

# Implementation of Aggregated Response Plan to Effectively Protect Crew Health and Safety and Prevent Spread of Covid-19 Pandemic Aboard Ships

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The global outbreak of Covid-19 has had a severe impact affecting all maritime sectors. It caused a significant worldwide health and economic crisis with a wide-ranging impact on maritime transport and trade. During this period, access to essential goods and medical items was ensured mainly by the ability of the marine supply chain to adapt by developing systems and processes quickly. Thus, regulations and instructions were imposed in response to the pandemic to monitor and counter the spread and the ancillary effects. This paper aims to assess and codify all those maritime regulations and instructions hastily created to protect the crew's health and safety and prevent the spread of Covid-19 aboard ships. Initially, all relevant rules and countermeasures to crew health and safety are explored and evaluated under the exploratory research coupled with the analysis of the relevant regulatory framework. Then, methods and processes are being created and proposed to offer a composed reaction plan to each case where the effects and consequences of the pandemic may occur. The relevant regulations are the primary source of data and similar studies conducted presently, whose outcomes are used to create and justify the recommended processes and the steps that should be followed based on the special conditions of individual cases. The paper concludes that implementing standard processes and procedures, such as those provided by the analysis, will enhance the speed and the effectiveness of handling the pandemic. It is also concluded that proactive measures coupled with fast and efficient responses are critical for developing effective procedures.

## KEY WORDS

- ~ Covid-19
- ~ Preventive measures
- ~ Crew health and safety
- ~ Proactiveness

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## 1. INTRODUCTION

The shipping industry is vital for international transportation; it is responsible for 90% of the world's trade (ICS, 2022). Specifically, it is the most effective and reliable means of transport. Moreover, it is responsible for making the international supply chain able to satisfy the ever-increasing needs for the carriage of goods. Nevertheless, the COVID-19 pandemic disrupted the "daily routine" and forced shipping companies to adapt and alter their operational processes and systems (Boviatsis, 2022).

Global shipping is dependent on nearly two million or approximately 1,545,000 seafarers worldwide, carrying the goods and products they need for everyday life (ICS, 2022). Although the sailors paid the highest price on board ships, almost all countries have closed their borders, ports, and airports due to the new coronavirus SARS-CoV2, making it impossible to replace them with other crews. Many sailors were also trapped in their homes and could not replace their colleagues (Boviatsis, 2022).

The European Union and IMO responded to the coronavirus outbreak and its effects by adopting various measures in many areas (health, economy, research, borders, mobility, etc.). However, the main focus of that legislation is the enforcement of proactive measures to counter the spread and handle the cases of infected crew (Psaraftis, 2002).

Bringing together all marine stakeholders to collectively address the pandemic and counter the risks to global trade and human health is an excellent example of how a common threat, such as Covid-19, can be tackled internationally. It is the common interest of all countries, governments, relevant international organizations, and maritime bodies to implement processes and systems to effectively counter the threat before it affects the crews and consecutively the international trade. The outcome of the spread of Covid-19 aboard ships would be the crew's unfitness for service. Subsequently, the vessel would be rendered unseaworthy, absent of the minimum required personnel aboard, affecting global trade and transport (Payer & Porter, 2021). Avoiding the occurrence of this threat requires close cooperation between international organizations, governments and shipping companies engaged in shipping to protect the health of seafarers (and passengers) and ensure the undisrupted operation of international trade (Millefiori et al., 2021).

Initially, governments must ensure that adequate and safe crew changes should be implemented so that the supply chain remains open. Every month, around 150,000 seafarers have to be replaced for these ships to remain effectively operational, according to the international maritime regulations on safety, health and well-being of the crew and the prevention of fatigue (Verschuur et al., 2021b). By mid-June 2020, around 300,000 seafarers required assistance to replace their fatigued colleagues effectively, while 70,000 sailors on cruise ships were waiting for repatriation (UNCTAD Report, 2020).

In addition, even crews on commercial fishing vessels, which provide an essential source of global food supply, must also be changed periodically to avoid fatigue. However, by 10 June 2020, only 30% of the world's governments were allowing crew changes; this situation was by no means sustainable, both for the safety and well-being of seafarers and for the safe operation of maritime trade altogether (UNCTAD Report, 2020).

Any disruption to global maritime transport networks can have far-reaching implications for the worldwide economy. When crises such as the Covid-19 pandemic arise, ensuring each port access to merchant ships ensures that the world continues to engage in maritime trade to a large extent, to transport supplies, energy and raw materials worldwide, and industrial products components, including vital medical supplies (Kamal et al., 2021).

It is estimated that the global trade in goods fell by 5% in the first quarter of 2020 and was expected to show an even deeper decline of 27% in the second quarter (UNCTAD Report, 2020). For the whole year, UNCTAD predicted a 20% drop. The World Bank further noted that the trade in goods appears to have fallen in

April, dropping nearly 20% year-on-year, after falling 10% in March. The contraction in trade caused by COVID-19 is more profound than that observed during the 2008-2009 economic crisis (UNCTAD Report, 2021).

