]. Observing social distance and banning traffic in the city and canceling all scientific, cultural, artistic, and sports events in the country, and starting online education in schools and universities have been among the measures taken by Turkey to manage this disease.

#### Japan

Japan, with a population of 126 million (as of September 15, 2020, 12:34 GMT), is ranked 44th globally regarding the number of people with COVID-19, with 75657 infected 1442 dead, 67242 recovered, and 2% have reported comorbid malignancies. However, Japan has a minimal number of patients whose reasons can be attributed to the proper functioning of the government and the country's health system, including the early cancellation of all cultural, social, political, sports, and artistic events, the closure of educational centers, the production of diagnostic equipment and its pilot use at airports. In addition, for short-term quarantine of incoming passengers from infected areas, a new test method was implemented to speed up the detection of COVID-19 in 30 minutes by the State Research Institute. Also, the country established a policy to protect against the spread of the coronavirus, such as asking people with mild symptoms to stay home until they recover and asking companies to promote telecommuting and variable opening hours.

#### Italy

With more than 60 million people (September 15, 2020, 12:34 GMT), Italy reported about 288761 infected, 35624 deaths, and 213950 cases recovered. At the time of the study, it was ranked 20th regarding COVID-19 disease globally [20]. The most crucial action of the Italian health system in the face of COVID-19 disease was using local health authorities in developing health instructions appropriate for each region. Also, the

closure of religious places and the use of virtual medicine in providing services to patients to prevent congestion in medical centers was another effective measure in this country.

### South Korea

Using the lessons learned from the 2015 MERS outbreak, South Korea could (on September 15, 2020, 12:48 GMT) become 77th in the world with a population of more than 51 million, due to the infection of 22391 people and the death of 367 people and the recovery of 18878 people from COVID-19 disease [20]. Furthermore, the country enhanced its capacity to monitor and deal with the rapid adoption of laws and developing a comprehensive framework for dealing with infectious diseases. Also, it established specialized departments for risk assessment, emergency operations, crisis communication, and increasing the capacity of hospitals to prevent and control infectious diseases to manage this disease very well.

South Korea has begun operations with 532 treatment centers for people infected with the COVID-19. As a result, it has the highest rate of COVID-19 testing in the world. On the other hand, hospitals conducted remote diagnostics for patients with mild symptoms and helped medical professionals to focus on people with more severe symptoms. They created a smartphone app to warn mobile users of places where people are infected and provide the possibility of announcing the health conditions of people with the authorities. These measures were taken to detect the disease at its early stage. In addition, a five-division system was developed to allow the general use of the mask, allowing each person to purchase two masks per person during the working days of each week, determined by the last digit of each person's year of birth. And if they do not buy the mask on the specified days, they can buy their quota on the weekend of the same week.

## 4. Discussion

The prevalence of COVID-19 in 215 countries worldwide has prompted governments to develop national strategies tailored to their social, political, economic, cultural, and religious conditions and adhere to international strategies and implement them to manage this disease optimally. Considering the type of crisis, the necessary actions of any government are in health system services management, which can help improve the current challenging conditions of societies by slowing down the epidemic process. In this regard, in this study, 10 essential

health measures indexes to manage the COVID-19 crisis in 6 countries were compared. The results showed that some health management programs could be effective in reducing morbidity and mortality. Furthermore, learning from successful global strategies and customizing them can strengthen countries' preparedness for the inevitable crises ahead.

The World Health Organization (WHO) recommends that the efforts and programs of all countries involved in the corona crisis be reviewed and its results used to strengthen the health system [76]. However, studies show that countries do not use other countries' lessons learned and experiences. A workshop after the influenza pandemic organized by the WHO in 2005 with the participation of the European Center for Disease Control and Prevention emphasized that the development and revision of pandemic preparedness programs should be facilitated by the transfer of information and best practices from other countries and all countries should share these experiences. Using this lesson also helps other health-threatening situations and enables International Health Regulation (IHR) [77].

Successful pandemic management systems include the Thai Ministry of Health, which, using the experience of Australia, Hong Kong, and China, has been able to improve its programs in influenza pandemic management (2009) [78]. Awareness of what has been learned helps countries be prepared to deal with other emergencies threatening health. The Chinese government has improved its capacity to respond to epidemics since 2003, following the SARS outbreak and addressing its challenges. This experience helped China successfully manage COVID-19 despite its initial emergence [79], demonstrating the importance of using the lessons learned in epidemics and disasters.

