

Nations' responses and control measures in confrontation with the novel Coronavirus disease (COVID-19) outbreak: A rapid review

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Abstract

The outbreak of Coronavirus disease 2019 (COVID-19) has posed a significant concern in many countries due to the rapid rate of transmission between humans. Taking advantage of the experience of the last epidemics in 2002 Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and 2012 Middle East Respiratory Syndrome Coronavirus (MERS-CoV), some regions of the world were well-prepared for the new outbreak. However, other countries needed to be adapted to the situation promptly. Many management strategies were established, and some restrictions were introduced in some regions. In this review, we aimed to determine countries' public responses to the epidemic of COVID-19 and how they developed administrative approaches towards the outbreak.

Keywords: COVID-19, Disease Management, Prevention and Control, Public Health, Disease Outbreaks

1 Introduction

1.1 brief background and objectives

At the end of December 2019, novel coronavirus-infected pneumonia cases were recognized in Wuhan City in China (1-3). These cases, with unspecified etiology, presented with symptoms of dyspnea, fever, dry cough, and bilateral lung infiltration on radiographs. The virus was named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), and the disease was called COVID-19 by the World Health Organization (WHO). In late January 2020, WHO announced the COVID-19 outbreak as a Public Health Emergency of International Concern in which countries with vulnerable healthcare facilities may be at an excessive hazard. The disease transmission may be disrupted by early diagnosis, social isolation, instantaneous therapy, and other control measures (1). This infection has imposed remarkable menaces on the global healthcare system in addition to potential risks in the economic sectors of countries all over the world. Since the disease does not have a particular treatment, there is a compelling need to find substitute means to dominate its expansion (4).

COVID-19 outbreak has led the public health officials of several countries to enact policies and manage the spread of the disease by employing different strategies, including encouraging people for self-isolating and quarantining. Therefore, in this rapid review, we sought to determine nations' responses to the COVID-19 outbreak and the strategies they have employed to control the spread of the disease.

2 Methods

In this study, the articles published from late 2019 to March 2020 were searched in MEDLINE, Scopus, and Embase databases. For a more concise investigation and due to the different nature of the topic, a different search strategy for each country was utilized in this study and some countries that reported a high number of confirmed cases in March 2020 were chosen. The countries included China, Italy, Iran, Spain, South Korea, Germany, France, United States, Australia, Canada, Japan, and Singapore. In addition to the published articles, the official

government websites of some countries were also evaluated to acquire additional data about the recent national responses and management strategies.

2.1 Inclusion and exclusion criteria

The inclusion criteria were as follows: reporting of 1) public responses to COVID-19 outbreak or 2) control measures when they experienced the virus spread. The articles out of these scopes were excluded from the study.

2.2 Terms of the search strategy

The terms searched besides the names of each country were: “Disease Management”, “Management”, “Prevention and Control”, “Public Health”, “Public Response”, “Disease Outbreaks”, “Outbreak,” “public health”, “COVID-19”, “novel coronavirus”, “2019-nCoV”, and “SARS-COV-2”.

3 Results

After the screening phase, 24 articles, in addition to the official government web pages of some countries, were selected for inclusion in the present review. In Table 1, we categorized public responses to the COVID-19 outbreak based on each country.

Table 1. Main control measures in the world categorized based on countries

Country	Main control measures	Reference	Article Publication Date
China	Reduced travel volume to and from China and its impact on the number of exported cases, the probability, and time delay of a major epidemic.	Anzai et al. (5)	February 24, 2020
	<ol style="list-style-type: none"> 1. A travel ban was started on January 23, 2020. 2. Social contacts were limited. 3. Government policies were enacted during the Chinese New Year holiday, such as social distancing policies. 4. People were encouraged to stay at home and prevented from being in crowds. 	Chen et al. (6)	February 20, 2020

