Abstract

**Purpose:** The devastating consequences of the COVID-19 pandemic for individuals, families, communities, countries, and the world as a whole offers vivid proof that microbes could be just as destructive and terrifying than the use of nuclear weapons. Pandemic caused by Covid-19 is realizing the dangers of bioterrorism and is aimed at emphasizing the importance of a system to prepare for it.

**Method:** To this end, the Covid-19 response policies of various European countries are examined to identify and examine the factors needed to respond to bioterrorism. To this end, we looked at the Pandemic response systems in Italy, France, Germany, and the United Kingdom in Europe.

**Results:** As a result, it is necessary to be prepared in advance in responding to infectious diseases and to respond immediately through quick decision-making. The policy also needs to be consistent and clear. In response to terrorism, it’s not much different from the epidemic. First, legislation such as immigration policy, quarantine system, and counterterrorism law is needed. It is also necessary to establish protocols and systems for tracking, testing, and isolation of infectious diseases. Finally, it is necessary to educate and promote people in advance so that they can respond to terrorist situations such as bioterrorism. Preparing these policies in advance is a way to overcome emergency situations such as bioterrorism.

**Conclusion:** As a result, preparations for infectious disease measures, quick decision-making, consistency and clarity of policies were derived, and to this end, legislative reform, bioterrorism response protocols were proposed, education and promotion of the people were proposed.

**[Keywords]** Covid-19, Pandemic, Bioterrorism, Biological Agent, Response System of Bioterrorism

1. Introduction

Warnings of biological and chemical terrorism have been around for a long time. Biological and chemical terrorism is easier to implement than nuclear terrorism, while the consequences can be even worse. It is the covid-19 pandemic that informs it well. The devastating consequences of the COVID-19 pandemic for individuals, families, communities, countries, and the world as a whole offers vivid proof that microbes could be just as destructive and terrifying than the use of nuclear weapons[1]. In response, the World Health Organization(WHO) officially declared on Jan. 30, 2020 that COVID-19 was a “Public Health Emergency of International Concern(PHEIC)”[2].

COVID-19 is a respiratory syndrome caused by SARS-CoV-2 infection that has been known to spread to the present day through coughing droplets or contaminated object contact[3]. MERS(Middle East Respiratory Syndrome) and SARS(Severe Acute Respiratory Syndrome) are also infectious diseases through respiratory tract, similar symptoms to Covid-19, but there is a difference that the infectious disease is incomparably higher in the case of Covid-19.
As we go through the worst pandemic since the 20th century, we realize the dangers of biochemical tarrers and the importance of their response. Currently, Covid-19 has caused more than 100 million confirmed cases and more than 2 million deaths worldwide. This situation could be caused by bioterrorism. There have been no terrorist incidents in Korea by international terrorist groups or followers of radical ideas, but there have been continuous signs of risk of fleeing overseas terrorists and raising terrorist funds in areas such as industrial complexes in the Seoul metropolitan areas including Ansan and Incheon, Gyeonggi Province, and the risk of homegrown terrorism by Muslim naturalized citizens (1,400 people), 2nd generation immigrants (1,300 people), and political and social discontent forces is also increasing [4].

The relationship between infectious diseases and bioterrorism is very close, and the response system is basically similar to infectious diseases and bioterrorism, so it can be applied to each other. In other words, the quarantine system for infectious diseases and bioterrorism can be implemented in a similar way, so it is possible to establish a quarantine system to respond to bioterrorism based on it in the Covid-19 situation.

Therefore, the purpose of this paper is to examine the response status of Covid-19 in each country and propose a response system to bioterrorism.

2. Bioterrorism
2.1. Definition of bioterrorism

Throughout history, infectious diseases have been used as weapons in conflict. In medieval times, for instance, dead plague victims or anthrax-infected cattle were catapulted into a besieged city to infect its inhabitants. Over time, states developed various biological weapons programs, such as Germany during World War I (e.g., anthrax, cholera) and Japan in World War II (e.g., anthrax, plague) [5].

As a result, the Geneva Protocol (1925) prohibited the use of chemical and bacteriological weapons in international armed conflicts. This prohibition was expanded by the Biological and Toxins Weapons Convention (BTWC) (1975) thus becoming the first multilateral disarmament treaty banning the development, production, and stockpiling of an entire category of WMD. In addition to the use in interstate conflict, there are also several examples of non-state actors deploying biological agents [6].