Following the outbreak of COVID-19, the WHO declared a state of emergency and set up an international committee of 15 members, urging countries with poor health to respond quickly to the disease and take effective measures in its proper management according to the local conditions [76].

The review of management measures in the present study also showed that most of the prosperous countries in the field of the COVID-19 crisis had taken steps to establish a National Corona Countermeasures Headquarters in the very first days of the epidemic, in addition to optimal policy in the field of health measures. They intended to have adequate supervision over the proper implementation of these guidelines (Tables 1 and 2). The



Table 1. Health strategies of selected countries in 10 research indicators in Covid-19

Index Country	Establishment of the National Headquarters Against COVID-19	Setting up a Convalescent Home	Allocation of Hospitals to COVID-19 Patients	Import and Export of Masks, Gowns, and Shields	Treatment Costs of COVID-19 Patients
Germany	Since the coronavirus outbreak in Germany, the federal government of the Robert Koch Institute has set up coronation headquarters [21].	On May 11, 2020, a convalescent home with a capacity of 160 patients and an oxygen supply system with a capacity of 14000 L were set up at an air military center [22].	To provide adequate access to medical services, all hospitals were required to provide services to COVID-19 patients [23].	On March 4, 2020, a general decree banned all personal protective equipment from Germany. Following control of the disease, the sentence was overturned on March 19, 2020. Exporting companies were required to obtain a special permit from the government to send their products [24].	In addition to German citizens, not all European patients in Germany paid for COVID-19 treatment in hospitals. In addition, health insurance was provided for international students, and the cost of treatment for COVID-19 became free [10].
Turkey	The COVID-19 Disease Management Group was set up supervised by the President to formulate the necessary health, economy, and society policies based on the existing conditions [25]. A scientific committee was also set up at the General Medical Emergency Operations Center at the Ministry of Health [26].	On April 6, 2020, a 1000-bed convalescent home was set up by the President at Istanbul's Ataturk Airport [27].	In May 2020, a new hospital with 600 beds and 99 intensive care beds was opened to provide services to COVID-19 patients, dedicated solely to hospitalization and medical services for these patients [28].	Export license for CPR equipment, ventilation equipment, oxygen generator, piping, intensive care equipment, chlorine, disinfectant, filter masks, surgical masks, sterile gloves, clothing, and goggles under the Agency's Personal Protection Equipment Regulations Turkish medicines and medical devices are obtained. Also, the customs fee for importing this equipment was eliminated [29].	As of April 16, 2020, all medical and pharmaceutical expenses of patients with COVID-19 in Turkish public hospitals were covered by insurance by the President and became accessible for patients [30].
Japan	The Japanese government complied with its state of emergency law, according to which the head of each state and city will make policies and decisions based on the circumstances [31].	Patients with mild symptoms were referred to COVID-19 hotels and temporary accommodation to prevent unnecessary hospital beds occupation and waste of financial and human resources [32].	St. Luke's International Hospital was introduced as the primary hospital for the admission of COVID-19 patients. Outpatients were screened at all hospitals [33].	The export and import of masks and disinfectants were banned for two months, during which time the government banned the international sale of surgical masks while providing financial assistance to mask manufacturers [34].	Japan National Health Insurance covered the cost of a corona diagnosis [34]. COVID-19 patients admitted to hospitals are exempt from paying 10% to 30% of hospital costs [35].
Iran	The COVID-19 National Committee was established following a presidential decree and chaired by the Minister of Health. In addition, COVID-19 provincial committees were formed under the governor's direction, and a secretariat was set up under the presidents of the country's medical universities [36].	More than 27000 convalescent beds were set up in hotels, crisis management shelters, and exhibition and commercial spaces across the country. In addition, 3000 hospital beds were created at the Iran Mall Exhibition Center to receive patients with COVID-19.	Armed Forces hospitals announced emergency admission readiness for COVID-19 patients, and the Army Headquarters established a 2000-bed hospital. In addition, 22 corona clinics were established in Tehran to facilitate work and prevent overcrowding.	A memorandum of cooperation was signed in the field of production of protective fabrics for medical personnel in cooperation with the Ministry of Health, Treatment and Medical Education, Ministry of Industry, Mines and Trade, National Medical Equipment Office, Iranian Textile and Garment Production and Export Union and 4000 daily Protective clothing was produced for health system staff.	They were providing free health care services to COVID-19 patients with positive laboratory results. In addition, donors covered part of the cost of treatment.