Global trade performance was uneven, suggesting that the sharpest decline in April took place in the Middle East, which recorded a trade drop of up to 40%. Trade also collapsed in sub-Saharan Africa, Latin America, the Caribbean, North Africa, North America and the European Union (E.U. 27) following the pandemic spread by the World Health Organization in mid-March 2020. The declines in East Asia-Pacific trade were less severe, with exports recording a decrease of 7% in Q1 2020 and 4% in April. In April, China appears to have performed better than other major economies, with moderate growth in exports. However, data shows that China's imports and exports fell by about 8% (Kamal et al., 2021; UNCTAD Report, 2021).

Although trade slowdown was visible in developing and developed countries, the trade in developing countries declined relatively faster. While the decline in developing countries' exports may reflect reduced demand in destination markets, the fall in imports is also due to reduced demand and other factors such as exchange rate fluctuations, debt concerns, and a lack of foreign currency (UNCTAD Report, 2021).

Meanwhile, with the ongoing blockades in Latin America due to pandemics, forecasts of worsening trade in developing countries are rising ever more rapidly. In the destination markets, the fall in imports is also due to reduced demand and other factors such as exchange rate changes, debt concerns, and lack of foreign currency. Meanwhile, with the continued blockades in Latin America, forecasts show an increasingly rapid deterioration in developing countries' trade (Drury et al., 2021).

## 2. MATERIALS AND METHODS

This paper is an exploratory research study initially extracting primary data and information from international shipping organizations and associations that hastily responded with regulations and instructions to counter the effects of Covid-19 to crew aboard (BIMCO, 2021b; IMO, 2021).

Then those sets of regulations and instructions are assessed and codified into more structured and efficient processes to avoid the infection or the spread of Covid-19 to a ship's crew. Finally, the same method is used by Yamahata et al. (2020) and Huang et al. (2021) in similar shipping studies.

The analysis of the relevant legislation is based on the legal doctrine, dominant form in legal research, aiming to provide a systematic exposition of the legal and regulatory principles and to analyze the relationship between those principles to provide clarifications and, in this case, suggest a more effective organization and more efficient enforcement of the set legislation and recommendation (Carr & Ramezani, 2020; Wilkins, 1967; Tiller & Cross, 2006).

This research method is qualitative and is very similar to critical analysis, whose application is performed through (a) research and description of the existing legislation, (b) prescription whose essence is to search for practical solutions that may fit in the existing regulatory system to overcome problems arising from the hasty implementation and enforcement, (c) creation and justification of processes, based on the conceptual method (Van Hoecke & Warrington, 1998; Ivanov, 2021).

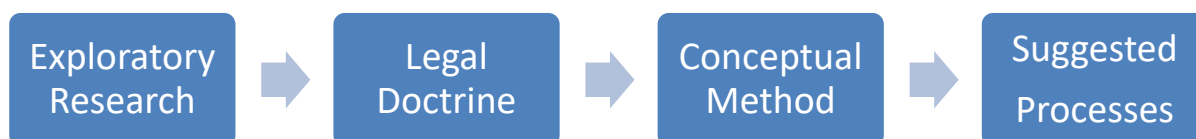


Figure 1. Research methodology

### 3. PREVENTION SYSTEMS AND MEASURES FOR SHIPPING COMPANIES ON BOARD SHIPS

Various vaccines have been created so far to deal with the pandemic. Initially, until the vaccination of the crew, public health authorities, under the guidance of the World Health Organization, tried to contain the virus through preventive measures to slow its spread and transmission. However, since the vaccination expanded, states should give priority to the immediate access of seafarers as essential workers to minimize the risk of communication between seafarers (WHO, 2021a).

All shipping companies have taken various coronavirus prevention and protection measures for their ships and crews under the World Health Organization and the International Maritime Organization (IMO) guidance to protect them as much as possible. According to the ISM Code, shipowners and shipping companies assess all recognized risks and establish appropriate precautions for their ships and personnel. As a result, companies developed plans and procedures to deal with Covid-19 for the health of seafarers and the safety of ships' operations (IMO, 2021; WHO, 2021b).

While marine safety and health measures had already been established aboard ships within the safety management system (SMS), ship managers detected the need to review or amend specific actions regarding the pandemic as an outcome of the hasty development of those measures (Moura et al., 2021).

Onboard prevention measures that respond to the risks associated with Covid-19 are presented as milestones in the following table (Moura et al., 2021; INTERTANKO, 2021a):

INFORMATION ABOUT COVID-19	MEASURES TO PROTECT HEALTH AND PREVENT INFECTION	MANAGING COVID-19 OUTBREAK ON BOARD	RESTRICTIONS ON ENTRY TO PORTS
1. Symptoms and incubation period	1. Monitoring and screening	1. Actions should be taken for a person showing symptoms of coronavirus aboard ship.	1. Delay of entrance and port clearance, which ships pass when they enter the port of each state.
2. Transmission	2. Personal protective equipment (PPE)	2. Definition of a suspected case of Covid-19.	
3. Personal protection	3. Testing and evaluation	3. Identification of a suspected case of Covid-19.	2. Prohibition of the crew leaving ports, or even repatriation or signing on, depending on the country's epidemiological situation.
4. Prevention of infection	4. Distance between people on board	4. Measures to reduce exposure to other people aboard ship.	
5. Testing and care	5. Cleaning and disinfection	5. Isolation of a suspected case in a particular area.	