A biological agent is a bacterium, virus, protozoan, parasite, or fungus that can be used purposefully as a weapon in bioterrorism or biological warfare. In addition to these living or replicating pathogens, toxins and bio-toxins are also included among the bio-agents. More than 1,200 different kinds of potentially weaponizable bio-agents have been described and studied to date.

The bioterrorism defined in CDC (Centers for Disease Control and Prevention) is as follows. Terrorism using biologic agents that are harmful to humans. Biological diseases and the agents that might be used for terrorism have been listed by the US Centers for Disease Control and Prevention (CDC). These agents include viruses, bacteria, rickettsiae (microorganisms that have traits common to both bacterial and viruses), fungi, and biological toxins. The biological disease agents are classified into three categories, according to the degree of danger each agent is felt to pose [7].

Category A agents, the highest priority, are associated with high mortality and the greatest potential for major impact on public health. Examples of Category A diseases include anthrax, botulism, the plague, smallpox, tularemia, and hemorrhagic fever due to the Ebola and Marburg viruses. Category B agents are ‘incapacitating’ because of their potential for moderate morbidity but relatively low mortality. Category C agents include emerging threats and pathogens that are potentially effective weapons. Examples of Category B diseases include Q fever, Brucellosis, Glanders, Ricin toxin, epsilon toxin of the gas gangrene bacillus, and Staphylococcus enterotoxin B. Examples of Category C diseases include Nipah virus, Hantavirus, tickborne hemorrhagic fever and encephalitis viruses, Yellow fever, and Tuberculosis (multi-drug-resistant TB) [8].
The problem of biological agents is that facilities to undertake research on or to produce biological agents are more difficult to detect and easier to hide than facilities to produce fissile material for nuclear weapons. The difficulties of detection enhance the risk of a surprise appearance of a new biological-weapon capability. Concerns about possible future weapons are even greater than the concerns about today’s biological weapons. Studies warn that new biowarfare agents could be developed through genetic engineering and that ways could be explored to weaponize biochemical compounds called bioregulators, which control basic human functions, from thought to action. Biological toxins are attractive weapons because they can cause widespread social fear and panic beyond physical damage[9].

2.2. Bioterrorism and covid-19

Much has been written about terrorist calculations for engaging in bioterrorism, with the general consensus among experts being that only a relatively small subset of terrorists is willing and able to do so[10]. Within the terrorist calculus, however, at least part of the motivation to pursue biological agents as weapons is based on the consequences that such weapons are likely to have. These, in turn, are influenced to a large degree by the vulnerability of the target society to infectious diseases in general. The inability of even highly developed countries to stop the spread of the virus and the often incoherent and delayed responses of authorities at all levels have exposed the myriad weaknesses present in global public health systems. Such outcomes will not go unnoticed by terrorist groups, who will remember these impacts when seeking new means to achieve their goals. It must be remembered that a key strategy of terrorism is to inflict psychological damage on populations as a means of coercion, usually through physical harm or the threat thereof. The societal disruption, economic damage, and deaths caused by COVID-19 are a perfect script for the theatre of terrorism.

It is thus logical that for many terrorists, wherever their prior calculations for bioterrorism had ended up, the vulnerabilities highlighted by the COVID-19 pandemic have shifted these towards the more attractive end of the scale[11]. For those terrorists who were near but not quite at the tipping point where they would actively pursue bioterrorism, the pandemic might push them across the Rubicon. At the same time, the indiscriminate nature of COVID-19, and the fact that it is affecting everyone irrespective of religion, ethnicity or citizenship, might give other terrorists that only target specific populations pause, at least when it comes to utilizing contagious pathogens[12]. The potential increase in the likelihood of bioterrorism might therefore be restricted to the more generally misanthropic terrorists or those espousing more transcendental ideologies.

The failure of governments in each country to deal normally in the current Pandemic situation is another reason why terrorists are attracted to bioterrorism. Since the report of SARS-like respiratory syndrome in Wuhan, China in December 2019, there has been a rapid global transmission as no proper response has been made. Governments failed to respond to the coronavirus in its early stages, causing more serious situations. The insufficient quarantine system increases the chances of successful bioterrorism, which makes terrorists more interested in it.