Country Index	Establishment of the National Headquarters Against COVID-19	Setting up a Convalescent Home	Allocation of a Hospital to COVID-19 Patients	Import and Export of Masks, Gowns, and Shields	Treatment Costs of COVID-19 Patients
Korea	The Korea National Committee for the Management of the COVID-19 clinic, consisting of infectious disease specialists or other physicians, was formed in early February 2020 [37]. As head of the Central Headquarters for Disaster Management, the Korean Minister of Health and Welfare oversaw the Central Headquarters for Disease Control [38].	People with mild symptoms were admitted to government-supervised convalescent homes and dormitories [39, 40].	According to a South Korean government decree, hospitals among public and private treatment centers were only dedicated to admitting patients with COVID-19, which were equipped with isolation chambers with negative pressure and a suitable distance between beds. Other hospitals also accepted patients with milder symptoms. A total of 67 hospitals with 7000 beds were dedicated to receiving patients with COVID-19 nationwide [41].	The number of masks available in pharmacies was measured [42]. The supply of health products and personal protective equipment such as masks and protective clothing for medical teams also increased [43]. According to the South Korean Ministry of Economy and Finance, about 8 million domestically produced face masks were distributed directly to the general public. The government also called for increased mask production to 10 million a day and a ban on its export [43].	The Korean government used cost-effective tests to diagnose COVID-19, which received a government subsidy. It also used innovative features of drive-through testing [44]. In addition, the government was responsible for providing treatment grants, and the Korean government covered all costs of diagnosis and treatment following the Infectious Diseases Prevention Act [45].
Italy	The Ministry of Health, accompanied by prevention centers and local crisis working groups, was tasked with overseeing and implementing government-approved health protocols.	Continuous intensive care units were also set up to help provide medical care at home. Providing medical and care services at home and training family members to care for patients in acute cases were used. Home care services were also provided for the elderly, the disabled, and patients after discharge from the hospital. Some hotel rooms were also reserved for people with quarantine restrictions [46].	The number of beds dedicated to caring for COVID-19 patients increased during the epidemic, and a dedicated two-story hospital was built for coronary patients over 10 days. Booths in the Milano Fiera building were also equipped with beds for the temporary care of patients with COVID-19 [46, 47]. A field hospital was also established in Milan to receive patients [46].	On January 31, 2020, the Italian government appointed a person to head the Department of Civil Protection, responsible for providing personal protective equipment and delivering it to local health authorities [48]. Many textile industries produced masks during the holidays. The government also began importing masks from reputable brands approved by health institutions and legalized themselves with mask hoarders [49].	Italy's health care system covers treatment costs through national and regional taxes under the Global Coverage Protocol. The public sector accounts for 78.2% of total health care costs, and local governments are responsible for providing health care. For patients with COVID-19, similar government services were used to help pay for treatment, which is often free [50].

National Corona Headquarters were set up in Korea and Germany with the lowest number of infected and dead people in a health research center attended by scientists in disease management [21]. This experience shows that the presence of health professionals can be effective in the success of strategies adopted in the management of a disease.

According to the WHO, one of the most important measures in the management of COVID-19 disease is the early diagnosis and screening of this disease. By ac-

tivating the maximum laboratory capacity, Korea could achieve a special place in the success of COVID-19 management [76]. A review of country documents shows that KCDC (Korea Centers for Disease Control and Prevention) in Korea has used emergency methods to track tests quickly. They performed 18000 diagnostic tests per day, used innovative drive-through testing in disease screening, and encouraged people to take the test to prevent the spread of disease [80]. In addition, awareness of contaminated areas through the design and use of a traffic routing application for infected people in Korea

Table 2. Health strategies of selected countries in 10 research indicators in Covid-19