6. Specialization and training	6. Measures for managing risks during embarkation of the seafarer.	6. Care of the case.	3. Imposition of quarantine, or even refusal of the ship's entry into port (in the extreme case).
	7. Risk management measures during disembarkation (repatriation of the seafarer).	7. Disembarkation of the suspected case	
	8. Measures for the management of risks related to ship-shore contact.	8. Cleaning and disinfection of the ship.	

Table 1. Assessment of prevention measures (Source: Author)

As the mutations of Covid-19 continue to spread rapidly and there are various means of spread, early intervention and proactive measures on the implementation of emergency and management mechanisms are required to counter the spread of the pandemic.

Under the guidance of the global health and maritime organizations (WHO & IMO), shipping companies have created a range of precautions and prevention measures for seafarers aboard ships to protect themselves from Covid-19. The entire shipping community has responded to this global threat by issuing guidance on the steps to prevent the spread. The shipowners have also created a set of contingency plans that describe entire processes of handling the case of a possible incident on board (IMO, 2021; WHO, 2021a).

These plans are based on the "COVID-19 OUTBREAK MANAGEMENT PLAN". Passenger ships, especially those engaged in international voyages, must have such a manual covering all cases of suspected cases on board, contact definitions, and a quarantine plan (INTERTANKO, 2021a; Verschuur et al., 2021a).

The "Covid-19 Outbreak Management Plan" must include the descriptions of the following:

- The ship's location where suspected cases should be isolated until disembarkation and transferred to a health facility.
- How to make the necessary communications between places (e.g. pharmacy, hostels, laundry, room service) for people placed in isolation.
- How the contacts of the cases will be managed.
- Procedures for collecting member/crew tracing forms (PLF).
- How to provide food service, utensils, laundry and more to isolated travelers.

The crew should have the necessary knowledge of this emergency plan and be able to implement it when needed. The World Health Organization, in collaboration with the International Maritime Organization, classification societies, and flag states are constantly providing updates on the response to the pandemic to shipping companies, and have proceeded to the creation of various preventive measures to limit and counter the spread of the coronavirus (IACS, 2021). The outbreak on the cruise ship "Diamond Princess", for example, provided the international community with an example of the importance of large-scale public transport in responding to public health emergencies (Yamahata & Shibata, 2020).

In cooperation with China's experience in the fight against COVID-19, proposals should be made to prevent and control the pandemic in terms of short-term response measures, the medium term, and long-term improvement of the mechanism (WHO, 2021c).

The International Chamber of Shipping has issued new guidance to the global shipping industry to fight the coronavirus, containing advice on managing port entry restrictions and offering practical Covid-19 prevention measures for seafarers, including an OUTBREAK Management Plan (INTERTANKO, 2021a; ICS, 2021b).

In general, shipping companies must provide their seafarers with information on Covid-19, hygiene measures, and precautions. Persons responsible for medical care on board ships should be informed of the outbreak of Covid-19 and any other information available. Companies and crew are advised to frequently monitor the WHO website for advice and instructions on Covid-19 (WHO, 2021a; WHO, 2021c).

### **3.1. Short-Term Protection Measures**

The core of short-term response measures is the exclusion of cross-infection from many infectious sources. Based on the effectiveness of the central quarantine and the difficulty of transporting staff, the "temporary cabin hospital" response idea was adopted.

The "temporary cabin hospital" is a concept of quarantine. The quarantine should be clarified in specific places where the infected person should be isolated and not contact anyone else. On cruise ships, for example, the area of the gym or some other entertainment can be defined as a place of isolation. However, in a concentration outbreak, quarantine on a cruise ship does not effectively control the spread of COVID-19. Therefore, it is further proposed to adopt making available "circular disinfection-repeat testing-batch transfer and quarantine-international collaborative medical treatment" to improve emergency response mechanisms in a cruise-related mass epidemic episode. Various solutions are designed and proposed (INTERTANKO, 2021a; WHO, 2021c).

### **3.2. Long-Term Protection Measures**

Seafarers should be especially careful about their health and follow the following instructions regarding their safety:

- Always wear masks in ports.
- Hygiene rules (regular hand washing, sneezing or coughing by putting tissue in front of them) should be applied regularly and avoid frequent close contact with other people (at least 2-3 meters away) and especially with people who will show possible symptoms of coronavirus (cough, sneezing).
- In addition, some special training should be done to the crews on dealing with and limiting a confirmed case.
- An epidemic management manual for ships should be developed to guide the crew appropriately.
- In the case of the appearance of the clinical picture of the disease, the use of mask should be mandatory. In addition, the crew member should be isolated in a particular enclosed area until the next port and, if necessary, repatriated there (INTERTANKO, 2021a; WHO, 2021c).

## 4. MONITORING AND MANAGING SUSPECTED CASES

Many shipping companies have put surveillance and management plans to deal with Covid-19. The first step for the crew member designated to take over the medical care aboard (99% of the captains or the first officers in the passenger ships) is to determine whether the condition is severe and necessary for communication or immediate medical care from shore, and seek advice (ICS, 2021b; Doumbia-Henry, 2020).