While the majority of past cases of terrorists and other violent non-state actors attempting to use biological agents to cause harm have involved noncontagious agents, like Bacillus anthracis and various biological toxins, there have been roughly a dozen cases involving contagious pathogens according to the Profiles of Incidents involving CBRN and Non-state Actors (POICN) Database[13]. Among the more prominent of these figure plots by R.I.S.E., a small group who planned to use Salmonella typhi in 1972 as part of a plot to destroy the world and repopulate it[14], as well as the Japanese doomsday cult Aum Shinrikyo, which attempted to collect Ebola virus samples in Zaire during its “African Salvation Tour” in 1992[15]. In 1995, white supremacist Larry Wayne Harris ordered vials of Yersinia pestis, the causative agent of bubonic and pneumonic plague[16], and in 2014 a laptop of a Tunisian linked to ISIS indicated an interest in weaponizing the same agent[17]. Recent studies have suggested that intentionally disseminating dangerous pathogens by using one person to infect others is certainly possible for perpetrators who are less concerned with their own safety[18]. It is therefore not out of the ques-
—particularly since it is so infectious and samples are readily accessible—that terrorists might be drawn to considering using the SARS-CoV-2 virus as a weapon.

There are three possible scenarios in this regard. First, there are low-level threats of actual spreading of the virus with little to no premeditation, usually as part of an emotional outburst or idiosyncratic behavior. There have been multiple cases in the United States, as well as reports from the United Kingdom, Italy, Japan, Belgium, Australia, Kazakhstan, and elsewhere of individuals claiming to have coronavirus intentionally and coughing or spitting on other people, licking products in stores, and similar behavior[19]. While not rising to the level of behavior that academics generally attach to the term terrorism, at least in the United States some of these have been prosecuted as cases of terrorism[20].

2.3. Characteristic of bioterrorism

Bioterrorism is covert. Without prior warning or specific information, a clinical condition appears before the contamination situation is known. Thus, the individual is the first to be seen in a medical environment, unlike conventional weapons or natural disaster scenarios in which police, firefighters, paramedics and other emergency service personnel are the first responders.

Potential targets for terrorists are widespread and somewhat unpredictable. Immediate recognition of a common source outbreak from a bioterrorist event might be missed secondary to a clinical latency period following exposure and casualties are likely to present for medical attention in diverse locations and at varying times[21]. This illustrates the critical importance of surveillance, data sharing and real-time communication.

Initial symptoms of bioterrorism-associated diseases may be nonspecific. In the absence of a known exposure, many mildly symptomatic individuals may either not seek medical attention or may be misdiagnosed with a nonspecific, ‘flu-like’ illness. However, once beyond the early stages, many of these illnesses progress rapidly and treatment may be less effective.

Most of the diseases caused by agents of bioterrorism are rarely, if ever, seen in clinical practice. Therefore, physicians are likely to be inexperienced with their clinical characteristics. By definition, agents of bioterrorism have been laboratory-manipulated and may therefore not demonstrate the classic clinical features of naturally occurring infection.

Early identification of bioterrorism can be facilitated by recognizing specific epidemiological and clinical clues. Clustering of patients with common clinical syndromes, especially unusual or known to be associated with bioterrorism agents, should prompt notification of public health authorities. The recognition of a single case of a rare or non-endemic infection in the absence of a travel history or other potential natural exposure. Unusual epidemiologic patterns of disease, such as atypical age distributions, unexpected clinical severity, or concurrent illness in human and animal populations. For some agents of bioterrorism and several naturally occurring, emerging infectious diseases, evidence supports the potential role of animals as early warning sentinels of an attack or as markers of persistent exposure risks to humans[22].

3. National Quarantine System

3.1. Italy

Until vaccines and treatments are developed, Italy's strategy to respond to Corona 19 can be divided into blocking inflows from abroad, social distancing, and Progressive mitigation(stage 2). Italy's response strategy follows a one-sided trend in which local governments interpret and decide whether to adopt the bill if the central government submits it[23]. This makes it difficult to say that a single systematic and integrated response strategy has been implemented due to different timing changes in response strategies and different regional distributions. The traditional infection prevention strategy, which isolates suspected people from outside, was adopted before other European countries, but at the same time did not pay much attention to infections in the community. As soon as a large-
scale community spread was discovered in late February, the government announced a local high-intensity social distancing the next day, and quickly strengthened its size and strength, once implementing a nationwide total blockade. On the other hand, the strategy of lifting and easing the blockade, which was first announced on May 3, was implemented by repeating the introduction and withdrawal step by step in line with the trend of increasing and decreasing the number of confirmed people.

3.2. France

The French government’s initial response was a mitigation strategy. Only patients with symptoms were tested. There was a problem with this initial response strategy. According to the Moatti JP(2020), Korea(12 confirmed people) and France(6 confirmed people) were in a similar situation on 1 February 2020, but France decided to block the country at the highest level. France was unable to conduct mass testing due to a lack of test reagents, and the school issued a shutdown order during the March 15 national elections, causing problems in communication in the crisis. Some media outlets have also fueled controversy by publishing the effects of the drug "hydroxychloroquine" as a covid-19 treatment. After such a chaotic experience, the French government shows clear and consistent performance in response strategies, such as increasing inspection capabilities, strengthening physical distancing, and forcing people to wear masks[24].

