

# Infectious Disease Prevention and Control Strategies and Techniques for Naval Ships on Overseas Missions

## Stratégies et techniques de prévention et de contrôle des maladies infectieuses sur les navires de guerre en opération outre-mer

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### Abstract

Overseas non-war military operations of naval ship units are getting more and more frequent, and ship crews are faced with the risk of the introduction and infection of infectious diseases. This paper focuses on biosafety risks of infection from complex and changing natural sources, pathogenic microorganisms, and contaminated food and water, characterized by port visits, the conduct of medical diagnostic and therapeutic activities, and hosting refugees and expatriates of military operations of ships. The characteristics of protection against infectious diseases in overseas missions of naval formations are summarized and the primary principle is preventing the entry of infectious sources. Besides, it is crucial to establish technology and equipment chain for protection against infectious diseases in overseas missions of naval formations, including internet surveillance and biosafety sentinel surveillance and early warning, quick identification and screening of infectious diseases on the spot, and necessary isolation and protection equipment. Moreover, it is beneficial to building the protection program for infectious diseases in overseas missions of naval fleet formations by a mass immunization protection plan based on development of infectious disease vaccines, and immunization tracked and evaluation, in order to satisfy the prevention and control of infectious diseases in the naval overseas mission forces, and to better protect the health and combat effectiveness of the naval overseas mission forces.

**Keywords:** Infectious disease protection, overseas missions, naval ship units.

### Résumé

Les opérations militaires en dehors des guerres menées par les unités navales à l'étranger sont de plus en plus fréquentes et les équipages des navires sont confrontés au risque d'introduction et d'infection de maladies infectieuses. Cet article se concentre sur les risques de biosécurité liés aux infections provenant de sources naturelles complexes et changeantes, de microorganismes pathogènes et d'aliments et d'eau contaminés, caractérisés par des visites dans les ports, la conduite d'activités de diagnostic médical et de thérapie, et l'accueil de réfugiés et d'expatriés dans le cadre d'opérations militaires de navires. Les caractéristiques de la protection contre les maladies infectieuses dans les opérations extérieures des formations navales sont synthétisées et le principe fondamental est d'empêcher l'entrée de sources infectieuses. En outre, il est essentiel d'établir une chaîne de technologies et d'équipements pour la protection contre les maladies infectieuses dans les missions à l'étranger des formations navales, y compris la surveillance par Internet et la surveillance sentinelle de la biosécurité et l'alerte précoce, l'identification et le dépistage rapides des maladies infectieuses sur place, et l'équipement d'isolement et de protection nécessaire. En plus, il est bénéfique de construire le programme de protection contre les maladies infectieuses dans les missions outre-mer des formations de la flotte navale par un plan de protection par immunisation de masse basé sur le développement de vaccins contre les maladies infectieuses, et sur le suivi et l'évaluation de l'immunisation, afin de satisfaire la prévention et le contrôle des maladies infectieuses dans les forces navales en mission outre-mer, et de mieux protéger la santé et l'efficacité au combat des forces navales des missions extérieures.

**Mots-clés :** Protection contre les maladies infectieuses, missions outre-mer, unités navales.

### Introduction

With the People's Liberation Army Navy starting to carry out escort flights in the Gulf of Aden in 2008, circumnavigating the globe in 2013, operating the Djibouti safeguard base since 2017, the People's Navy has been carrying out overseas military

missions more and more frequently, and going out of the country and into the oceans with the ship formations as the basic unit, which has embodied the Chinese Navy's attitude towards active participation in the governance of global affairs, safeguarding the interests of Chinese security and sovereignty, as well as maintaining world peace and stability.

ber of infectious disease outbreaks are among the most important biosafety risks challenging naval ship units, and it seems to be only a matter of time before the infectious disease outbreaks reaches the officers and soldiers of the naval ship units. This paper discusses the biosafety risks faced by different styles of overseas military missions of naval ship units, and proposes the main practices of infectious disease prevention and control technology chain, with the aim of establishing the medical protec-

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The natural sources of infectious diseases around the world and the increasing num-

tion technology and equipment system for prevention and control of infectious disease epidemics on naval ships, while also aiming at standardizing the guarding management system of naval ship units to prevent infectious disease epidemics from entering the ships.

## **Part 1. The Operation Style of Overseas Missions of Naval Fleet and Its Biosafety Risk Characteristics**

### **1. Biosafety risk of military operations of ships characterized by port visits**

Overseas military operations of ships characterized by port visits mainly include missions such as the escort in the Gulf of Aden, round-the-world voyages, bilateral or multilateral maritime military exercises, ship visits, and maritime scientific expeditions. This is the main style of current naval ships' overseas military operations, which is characterized by systematically arranging ships to call at designated ports on a regular basis and arranging material supplies, personnel rest and recuperation, as well as other military and civilian exchange activities. In this style of operation, naval ship units and personnel are primarily exposed to the risks of infection from complex and changing natural sources, microbiology and toxin contamination of supply materials (water and food), and pathogenic microbial infections during social interactions of personnel.