### 4.1. Monitoring Officer

In general, the captain is the one who will undertake the monitoring or at least will determine the officer who will make daily temperature measurements to the crew to monitor their condition twice a day, usually in the morning (around 8-9 a.m.) and in the afternoon (around 6 p.m.). Also, as responsible for medical care, the captain will seek immediate medical assistance at the nearest shore station in case of suspected cases and advise on the procedure and the following steps to take (Gavalas et al., 2022).

The results of monitoring and measuring the temperature of the crew and passengers shall be reported even if the number of suspected cases is zero. Under normal circumstances, the results should be reported daily to the management department of the shipping company at regular hours. In addition, in case of any fever, other suspicious symptoms or abnormalities, the health status of the crew detected should be immediately reported to the shipping company. If the case is considered severe or critical enough, the primary purpose will be to ensure that the patient remains stable until additional medical assistance is available (Hong & Li, 2020).

Timely identification of cases allows for the rapid start of supportive care and safe and fast referral and transfer to a designated facility on shore with the appropriate medical expertise and equipment. To meet this need for rapid testing, diagnosis and care, the crew member appointed as responsible for medical care must seek advice from the Telemedicine Assistance Service (TMAS) or another medical service. The plan below summarizes the path to identify and manage a suspected case of Covid-19 on board take (Gavalas et al., 2022).

### 4.2. Risk Assessment on Board

Risk assessment should be taken on two possible types of transmission of the coronavirus:

- Contact (close to less than 1 meter) between shore-based workers and ship's crew
- Contact between crew members.

Special consideration should be made for the areas of the ship where only crew members are involved and those who will facilitate newly embarked crew members. Therefore, as a principle, four zones and categories of approaches have been characterized aboard ships:

- Potentially contaminated zones are utilized when it is suspected that someone is infected with COVID-19. These are areas where suspected cases can be isolated in a particular ship area, such as the ship's pharmacy (medical room) and other probably contaminated places that have not been disinfected.
- Zones in which there is frequent contact among the ship's crew (such as mess rooms, smokehouses, bridge, shared toilets, ordinary cabins).
- Zones where the crew comes into contact with people from the shore.
- Zones where there is no contact between crew members.

This categorization will help decide which protective equipment should be taken in each zone or during each activity. Delegated crew members responsible for medical care aboard ships should be informed about the outbreak of Covid-19 and any new and available data and guidance. It is recommended that they regularly review the IMO, WHO, and similar organizations that maintain a constant flow of information (INTERTANKO, 2021a; Battineni et al., 2021; Templeton et al., 2020).



## 5. EMERGENCY RESPONSE IN CASE OUTBREAK IS FOUND

If a case is detected on board, prevention and control process management must be activated. In addition, the necessary isolation, prevention, and control procedures should also be followed.

### 5.1. In Port

Patients must be isolated immediately, and all crew members must take the necessary protective measures. Ships should report this case to the Company and their port authorities, and accept telemedicine instructions. Ships should contact the local service or representatives of their Company to arrange the disembarkation and medical transportation of patients, and ask the Company to assist on shore.

Crew members aboard must refrain from participating in the movement and transport of patients for any transmission of the virus to them. Contact tracing should begin immediately after detecting suspected cases on board; the ship should be thoroughly disinfected. The final disinfection should be carried out in the patient's cabin and movement areas. Close contacts with the patients should be isolated and placed under medical supervision in their cabins (at least for as long as necessary, maybe 14 days). (Hirata & Matsuda, 2021; De Beukelaer, 2021)