3.3. Germany

Germany’s response to the Covid-19 pandemic was led by the federal government and local governments, led by the Robert Koch Institute(RKI). Germany was decentralized, so the quarantine policy was decided by coordination between local and federal governments. Merkel assumed the worst situation in several interviews and speeches regarding Covid-19, for example, at a press conference on March 11, warning that 70% of the population could be infected with Covid-19, because there were no Covid-19 drugs and vaccines. Merkel promised the people’s cooperation in responding to Covid-19 and national support, and emphasized solidarity and social symbiotic spirit to overcome the Covid-19 trend[25]. Chancellor Merkel left the quarantine policy to an expert at the Robert Koch Institute(RKI), where Germany’s top experts gathered, and focused on persuading the people. Christian Drosten, a German coronavirus expert, said in an interview with the Guardian that Merkel herself is a scientist and helps her respond appropriately to the Covid-19 epidemic[26].

3.4. England

The UK has established and clearly announced and implemented response strategies according to appropriate procedures, but have not been consistent. In the early days of fashion, containment strategies were applied to track and isolate confirmed and contacted persons. As the trend spread in mid-March, it was announced that it would be implemented as a delay strategy on March 12, and that it would stop tracking and inspecting contacts[27]. However, the announcement came a day after the WHO announced the Covid-19 pandemic, and four days later, it was not until it was officially recommended that social distancing was officially recommended and the chief medical advisor stated in a press conference that the goal was to obtain some sort of collective immunity[28].

The WHO also recommended testing of suspected patients, and from 16 March, the revised strategy was adopted[29]. It was recommended that non-essential social contacts should be avoided for social distancing, and that only children of key personnel should be allowed to go to school two days later[30]. From 23 March, Full lockdown was implemented, restricting freedom of movement and limiting gatherings and recommending staying at home.

4. Response System of Bioterrorism

Earlier, we looked at the Covid-19 response system in many European countries. As a result, it is necessary to be prepared in advance in responding to infectious diseases and to respond immediate-
ly through quick decision-making. The policy also needs to be consistent and clear. In response to terrorism, it's not much different from the epidemic. It is important to respond to terrorism immediately through quick decision-making because it is also necessary to respond to terrorism and it occurs in an urgent situation. And it is better to be consistent and clear in counterterrorism policies. In that respect, many European countries have introduced decentralization systems such as the federal system, which has disadvantageous factors in this regard.

Korea has the advantage of being able to carry out fast, consistent and clear policies because it has a structure in which power is concentrated in the central government. These factors can be seen as the reason why Korea’s quarantine policy is recognized worldwide. Therefore, it is necessary to prepare the terrorist situation in advance and prepare protocols to cope with bioterrorism. There is still a lack of Korea’s level of responding to bioterrorism, and it needs to be supplemented in the future.

First, legislation such as immigration policy, quarantine system, and counterterrorism law is needed. In order to proceed with the policy, legal grounds are needed and it is necessary to prepares in advance. It is also necessary to establish protocols and systems for tracking, testing, and isolation of infectious diseases. It is necessary to designate a command system, director, and specialized hospitals in advance that can respond in the event of a bioterrorism incident. The characteristic of the corona response system is that the policy objectives are very urgent and important, so the network is showing a centralized appearance, and the fact that Korea Disease Control & Prevention Agency(KDCA) has been highly recognized for its specialty and expertise to respond to the pandemic[31]. also, local healthcare organizations should hire experts in infectious diseases and offer sustained education for them[32]. Finally, it is necessary to educate and promote people in advance so that they can respond to terrorist situations such as bioterrorism. Preparing these policies in advance is a way to overcome emergency situations such as bioterrorism.

5. Conclusion

This study was conducted to recognize the increasing threat of bioterrorism in the Pandemic era and to establish a response system. Therefore, I wanted to look at the Covid-19 response systems in many European countries and learn from them. As a result, preparations for infectious disease measures, quick decision-making, consistency and clarity of policies were derived, and to this end, legislative reform, bioterrorism response protocols were proposed, education and promotion of the people were proposed.

6. References

6.1. Journal articles


6.2. Books


6.3. Additional references


7. Appendix

7.1. Authors contribution
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