Index Country	Employing Volunteers in Hospitals	Hospital Infection Control	Providing Resources and Credits in the Field of Health	Communication and Information (International / National / Social Media Use)	Teach Employees the Principles of Personal Hygiene and PPE
Germany	Volunteers in the management of COVID-19 at the hospital included medical students who assisted physicians and nurses as assistants [51]. A group of volunteers also provided primary health care and psychological support in person or online to quarantine patients at home and in convalescent homes [51].	Patients with COVID-19 were admitted to isolated rooms and provided services by trained personnel. Both the patient and the service providers used complete personal protective equipment. Family visits were restricted. The disinfectant was used to disinfect the surfaces. The surfaces of the patient's room were disinfected twice a day, and the infectious waste was disposed of separately [52].	The German Ministry of Economics and Finance has set up a special fund with € 25 billion for crisis management [53].	Public and social media were used for education to increase public awareness of the danger. Social messaging taught information about health practices and ways to deal with the disease. Due to the presence of German citizens in other countries, international networks were used to inform about the status of the disease and travel restrictions [54].	Personal hygiene and PPE training is part of the annual training of hospital staff, but in this epidemic, as soon as China first reported, training was again held in workshops and training videos for all hospital staff [55].
Turkey	Due to the high number of hospitalized patients, volunteer forces were used in COVID-19 general wards. However, in certain sections, such as the children's section, volunteers were banned from entering [56].	In addition to medical supplies, employees should take disinfectants and clean their personal belongings to the workplace, such as cell phones, keyboards, landlines, keys, tables, chair handles, stair railings, elevator buttons, handles, and door handles. The process of rapid reporting of symptoms in staff was defined and informed [57]. Adequate personal protective equipment was provided to staff. Disposal of infectious wastes of patients and gowns and masks was done completely separately [58].	In 2020, \$ 8.4 billion was allocated to the Ministry of Health, which was the largest share of the budget to combat the corona pandemic [59].	A clear, transparent, and up-to-date information strategy was developed to increase public awareness of COVID-19 risk and public confidence. All information channels were used to increase the speed and dissemination of news in the community. Virtual networks were constantly monitored to address ethical issues and prevent the spread of rumors. Most international interviews were conducted by the President of Turkey based on official country data [60].	Because of the high severity and speed of the spread of COVID-19 disease, an intensive course on using personal protective equipment and the principles of proper handwashing and disinfection of surfaces was held for various hospital staff, and educational clips were also provided to them as retraining [61].
Japan	Medical and nursing students and retirees were recruited to volunteer at the hospital [62].	Patients with or even suspected of COVID-19 were admitted to a separate room [63]. To reduce the hospital staff's exposure to patients, a robot was used to deliver food and medicine to patients' rooms [64]. Screening measures were performed upon the arrival of patients to the hospitals [65]. Treatment staff were required to use all personal protective equipment and were periodically tested for COVID-19 [64].	An emergency budget of \$ 100 million was allocated to control the virus and \$ 2 billion to combat the COVID-19 [34].	Minimal information was provided on COVID-19 to reduce public fear. Because of careful monitoring of published content, some unofficial sites were filtered [66]. Doctors and nurses were banned from interviewing the media [32].	Simulation exercises to teach the principles of personal hygiene and PPE were given to staff in different departments of COVID-19 treatment [67].

Index Country	Employing Volunteers in Hospitals	Hospital Infection Control	Providing Resources and Credits in the Field of Health	Communication and Information (International / National / Social Media Use)	Teach Employees the Principles of Personal Hygiene and PPE
Iran	A voluntary registration system for the management and control of the coronavirus and a system of direct communication between nurses or assistant nurses were set up by the Ministry of Health. In addition, volunteer physicians and paramedics were also dispatched to specific areas for COVID-19 control and treatment.	Scientific and safe methods isolated hospital waste related to COVID-19 patients and then delivered it to special municipal systems [36]. Maintaining a distance of one meter between patients and doctors in medical centers, preventing congestion by using telephone or Internet appointments and receiving fees electronically, as well as providing masks and gloves to suspicious patients, improving ventilation and disinfection of surfaces with appropriate disinfectants approved by the Food and Drug Administration was continuously and correctly on the agenda of the Ministry of Health to hospitals [68].	The Financial and Budget Assessment Group was formed within the COVID-19 National Committee, and a Memorandum of Understanding was signed between the Foreign Exchange Board of the Ministry of Health, the Food and Drug Administration, and the Ministry of Defense to expedite the supply of COVID-19 equipment.	The national campaign, entitled “We Defeat the Corona” and “I Wear a Mask”, was organized by the National Committee and was reported at the national media level. A working group was formed to provide accurate information and training to individuals, whose duties include educating and informing about the new coronavirus under the supervision of provincial medical universities. The Ministry of Health also sent educational messages to all citizens across the country. The official COVID-19 statistics were provided by the official spokesperson of the Ministry of Health at the national media level or related social media pages, and the information of the COVID-19 National Epidemiology Committee at the Ministry of Health was set up to announce daily trends and epidemiological models of the disease nationally and globally. In addition, educational billboards were installed in many cities.	Personal hygiene protocols against coronavirus were developed, and “Guidelines for the proper use of COVID-19 personal protective equipment for outpatient centers” as well as “Environmental Control Guidelines for Combating COVID-19” were published.
Korea	General practitioners were trained and assisted by active physicians to fulfill their commitment to work in the days of the corona outbreak [44, 45]. About 150 physicians from the Daegu Medical Association volunteered to visit quarantine patients at home [37]. Volunteers were also registered to use their services in case of emergency [38].	Hospital waste related to COVID-19 patients was isolated by scientific and safe methods and then delivered to special municipal systems [36].	The South Korean government funded COVID-19 testing, medical treatment, and patients’ living expenses from the state budget [69].	Corona mapping with the ability to present contaminated areas and people suspected of COVID-19 was done via GPS and smart cards and was made available to the public to prevent crowding in contaminated areas. In addition, accurate statistics of infected people, deaths, and recovered were provided to patients on the official website of the Korea Center for Disease Control and Prevention and online news on the popular website and social media attributed to the government [70]. The “Social Distance” campaign was launched on March 22 in Seoul, just 12 days after the first infection was diagnosed [71].	The Korean government has ordered training on caring for patients with COVID-19, which includes taking a diagnostic test, treating infectious diseases, and wearing protective clothing [44, 45].