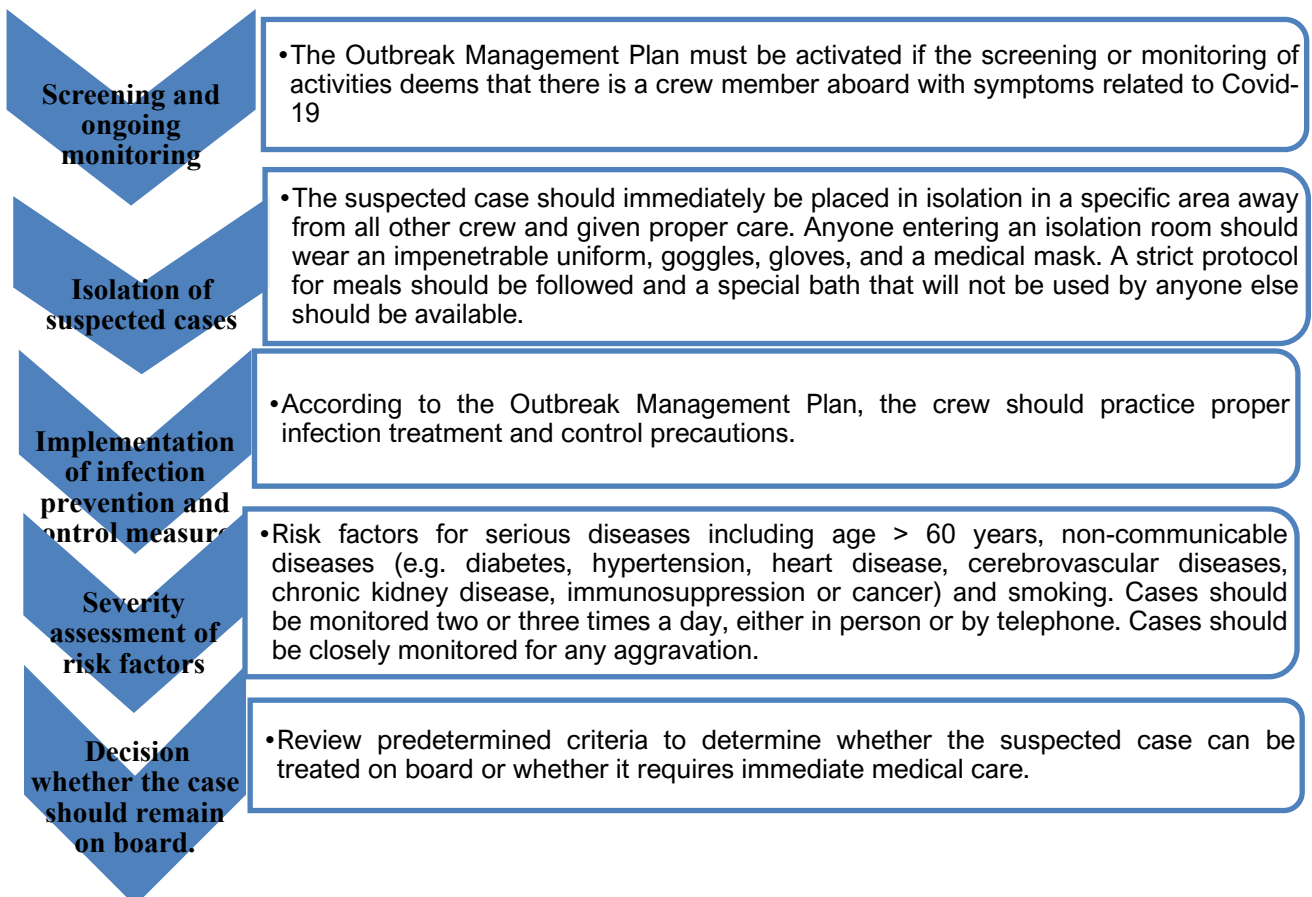


Figure 2. Process of handling crew infection on board



## 5.2. At Sea

Patients should be isolated immediately, and all persons on board should be separated as much as possible from each other, taking all protective measures (constantly wear gloves and masks, and wash their hands regularly). In addition, ships should report the incident to their companies, request telemedicine assistance from the nearest port authorities, and follow their instructions (Verschuur et al., 2021a).

The medical staff on shore and the ship jointly assess the patient's condition. If the condition is stable, the patient can be transported to the local hospital for examination and treatment after the vessel arrives at the port. However, if the patient's condition is critical, an urgent response should be started, and patients should be sent ashore for treatment as quickly as possible.

Ships must activate procedures to replace the emergency crew. Next, close contact with patients should be isolated and placed under medical supervision in their cabins. Finally, the vessel must be thoroughly disinfected, and the final disinfection must be carried out in the patients' cabins and their movement areas (Templeton et al., 2020; Stannard, 2020).

## 5.3. Movement for Care and Treatment

Moderate and severe cases, which have clinical symptoms of pneumonia, including fever, cough, and difficulty in breathing, should be called immediately by the master of the TMS and transferred to a medical facility on shore. The decision as to whether a patient will be monitored on board or transferred immediately to a medical facility on shore for further treatment will depend on the clinical presentation, requirement for supportive care, factors and situations aboard. When disembarking infected crew members, efforts should be made to minimize the exposure of other people (Sagaro et al., 2020).

## 5.4. Constant Communication Between Ship and Company

There should be clear and timely communication between the vessel, shipowner, agents, and organizations from shore to board the ship. The channels must be activated between the vessel and the competent authorities at the port, flag state and shipowner (e.g. directly from the master or the master to the doctor by telephone, videoconferencing or through the maritime telecommunications assistance service [TMS]). Procedures must be in place to collect information and communicate with all persons aboard to contact them if necessary during the 14 days after disembarkation (Stannard, 2020; Hebbar & Mukesh, 2021).

Communication protocols must be established for coordination from land to advise the ship if symptoms occur within 14 days of boarding the ship. Additional measures should improve communication and information aboard ships, including the following:

- Posters, videos and message boards to raise awareness of COVID-19 among crews and promote safe individual practices and interaction with the crew, providing enough material on preventing measures and their effectiveness and managing mental health challenges.
- Information on the applicable rules and local public health and social measures before arrival at each port.
- Regular information on the risk of COVID-19 using official sources, such as government organizations like the WHO, and highlighting the effectiveness of adopting protective measures and combating disinformation.

## **5.5. Communication and Contact with Patients**

The transmitting system and the intercommunications on board shall be used to communicate with patients to reduce the probability of direct contact (Sagaro et al., 2020). The supply of food and other things should be provided one after the other from time to time to reduce the likelihood of cross-contamination (Fanoy et al., 2021).

