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Containment, mitigation, and suppression in the fight against the COVID-19 pandemic: survey and analysis

Contención, mitigación y supresión en la lucha contra la pandemia COVID-19: encuesta y análisis

Contenção, mitigação e supressão no combate à pandemia do COVID-19: levantamento e análise

DESCRIPTORS: Coronavirus Infections; SARS Virus; Quarantine; Patient Isolation; Pandemics.**DESCRIPTORES:** Infecciones por Coronavirus; Virus del SRAS; Cuarentena; Aislamiento de Pacientes; Pandemias.**DESCRITORES:** Infecções por Coronavírus; Vírus da SARS; Quarentena; Isolamento de Pacientes; Pandemias.**RECEIVED ON:** 04/20/2020 **APPROVED ON:** 04/21/2020**Miriam Viviane Baron**

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On February 11, the World Health Organization (WHO) declared the pandemic for the new coronavirus (COVID-19). Since then, social distancing, quarantine and isolation

of patients confirmed for SARS-CoV-2 have been recommended, both in countries with zero cases and those with community transmission. Thus, to control transmission, countries have

adopted public health measures, such as containment, mitigation and suppression. Containment allows the adoption of deliberations that limit the spread of a pathogen in well-defined foci - such

as in the identification and isolation of infected patients, contact tracking and quarantine of small areas, where the cases appeared to break the chain of transmission. When the virus spreads rapidly and there is sustained local transmission, making it impossible to isolate all cases, mitigation measures are adopted involving the closure of schools and the banning of events with social agglomeration, to avoid overloading the health system and increasing cases. who need intensive care⁽¹⁾. Suppression is a measure of intensive and large-scale social detachment that aims to suppress rapid transmission and minimize short-term deaths. The large volume of confirmed cases, deaths and the collapse of the health system results in the so-called lockdown. People circulate on the streets solely to buy food and medicines, or to work, in the case of health professionals. The goal is to reduce the number of reproductions - the average number of

secondary cases that each case generates - (as in SARS or Ebola) that eliminates human-to-human transmission^(1,2).

Researchers have recommended that non-pharmaceutical interventions based on physical distance have a strong potential to reduce the magnitude of the COVID-19 epidemic peak and lead to fewer cases, thereby reducing the demand on the health system. Tracking the number of infected and dead and contingency measures adopted by the first two countries on each continent: North America, South America, Europe, Africa, Asia, the Middle East and Oceania that have reported proven infections by COVID-19 can provide data for an analysis of the effects of these actions. The list of these countries is shown in Chart 1.

It appears that the number of infected, deaths and the time intervals between measures of containment, mitigation and suppression are different among the countries listed. In addition, the peculiarities

adopted in each phase by each of them are added as follows:

United States of America (USA) - The containment was limited to the identification and isolation of suspected and confirmed cases and the suspension of the entry of immigrants and non-immigrants from China (Jernigan). The active monitoring of close contacts of patients with confirmed contamination through calls, text messages and symptom assessment was the main method used to control new cases. When implemented, social distancing and the decrease in trade activities, there was resistance, leading to a delay in the implementation of more aggressive measures. New York has become the new epicenter of the disease.

Canada - Adopted measures similar to those of the USA. The border with the US closed three days after the beginning of the mitigation. It is observed that the mortality rates due to COVID-19 are also similar between

Chart 1. List of the first two countries on each continent to report COVID-19 proven infection. Porto Alegre, RS, Brazil, 2020