Index Country	Employing Volunteers in Hospitals	Hospital Infection Control	Providing Resources and Credits in the Field of Health	Communication and Information (International / National / Social Media Use)	Teach Employees the Principles of Personal Hygiene and PPE
Italy	On social media, private volunteer groups were formed for financial and emotional support. Voluntary campaigns were launched in Milan, with the help of the people and the mayor of the region, to provide medicine and services to people affected by COVID-19. Priests and students volunteered. Some doctors and nurses also volunteered to be sent to infected areas [72].	To control nosocomial infections and prevent the spread of the disease, the movement of people from areas equipped with diagnostic test sites was made possible to prevent the spread of the disease by early monitoring [40].	Treatment costs were covered by national and regional taxes, which account for 78.2% of total health care costs. Local governments are responsible for providing health care. Patients with COVID-19 also used government services similar to those previously used to help pay for treatment, which in most cases was free [42].	In some areas, the mayor personally attended public places and invited people to stay at home. Social media was also used to encourage people to stay home [73]. For example, the #fermiamoloinsieme campaign on social media was launched to invite people to quarantine at home. In addition, information on COVID-19 statistics and news was provided in the Italian national media and internationally [74].	The correct method of using personal protective equipment was taught to the medical staff by the local health authorities [75].

is another successful experiment in reducing the spread of the disease that can be localized and used by other countries [70].

Other essential measures in the management of COVID-19 disease were the protection of medical personnel and the prevention of the financial and workload of hospitals [81]. One successful strategy for controlling the health care wave is “forward triage” or patient classification before entering the emergency department. Remote diagnosis and treatment or virtual medicine is another method that effectively screened the disease or applied home quarantine while maintaining the health of the patient and the treatment staff [82]. Italy has taken appropriate measures to screen patients and reduce unnecessary referrals to medical centers using telemedicine [83]. Keeping people away from significant sources of infection, such as hospitals and providing services at home, is another effective measure that can reduce the incidence of the disease. Therefore, having similar technologies in other countries is recommended to deal with the spread of epidemics.

Protecting the health of medical staff against infectious diseases is another issue that can help meet the challenge of reducing the number of specialists in disease control. Protecting the health of medical staff is an essential issue that the WHO also addressed its importance as a prerequisite for patient safety in the slogan of the World Patient Safety Day on September 17, 2020 [84]. In this regard,

personal protective equipment and training on how to use it properly can help reduce the risk of infection to a great extent. However, studies show that only 15% of physicians have received complete and sufficient training to use personal protective equipment [85]. Early in the outbreak of COVID-19, in some countries, such as Italy, there were problems with the supply of medical equipment, in which a large number of medical staff were infected and required to use personal protective equipment by local health authorities. However, the disagreement of some famous Italian leaders over the requirement to use personal equipment created some problems [86, 87].