## **5.6. Care for Patients Isolated in their Cabins**

Patients on board who have contracted an infection with Covid-19 should be in their cabins, isolated from all the rest of the crew. Although they will be in their cabins, patients must wear a mask and be isolated in separate ones. In addition, they should have their meals alone in their cabins and cannot participate in group activities to avoid close contact with other crew members (Fanoy et al., 2021).

Their isolation area should be well-ventilated, ventilation systems should be used if necessary to circulate the atmosphere, and the rooms should be well-groomed and clean. Gloves, tissues, masks, and other waste used by patients should be placed in a unique disposable bag and labelled as dirt to be disposed of in the first given occasion (Fanoy et al., 2021).

The number of visitors without any particular reason should be reduced to an absolute minimum and a responsible with good health and without any chronic illness should be appointed to take care of the patient when they come into close contact with him (Fanoy et al., 2021).

Caregivers must take personal protective measures, such as masks, eye shields, and dresses. Protective equipment must be disinfected or discarded after use. All visits should be scrapped (Lai et al., 2020.)

## **5.7. Managing Close Contacts**

All persons aboard should be assessed and classified as close contacts or low hazards based on their level of exposure and passenger/crew tracing forms. Contact tracing should be initiated immediately after a suspected incident has been detected on board (WHO, 2021b).

All passengers, medical personnel and crew members who were exposed to high risk should be subjected to autonomous isolation under the supervision of the ship's medical personnel or by providing telemedicine for 14 days starting from the last possible exposure (Fanoy et al., 2021).

## **5.8. Transfer of Suspected Patients**

During disembarkation, the rest of the people aboard should avoid coming into contact with the patients. The patients should be confined within a certain perimeter. The patients must be transported by professional medical staff ashore (ICS, 2021a). When conditions require the participation of other crew members in the transport of patients, they must observe hand hygiene and wear a medical mask, goggles, robes and gloves (De Beukelaer, 2021). The transfer is also under the rules and regulations of the port of disembarkation. In port closure, special consideration should be made for the safe transportation of the infected crew (Templeton et al., 2020; Hebbar & Mukesh, 2021).

## **5.9. Disposal of Medical Waste**

All waste in quarantine cabins or areas shall be disposed of as medical waste, which shall, if possible, be incinerated aboard ship or collected and delivered to shore for special treatment as required by the authority of the next port of call (Sharma et al., 2020).

## **6. SUGGESTIONS ON PREVENTIVE MEASURES BEFORE EACH EMBARKATION**

In addition to the quarantine imposed by the Company, which may be in a hotel or any other place exclusively for this purpose and under monitoring, to avoid contact with other people, the infected person should also go through a parallel series of tests to determine his/her physical status as well as his/her immune system. A questionnaire with various questions about his/her health, such as whether he/she has any medical history or any specific illness in the past, symptoms, or even allergies, would help clarify the resilience of his/her health (Chua et al., 2022; ILO, 2021).

Seafarers should be given priority to vaccination. It should also be made compulsory so that when they go on board, they will protect themselves and not transmit the virus to the other seafarers. Tests should be done daily, at least once a day, with a rapid test if a result comes out positive and the intake of measures should be done on time (ICS, 2021b).

As far as their psychological state is concerned, they should be placed in some isolation and self-isolation, as already implemented in many countries (a room in a hotel or a special place exclusively for this purpose) and not get in contact with other people for a specific period to verify both their physical and mental endurance and protect themselves from the possibility of infecting or be infected by others (Dolumbia-Henry, 2020).

Each seafarer, before his/her embarkation, should undergo a series of special medical examinations, in addition to those for his/her physical health, to ascertain that he will withstand a possible infection and that he will not reach such a point that he loses his senses and commits harm to himself or any of his colleagues on board. In this case, a psychologist specialist for such situations would be ideal for monitoring the seafarer for some period and approving that the he/she will work on the ship safely, even under severe circumstances. This specialist should talk to each seafarer and persuade them to speak to him/her about any problems that they may have and cause them confusion, such as if the seafarer, for example, has some issues that will tend to affect his/her mental health either domestically or financially, or some rare case of affection of his/her mental health that may lead him to suicide aboard ship. The psychologist should try to help each seafarer as much as possible to guide and support them. A specialized questionnaire with questions based on these issues and problems that may surround the sailors would be an ideal solution to ascertain the character and nature of each person (Chua et al., 2022; Nam & Kim, 2021).

### **6.1. Issues of Pre-Board Screening**

As the global situation with the pandemic is constantly changing, travel from country to country continues and should be taken safely. Thus, it should be ensured that seafarers can safely travel to their embarkation port. In addition, seafarers may be exposed to the virus as they travel to the vessel (via flights, at airports), so the best time for COVID-19 testing to reduce the risk of onboard infection ships is at the port or terminal before boarding, isolating the sailor until the results come out (Zhang & Sun, 2021).

A whole series of checks and procedures have now been set up to thoroughly screen all passengers who are going to travel from state to state via flights to avoid, as much as possible, the spread of COVID-19 (ILO, 2021).

Test before the start of the journey to the ship:

- Reduce the risk of transmission with COVID-19.
- It should be pre-required by the respective authorities for the trip.
- Aim to prevent sailors travelling for the vessel due to a positive test during diagnosis to avoid transmission to others. Preventive tests on seafarers, especially if there is a possibility that they are infected with the virus, can help reduce onboard transmission ships and identify those who need to be tested (WHO, 2021b; ILO, 2021).