PAÍSES														
	INÍCIO*	INFECTADOS	ÓBITOS	INÍCIO	INFECTADOS	ÓBITOS	DIAS M-C	INÍCIO	INFECTADOS	ÓBITOS	DIAS S-M	DATA	INFECTADOS	ÓBITOS
EUA	23/01/2020	1	0	11/03/2020	696	25	48	NA**	-	-	-	20/04/2020	760.570	40.702
Canadá	27/01/2020	1	0	13/03/2020	138	0	46	NA	-	-	-	20/04/2020	36.039	1.626
Brasil	26/02/2020	1	0	13/03/2020	77	0	16	NA	-	-	-	20/04/2020	39.144	2.484
Equador	29/02/2020	1	0	11/03/2020	17	0	11	17/03/2020	111	2	6	20/04/2020	9.468	474
França	25/01/2020	3	0	29/02/2020	57	2	35	16/03/2020	5.380	127	16	20/04/2020	154.098	19.744
Alemanha	28/01/2020	1	0	16/03/2020	4.838	12	48	22/03/2020	21.463	67	6	20/04/2020	145.743	4.642
Nigéria	28/02/2020	1	0	21/03/2020	12	0	22	30/03/2020	65	1	9	20/04/2020	627	21
Argélia	25/02/2020	1	0	11/03/2020	20	0	15	05/04/2020	1.251	130	25	20/04/2020	2.629	375
China	31/12/2019	1	0	14/01/2020	41	1	14	23/01/2020	571	17	9	20/04/2020	83.817	4.636
Tailândia	13/01/2020	1	0	18/03/2020	177	1	65	02/04/2020	1.771	12	15	20/04/2020	2.792	47
Egito	15/02/2020	1	0	18/03/2020	166	4	32	NA	-	-	-	20/04/2020	3.144	239
Emirados Árabes Unidos	29/01/2020	4	0	19/03/2020	113	0	50	09/04/2020	2.659	12	21	20/04/2020	7.265	43
Austrália	25/01/2020	3	0	13/03/2020	140	3	48	NA	-	-	6	20/04/2020	6.547	67
Nova Zelândia	28/02/2020	1	0	24/03/2020	102	0	25	NA	-	-	6	20/04/2020	1.440	12

Note: NA: It hasn't happened yet; * same date as the detection of the first case; ** New York and other cities in the United States entered a phase of suppression since 20/03/2020; M-C days: number of days between containment and mitigation; S-M days: number of days between mitigation and suppression.

Source: Data collected from the World Health Organization website⁽³⁾ and Johns Hopkins University⁽⁴⁾.

countries, being approximately 2.4 per 100,000 inhabitants for Canada and 2.1 per 100,000 for the USA.

Brazil - Initially, it adopted health surveillance measures to detect, notify and respond quickly to possible cases of the disease, in addition to preparing the public health system for the treatment of suspected and confirmed cases. The measures to prevent COVID-19 involved surveillance at ports, airports and borders, avoiding, in principle, restrictive measures considered disproportionate to the country's situation. In Brazil, states have the autonomy to adopt contingency measures. Sixteen days after the announcement of the first case, community transmission in the cities of São Paulo and Rio de Janeiro was confirmed. So, some mitigation measures were reported by the Ministry of Health⁽⁵⁾, which included the use of respiratory etiquette, home isolation for symptomatic or confirmed cases, voluntary isolation for individuals who recently traveled abroad, and the cancellation or postponement of major events. In addition, in cities with local transmission of the virus, measures to restrict social contact were recommended for the risk group. Some states have announced specific mitigation measures that include closing schools, suspending events (including services and face-to-face celebrations), closing shops, leisure and sports centers, shopping malls and specific security measures for the operation of bars, restaurants and food courts, with services considered essential. On March 19, 2020, some restrictions were imposed on the entry of foreigners into Brazil across land borders and by air.

Ecuador - Mitigation measures ended activities in public and commercial services, except the essential ones, such as markets, banks, pharmacies and health services, and were quickly followed by suppression measures. The curfew was imposed for vehicles and people, from 9 pm to 5 am. All international travel to or from the country has been canceled; internal travel between cities was also prohibited. The deadlines between miti-

gation and suppression were the shortest in the countries listed in Chart 1.

France - The COVID-19 pandemic in Europe had its first recorded case in France. The French government drew up an internship plan: 1 - delaying the presence of the virus in French territory, 2 - implementing mitigation measures, making prevention more stringent and tracking each case back to the source. Sixteen days after the start of the mitigation, France has adopted suppression measures leading to the confinement of the population for a period of at least 15 days with a fine of 135 euros for non-compliance. The suppression period is expected to extend until mid-May.

Germany - Within a longer period than France, social distance, the closing of borders with several countries, the closing of trade, the ban on long-distance bus travel and the cancellation of holidays in the country and abroad was imposed⁽⁶⁾. More comprehensive restrictions on freedom of movement for two weeks prohibiting interactions with more than two people in public spaces, subject to a fine of up to 25,000 euros, extended the quarantine decree until mid-April.