In Iran, by concluding memoranda of understanding with the textile industry and knowledge-based companies, extensive measures have been taken in the production of personal protective equipment, and with the increase in production capacity, activities were carried out in the field of limited export of personal protective equipment to some countries in the crisis of shortage of this equipment. Also, effective measures were taken at the national level to teach the correct method of using personal protective equipment, and similar measures were taken in other countries studied in this study. Furthermore, utilizing existing potentials to increase the production capacity of equipment needed to deal with a crisis and cross-sectoral cooperation and procedural unity is another practical factor that can effectively reduce constraints.

According to WHO, the convents with three main features (rapid construction, large-scale, and low cost) and five essential functions of quarantine (triage, primary medical care, frequent and rapid monitoring, and providing social services) to implement the predominant strategy will be very effective to cope with the COVID-19 crisis [42]. Thus, many advanced countries have set up convalescent homes in field hospitals, nursing centers, or allocation of hotels, airports, and other public centers to temporary care centers, or, like Italy, they have benefited from home quarantine and telemedicine services. Moreover, managing patients with contagious infections and providing timely medical services until a complete cure can effectively prevent the spread of the disease can be considered in the management of subsequent crises.

With the daily increase in the number of patients with COVID-19 disease and the illness of medical staff, the capacity to provide services in hospitals decreased, so no guidelines and instructions were provided to establish a dedicated hospital. On the other hand, this measure is not cost-effective and is less effective because there is contamination in all medical centers due to the presence of asymptomatic carriers [88]. But China and Italy built a specialized hospital, and Iran evacuated some of its hospitals and turned it into a dedicated hospital for COVID-19 patients, which returned to its original condition after two weeks due to ineffectiveness. COVID-19 disease, as a long-standing pandemic, has many economic dimensions and poses a significant threat to the achievement of the United Nations Sustainable Development Goals (SDGs). One of the goals of sustainable development is fair and universal access to health services [89].

The study showed that all countries have paid for the diagnosis and treatment of COVID-19 through insurance coverage or the services of government agencies, sponsors, and donors. Having the same health services for people with different economic backgrounds is an effective way to control epidemic diseases that can effectively manage health crises.

The COVID-19 disease has a wide range of dimensions and effects, the most important of which is to increase the burden of hospital services and the disease of medical staff. Volunteers can be a good help in managing hospital services [90]. Because most hospitals need expert personnel familiar with medical sciences, most countries in this study invited the nursing and medical volunteers, retired medical staff, and students to provide support services in the field of treatment or to provide educational, health, and screening services in the field of health. The use of volunteers and the invitation of health

retirees is an effective measure to reduce the service load of the treatment system, which can be considered an efficient process in emergencies of epidemics.

The diverse outcomes of COVID-19 required different indices to evaluate health system. This study only reviewed 10 indicators of the response phase of the COVID-19 crisis, which is one of the limitations of this study. Also, the selection of countries according to the authors' nationality, the country's success in health and disease management, and the availability of information in Persian or English are other limitations of this study and require further research.

## 5. Conclusion

A pandemic of viral diseases such as COVID-19 is one of the world's challenges at various intervals. Because of emerging diseases, epidemics, and pandemics worldwide, it is necessary to use the lessons learned to manage these diseases. In epidemics, prevention is an essential step because the disease is emerging, and treatment is impossible in the first weeks and months of the outbreak.

Therefore, training and employing health personnel to promote culture and public health literacy are among the measures that can effectively control diseases. Disseminating the teachings of these events and using them for education in schools and the general public can reduce the severity of unavoidable future events. Establishing infectious disease centers and using their knowledge, scientific and skill capacity in disease management is another factor that will lead to a unified procedure in formulating and implementing preventive laws away from political issues and is therefore essential. Also, implementing new technological and electronic facilities during all phases of crisis management of infectious diseases, such as risk reduction (education), preparedness, response, rehabilitation, and recovery, can control this disease more effectively. It is consistent with new and widely used methods of obtaining information. Prompt action to control an epidemic is like preventing a fire from spreading to nearby buildings, thus preventing the spread of the disease. Therefore, it is recommended that countries act honestly (away from political disputes) in presenting their strengths and weaknesses in providing health services and establish a unified system for learning from experiences gained to provide valuable and practical guidelines for dealing with subsequent crises.

## Ethical Considerations

### Compliance with ethical guidelines

This article was approved by the Vice-Chancellor of the Iran University of Medical Sciences (Code: IR.IUMS.REC.1400.087).

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### Authors' contributions

All authors equally contributed to preparing this article.

### Conflict of interest

The authors declared no conflict of interest.

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