## **6.2. Pre-Board Screening for all Merchant Ships**

Pre-board screening should be mandatory for all persons about to board a ship and provide them with information and updates to identify any symptomatic person with the virus. The infected person should not travel but receive medical treatment until full recovery in case of symptoms. This surveillance and monitoring can be carried out through reporting and visual observation and temperature measurement with thermometers. Sailors should also inform healthcare providers if they have visited a populated area in the last 14 days to track a possible spread of Covid-19 or have had close contact with someone with respiratory symptoms (ICS, 2021a; ILO, 2021; Nam & Kim, 2021).

- Thus, it is highly suggested that a questionnaire for each pre-boarding activity should be filled out, including the following:
- If the sailor has developed a fever above 38°C degrees temperature or if he had any cough or breathing difficulty.
- If the sailor has been in contact at all with someone who was tested positive for Covid-19.
- If the sailor was in contact less than 1 meter with someone positive in Covid-19 for more than 15 minutes.
- If he has treated someone who tested positive for Covid-19 and did not wear the appropriate protective equipment.

It is also highly recommended that the port authorities enforce a mandatory check before boarding or monitoring the health of port workers. The results must be shared with the shipmasters and officers on board to avoid repetition of the measures. These boarding measures should be embodied in the ports' outbreak management plan, which should be shared with the master or the officers onboard for review. Contacting the onshore employees with the crew should be done only for operational and administrative purposes, necessary for the operation and supply of the ship (ICS, 2021a; Faqiang & Abliakimova, 2020).

Concluding, the indicative spots and timeframe of screening and quarantines are: i) stay in residence time at the permanent residence until departure or time of stay at temporary accommodation (hotel, etc.)- indicative quarantine ten days- ii) travel time for the sailor to move to the airport, iii) time spent by the sailor at the departure airport-indicative quarantine two days- iv) plane - time of stay on the flight, v) time that the sailor stayed at the arrival airport vi) transfer to the hotel – indicative quarantine three days- vii) transfer time to the port where the ship of embarkation is located, viii) boarding the ship, ix) period needed for subsequent boarding (BIMCO, 2021a).

### 6.3. Pre-Board Screening for Passenger Ships

Passenger ships, especially those that make international voyages, should be obliged to inform passengers about Covid-19 and implement prevention during pre-boarding, to postpone or reschedule the boarding of any traveler, infected or suspected of infection. Initial screening should be made with a questionnaire to track the contacts of each passenger, followed by a medical examination and short-term quarantine (Sawano et al., 2020; Rocklöv et al., 2020).

The World Health Organization defines as contact with a case a person who experienced any of the exposures two days before and fourteen days after the onset of symptoms of a possible or confirmed case:

- Face-to-face contact with a suspected or confirmed case less than one meter away for 15 minutes.
- Constant physical contact with a possible or confirmed case.
- Constant care of a patient with possible or confirmed symptoms without the appropriate equipment.

Diligent screening is vital in passenger ships because it is almost impossible to avoid any kind of contact between passengers; there are no safe zones and in case of an extended spread of Covid-19, it is impossible to isolate the passengers aboard or be able to offer the proper medical care. Moreover, even if the disembarkation of the passengers is achieved, it is questionable if the local health care will be able to facilitate such a high number of infected or possibly infected passengers and crew (BIMCO, 2021a; Kizielewicz, 2020).

### 6.4. Protocols

With the pandemic lurking worldwide, shipping companies have created a series of protocols for seafarers when it comes to boarding and disembarking from ships to ensure they are healthy. This framework of protocols sets out general measures and procedures that must be implemented by governments and all stakeholders – although these can be amended accordingly – to facilitate safe changes of the ship's crew during the COVID-19 pandemic (WHO, 2021a; WHO, 2021c; ICS, 2021a).

These protocols will be helpful for the following reasons:

1) Maritime administrations should be in constant cooperation and coordination with governments and competent national authorities including, but not limited to, health, customs, migration, border control, seaport and civil aviation authorities.

2) A "shipping company", as defined by the International Safety Management (ISM) Code and "the shipowner", as limited by the ILO Maritime Labor Convention (2006), must demonstrate broad compliance with the observance and enforcement of measures that may be applied to them.

3) Governments and their competent national authorities should be encouraged to make everything to facilitate changes of the ship's crew despite the restrictions that may continue and are in place in response to the pandemic.

4) The communication and cooperation that each shipping company will have through an agent or any other representative with each country where its ships will travel, is to be informed about the local authorities, ports, airports and airlines that participate in the process of facilitating travel to change the crews of the ships.

To comply with the ISM Code, shipping companies are required, among other things, to assess all identified risks to the safety of ships and personnel and to determine the necessary safeguards and procedures in a documented safety management system (SMS). As part of the SMS, shipping companies may find it helpful to develop detailed plans and strategies for the different aspects and risks associated with the coronavirus (COVID-19) on their ships. Elements of this framework could be incorporated into the SMS as appropriate. Health protection measures, such as personal protective equipment (PPE), as referred to in these protocols, must be provided, in principle, at no cost to seafarers by the ILO MLC (2006). These protocols can be amended to provide additional details to address national or local regulations, public health guidance, and prevailing conditions (IMO, 2021; EMSA, 2022; Stannard, 2020).