	<ol style="list-style-type: none"> Crowded public events were postponed or canceled; schools, universities, government offices, libraries, museums, and factories were closed. 		
	Containment strategies and core measures such as social distancing, case isolation, close contact tracking management, closing epidemic areas, and traffic controls were used to diminish movements and environmental actions and increase personal protection.	Chen et al. (7)	February 17, 2020
	Wuhan was quarantined on January 23, 2020.	Du et, al (8)	May 2020 <i>early release</i>
<i>Italy</i>	On February 21, the Italian government established an emergency task force of Lombardy and the authorities of local health to respond to the virus outbreak.	Grasselli et. al (9)	March 13, 2020
	<ol style="list-style-type: none"> National measures to restrict viral spread including an air travel ban from China, quarantining Italian passengers in China, and severe controls at international airports' arrival terminals An algorithm for the recognition of the suspected cases was designed. 	Spina et al. (10)	February 28, 2020
<i>Iran</i>	A telephone system was established for psychological assistance.	National Ministry of Health (11)	March 14, 2020
	An online self-monitoring system was launched for COVID-19 suspected cases.	National Ministry of Health (12)	March 5, 2020
	New restrictions were imposed on the intercity traffic.	National Ministry of Health (13)	March 14, 2020
<i>Spain</i>	<ol style="list-style-type: none"> In January, a health screening protocol was implemented by the government. Transparent information was ordered to be released. The protection of highly exposed people to the disease was prioritized. Support of health workers, families and companies was planned. Unity and social responsibility were demanded by the president of the government. 	Government of Spain(14)	March 18, 2020
<i>Japan</i>	<ol style="list-style-type: none"> Travel restrictions were conducted to and from Wuhan city. The authorities held the process of evacuation for the passengers of the flights dated from 29 to 31 January, 2020, and they were screened with portable thermoscanners and tested for COVID-19. 	Nishiura et al. (15)	February 4, 2020
	Systems to diagnose the virus were urgently developed. Real-time RT-PCR and nested RT-PCR assays were adjusted to the local conditions of Japan.	Shirato et al. (16)	February 18, 2020

<i>France</i>	To detect imported cases early and prevent secondary transmission of the virus in the community or health workers, an increased observation was performed on January 10, 2020.	Stoecklin et al. (17)	February 13, 2020
<i>Germany</i>	<ol style="list-style-type: none"> 1. Sensitive diagnostic assays were rapidly established in public health laboratories. 2. A massive contact probe around the first German patient with the virus was instantly commenced, with more than 700 samples. 	Conrad et al. (18)	March 5, 2020
<i>Canada</i>	<ol style="list-style-type: none"> 1. Performing a comprehensive health screening of returning travelers in 10 major airports. 2. Control of the outbreak and the prevention of the future spread were focused on. 3. Emergency Operation Centre was established. 	Government of Canada (19)	March 5, 2020
<i>Singapore</i>	<ol style="list-style-type: none"> 1. The country had increased pandemic readiness due to its experience on the outbreak of SARS in 2003. 2. Multi-Ministry Task Force was established before the presence of the first COVID-19 case. 3. Employing complementary diagnostic methods and containment and surveillance measures to detect cases 4. A network of preparedness facilities was set up to manage infected cases. 5. Screening estimations, including temperature measures, were held for incoming travelers. 6. Social and community assessments were performed. 	Lee et al. (20)	March 13, 2020
	<p>OR response measures were introduced, i.e.:</p> <ol style="list-style-type: none"> 1. An isolated OR was set up. 2. Workflow and processes were modified. 3. The staff was managed. 4. Clinical guidelines for anesthetic management were managed. 	Wong et al. (21)	March 4, 2020
	<p>ICU responses to the virus outbreak:</p> <ol style="list-style-type: none"> 1. A common strategy of containment was launched for healthcare settings. 2. All confirmed or suspected cases were isolated. 3. Solutions were introduced to address issues of critical care, including the control of infection, the flow of information among health personnel, psychological problems in healthcare workers and their exhaustion, progressive ICU services, resuscitation response. 	Liew et al. (22)	March 9, 2020
	<ol style="list-style-type: none"> 1. On January 2, 2020, all physicians were alarmed to detect any pneumonia case and a travel history to Wuhan in recent days. 2. On January 3, 2020, temperature screening of the incoming travelers was started at airports. 	Wong et al. (23)	February 20, 2020
<i>South Korea</i>	<p>Information gathering methods were used to monitor and manage COVID-19 cases and their contacts, using</p> <ol style="list-style-type: none"> 1. CCTV 	COVID-19 National Emergency	February 18, 2020