Nigeria - Africa's most populous country has restricted travelers from countries with more than 1,000 cases of coronavirus. The restriction of flights and visitors was necessary, as 57% of the cases had a history of travel to high-risk countries⁽⁷⁾. The suppression ordered the total confinement of the populations of the capital and megacities with 20 million inhabitants. The closure of all movements in these two cities was ordered for an initial period of 14 days. Nigeria has managed to contain the advance of COVID-19 in its country very successfully, as it has confirmed cases in 20 of the 36 states.

Algeria - Mitigation ended sporting events, competitions, meetings, events and cultural activities. The flights were progressively canceled and, by decree, transport services were suspended and bars, restaurants and entertainment spaces were closed. Meetings with more

than two people were prohibited. As the number of cases increased, suppression measures were decreed in the country, curfews were imposed in the capital and eight other provinces from 3 pm to 7 am. When compared to Nigeria, there appears to be an association between the number of infected and dead and the number of days to implement suppression.

China - First country to identify and report the new coronavirus. Soon, the seafood market in Wuhan City closed for sanitation and environmental disinfection. The mitigation phase required the installation of 35 infrared thermometers at airports, railways, bus stations and ferries. Public education on disease prevention and environmental hygiene has been strengthened in public places across the city. The coronavirus test in China was done free of charge and the government pledged to pay COVID-19 charges not covered by health insurance⁽⁸⁾. New hospitals were built and medical services were transferred to online format. In addition, people who thought they had the new coronavirus were referred to specialized fever clinics, which were created when the country dealt with the aggressive SARS outbreak in 2002. The suppression phase brought a stoppage across the country, requiring that every resident Chinese stayed at home until the curve was flattened, and for that rule to be enforced, there were security guards on patrol in the streets.

Thailand - Second country to have registered COVID-19 in the world. After confirming the first case, all travelers arriving in the country had to complete a declaration with information in order to be able to be located and monitored by the Thai authorities, in addition to installing a cell phone application to monitor these tourists. The country has also subjected all travelers who show symptoms to confirmation tests by COVID-19. If the result were positive, individuals would be compulsorily admitted to the quarantine system. Mitigation measures started more than two months after the confirmation of the first case,

closing schools, universities and leisure spaces. Due to the increase in the number of cases, the Thai government evolved to suppression measures and imposed a curfew, in addition to a sentence of up to two years in prison for those who did not comply with the rule.

Egypt - Adopted containment measures such as the general alert of the population to preventive measures; afterwards, mitigation measures like closing mosques and churches⁽⁹⁾. Suppression measures have not yet been officially taken, and the closure of schools and commerce is still not very well accepted by the country's government. There are reports of the difficulty of publicly claiming that the number of infected people registered by the authorities was much lower than the government had officially confirmed.

United Arab Emirates - Mitigation measures were initiated 50 days after the beginning of the containment. The suppression measures were implemented when the Dubai authorities began to impose fines of R\$ 70,000 for people who violated the isolation measures. Tests

have been intensified and carried out free of charge on a "drive-thru" system, which works in different parts of the city, in addition to drones that clean streets and public places. Cruise operation has also been banned at local ports.

Australia - cases are predominantly of people with a history of recent travel abroad. With the increase in cases, social isolation, which was imposed on travelers abroad and for confirmed cases and their contacts, became mandatory for all citizens. Schools remain open and it is recommended that children with symptoms suggestive of COVID-19 remain at home.

New Zealand - The main focus was the screening of confirmed cases and possible contacts. He used contact tracking and announced self-isolation, in addition to adopting measures to restrict borders and travel to China. Mitigation measures led to the cancellation of meetings, the closure of facilities, with the exception of essential services, the closure of public places and physical distance, followed by the closure of educational institutions and the re-prioritization of the health

service. The borders remain closed to almost all travelers. In April, the country has observed a daily drop in the number of new confirmed cases, while maintaining the number of tests performed daily for COVID-19, which represents a positive result for the measures adopted⁽¹⁰⁾.

Notwithstanding, the differences in country approaches to contain the spread of the new coronavirus, it is necessary to consider the weight of other factors in the final result of the number of deaths and infections, among them: age, sex, education, habits, population, density population, territorial extension, climate, socioeconomic aspects, infrastructure, political regime, freedom of expression, underreporting, clinical criteria, access to tests, basic sanitation, health system, among others.

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