Since most protocols focus on changes in the crew of ships involving international air travel, they may also be related to domestic voyages engaged in carrying out crew changes. Therefore, these protocols may be applicable or modified by various modes of transport used during a ship crew voyage (IMO, 2021; WHO, 2021a; WHO, 2021b). The framework of protocols is divided into two categories, i.e., protocols before the embarkation and protocols after the disembarkation. In the flowcharts below, the necessary milestones of crew screening are depicted along with indicative periods of quarantine (UNCTAD Report, 2021; BIMCO, 2021b; INTERTANKO, 2021b; WHO, 2021c; ICS, 2021a; BIMCO, 2021a; Yazir et al., 2020; Boviatsis & Daniil, 2022; Pauksztat et al., 2022).

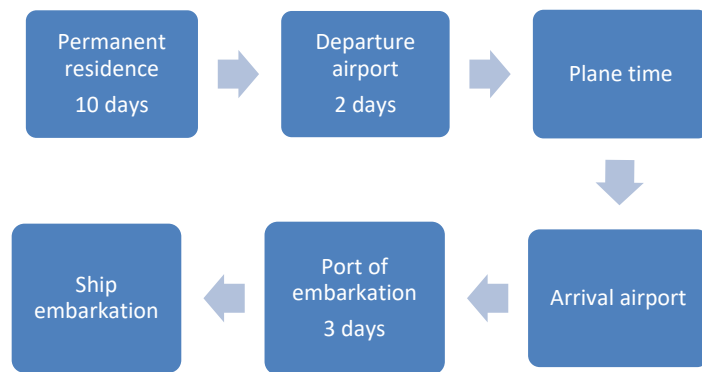


Figure 3. Indicative milestones of pre-board screening

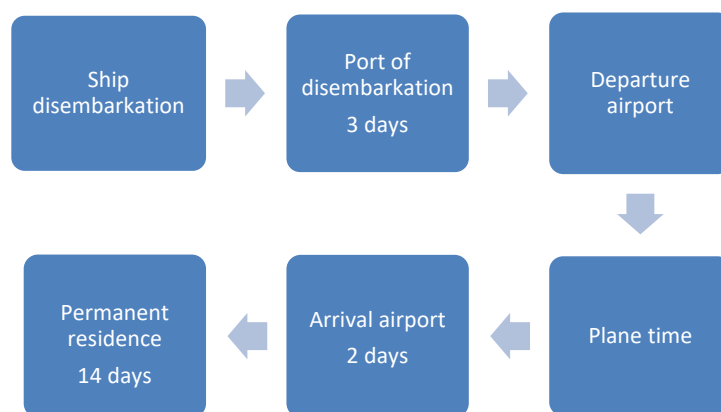


Figure 4. Indicative Milestones of screening after the disembarkation

Those protocols ultimately aim to offer a compartmentalized approach upon countering Covid-19, by providing a structured process of avoidance and countermeasures, as opposed to the IMO's and other relevant guidelines, which the majority of shipping companies have characterized as convoluted and practically inefficient (IMO, 2021).

Another issue, in addition to the disorganized approach of the majority of maritime organizations towards Covid-19, is the lack of national coordination to maintain a common policy and enforce similar measures. An example is the CDC in the US, which abruptly ended COVID-19 social-distancing recommendations and measures in August 2022, while strict measures were still implemented worldwide. This lack of coordination will surely incommode the installment of proactive and countermeasures and disorganize the effective enforcement of any processed, similar to the above mentioned (CDC, 2022).

## **7. CONCLUSION**

The protection and health of seafarers should be the absolute priority for shipping companies. Therefore, they should be constantly aware of every eventuality and information regarding some threat or risk, such as the outbreak of this pandemic and how to protect themselves. Just as seafarers are responsible for the transport of various goods safely, so the rest of the world should respect them as they are already deprived in many instances of many fundamental rights, such as freedom of movement or communication aboard ships, and their safety and health status must be the most important condition of all.

Shipping companies should give priority to proactive measures to enhance crews' health and safety, such as crew vaccination against the coronavirus for them to travel and embark on the ships safely and in health, to receive instructions and advice on protection against Covid-19 in cooperation with each government and at the same time to give immediate priority to the safety of the already onboard personnel. The instalment of such processes and control by shipping companies is essential for the crew even for psychological reasons.

Under the above mentioned, the current research proposes the implementation of processes and systems which provide a structured and realistic response to each case related to the pandemic, aiming to enhance the speed and the effectiveness of handling by the competent stakeholders. It is also suggested that proactive measures, such as constant checks and quarantines, are by far the most effective measures in countering the expansion of the pandemic. Ideally, the utilization of proactive measures coupled with fast and efficient responses to cases of the infected and the development of processes and protocols from shipping companies would be the most efficient method for countering the spread of Covid-19 of crew on board and effectively protect the crew health and safety.

## **CONFLICT OF INTEREST**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.



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