	<ol style="list-style-type: none"> 2. Medical facility records 3. GPS 4. Card transactions 	Response Center (24)	
	Patients were transferred to national quarantine stations or medical centers for isolation.	Moran ki (25)	February 9, 2020
	<ol style="list-style-type: none"> 1. Mobilizing hospital beds for infected cases 2. Using accommodation facilities (training institutes) 3. Releasing safety measures for healthcare workers and other people 4. Many public health physicians were ordered by the government to be under specialized training courses to treat COVID-19 cases. 	Sun Huh (26)	March 7, 2020
United States	Slowing down the virus spread by: <ol style="list-style-type: none"> 1. Suspension of entry to the US 2. Executing forceful measures including screening of travelers arriving from china and case identification 3. Establishing a thorough regulatory system including setting up quarantine stations 4. Public health assessments 	Patel & Jernigan (27)	February 4, 2020
	<ol style="list-style-type: none"> 1. Detecting cases and contacts of persons infected with the virus 2. Evaluation, screening, and care of incoming travelers from zones with a considerable transference of the virus. 	Daniel B. Jernigan (28)	February 28, 2020
Australia	The country released weekly epidemiology reports on COVID-19 outbreak and the status of Australia <ol style="list-style-type: none"> 1. Denial of the entrance permission to people who have traveled to China 2. Active investigation of Australian cases 3. Announcing more strict travel restrictions 	COVID-19 National Incident Room Surveillance Team (29-33)	February 8- March 7, 2020

RT-PCR: Reverse Transcription Polymerase Chain Reaction / OR: Operating Room / ICU: Intensive Care Unit / CCTV: Closed-circuit Television / GPS: Global Positioning System

4 Discussion

The world has encountered three outbreaks since 2002 with the epidemic of SARS-COV, followed by MERS-COV in 2012, and the recent SARS-COV-2 or COVID-19 in 2019, which spread swiftly to several countries and has threatened public health (34). The immediate virus spread, and the high transmission rate between people have caused global distress (35, 36).

There are various means by which preventing further transmission of the virus can be conducted, including investigating, categorizing, monitoring, and managing contacts by identifying the patients' travel routes as well as contact investigation. For instance, in South Korea, some

methods for information collection were introduced for the screening and management of COVID-19 cases. By employing these techniques, precise information about the location and time of exposure and other details would be accessible to the general public (24).

Singapore had the experience of the 2003 SARS outbreak and performed well due to its readiness. Intensive Care Units (ICUs) of the country were fully prepared and responded swiftly to the virus outbreak (20-22). As a result, no death has been reported in the country yet (37). Many countries enacted policies on travel restrictions, such as suspension (6, 10, 15, 27, 29-33) or close monitoring of the incoming travelers on their arrival at the international airports (10, 19, 20, 28). Iran has launched a psychological assistance system for residents as well as establishing a self-monitoring website for suspected cases of COVID-19 (11, 12). Considering the high rate of mortality and confirmed cases in Iran, it seems that stricter policies are needed to be implemented by the government to curb the speed of the infection. Italian and Iranian governments solely screened symptomatic cases, while South Korean officials planned to monitor the whole population. Healthcare strategies in tracking people based on the available resources in different countries would be of significant importance.

Many other management strategies were employed worldwide, including quarantining (8), encouraging the limitation of social contacts, postponing events, closing schools, and isolating suspected cases (6, 22). More efficient clinical management of infected patients in addition to public health preparedness (1) in addition to a prompt and accurate screening of the epidemic are needed in all countries in order to succeed in managing the spread of the infection (38).

At the beginning of the epidemic, China led the virus transmission rate, while in the next few weeks, other countries took over China as the leading country with the fastest pace of the spread. Italy, Iran, and Spain confronted a remarkable increase in the number of confirmed cases and deaths; As on March 19, 2020, It was reported that Italy overtook China with more than 3400 deaths from the virus(39). This would probably be the result of late quarantining in Italy compared to china.

Regarding management and investigative strategies, there has still been remarkable unfamiliarity for many countries. It is highly recommended that isolation and home quarantine would be held for symptomatic and asymptomatic cases, respectively. International cooperation would be

beneficial in controlling the spread of the virus (40), and by screening the situation deeply, further context knowledge about the new virus would be gained, and nations can respond better (41). The most known measures to control and prevent the disease include finding suspected cases and their contacts, blocking the transmission of the virus by isolation, and personal protection as well as managing the infection sources (42).

5 Conclusion

According to the management decisions of some governments on quarantining, social isolation, and flight suspension due to the severity of the virus spread, it is highly assured that this strategy would be a successful technique to confront the present pandemic. In addition to that, there are some prediction models(43) in which experts forecasted the positive impact of these plans on controlling COVID-19 infectious transmission. In the United Kingdom, there is also a public request on holding more robust measures of restrictions by the government. Although this policy can have a tremendous economic burden on countries, this issue may be solved by some approaches, including the allocation of financial support to riskier zones through worldwide health institutes and international banks. Overall, we advocate a probable global plan of forceful isolation by WHO, which would be an accomplishing approach in this critical era. This decision should be made promptly by globally responsible officials to conquer the pandemic.

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