Natural sources of infectious diseases have obvious geographical attributes, and docking at different terminals during global voyages inevitably exposes the crew to unfamiliar high risks of infectious diseases. Naval crew relative to the ship berthing area is classed as "imported susceptible people", and "source of infection" objectively exists. It is difficult to completely cut off the "transmission" so that it is very easy to invade the navy. The biosafety protection of overseas material supplies should not be neglected. On the one hand, the security situation, sanitary facilities and hygienic conditions in some port areas are poor, hence there is the risk of contamination by pathogenic microorganisms and biotoxins; on the other hand, the hygienic standards of water and food in many countries are not uniform, and hygienic testing is not standardized, leading to greater hygienic risk of replenishment of materials.

### **2. Biosafety risks of medical assistance on board hospital ships most widely represented by the conduct of medical diagnostic and therapeutic activities**

Overseas military operations characterized by medical diagnostic and treatment activities are mainly overseas medical assistance missions carried out by hospital ships. This is the main mode of overseas military operations of China's naval hospital ships, which is characterized by the planned arrangement of regular docking of the ships at designated ports and the arrangement of personnel to engage in medical and health activities such as clinical diagnosis and treatment, hygienic and epidemic prevention, health education and other medical and health care activities, as well as their related social interaction activities.

In this type of operation, in addition to the aforementioned biosafety risks faced by naval personnel, the risk of infection by pathogenic microorganisms in the course of medical diagnosis and treatment is more prominent, especially the spread of diseases through body fluids, blood, close contact and accidental injuries; AIDS, hepatitis B, hepatitis C and other infectious diseases that can lead to acute respiratory infections may pose serious threats of the crew's health of the ship.

### **3. Biosafety risks in shipboard overseas rescue operations characterized by hosting refugees and expatriates**

Overseas military operations by ships characterized by the admission of refugees and nationals of overseas countries mainly include overseas evacuation, maritime disaster relief and maritime disaster rescue missions. This is an important new method for Chinese naval forces to carry out overseas emergency rescue missions under the new situation, which is characterized by temporary arrangements for ships to dock at unplanned ports, war zones or disaster areas, and the admission of non-military personnel of unknown health status into the ships. In this style of operation, naval personnel, exposed to the aforementioned biosafety risks, are also more susceptible to infectious disease epidemics due to the complexity of the local situation, the destruction of public health facilities, the deterioration of food and water, and the proliferation of vectors. Expatriates/refugees are prone to physical and psychological injuries, poor basic health conditions, inadequate nutrition, and low resistance, which puts them at high risk of infectious diseases

and makes them a "mobile" source of infection. Disasters such as earthquakes, typhoons, and wars may also result in serious pathogenic outbreaks such as tetanus bacillus and gas gangrene. As can be seen, naval personnel in this style of operation face the greatest biosafety risks.

## **Part 2. Strategies and Methods of Protection against Infectious Diseases for Overseas Missions of Fleet Organizations**

### **1. Characteristics and principles of protection against infectious diseases in overseas missions of naval formations**

Naval ships are independent combat units at sea, and the special characteristics of their construction, environment and mode of operation make it difficult for naval ships to cope with the propagation of disease pathogens within ships. The reasons are as followed. First, the naval ship internal space is small and dense, so it is difficult to cut off the transmission pathway with frequent personnel contact; Second, the Navy's main battle ships are with high pressure in the cabins, it is difficult to establish an area specifically designed for respiratory isolation, in defense against respiratory infectious agent, and the cost, so that only a few digestive infectious agents can be controlled; Third, the naval ship faces the conditions for the spread of infectious diseases. The naval ship's food and water security chain is single and no backup, once contaminated it will directly decrease the combat effectiveness of naval ships. The fourth is that infectious disease patients on the naval ship should not be sent back through the marine medical treatment chain level, which will lead to the proliferation of infectious disease outbreaks and dissemination; The fifth is that once infected crew members of the same ship usually share similar symptoms (fever, rash, diarrhea, upper respiratory symptoms) although concentrated onset of infectious diseases may be perceived, the ship's military doctors do not have the conditions and ability to implement pathogenic infectious disease diagnosis on board the ship. From this, we can see that naval ships to deal with the global complexity of infectious disease epidemic threat in overseas missions and to accomplish its duty of epidemic protection facing the arduous and complex task, and the slightest error will directly affect the resilience of the ship's combat mission capabilities.

Therefore, preventing the entry of infectious sources has become the primary principle of biosafety protection for overseas military operations of naval fleet formations, and a system designed to monitor and give early-warning of infectious diseases in overseas missions, immunizing and protecting officers and soldiers, managing infectious sources, and performing medical evacuation are the main technical means of protection against infectious diseases in overseas military operations of naval fleet formations. This is a point that requires consensus at all levels of the Navy.

## **2. Technology and equipment chain for protection against infectious diseases in overseas missions of naval formations**

### 2.1 Infectious disease protection technology and means of "preventing the entry of infectious sources"

The implementation of "preventing the entry of infectious sources" in naval ship forces faces a series of challenges, and several questions need to be answered. Firstly, there is the question of what the real infectious disease threats on naval ships in their missions are, which determines what to focus on preventing; secondly, how we can detect and identify or screen for infectious sources at an early stage is the technical key to the implementation of "stopping the entry of infectious agents"; and third, the way in which we organize the management of infectious agents within the ship is the key to the implementation.

#### *2.1.1 Surveillance and early warning of infectious disease risks*

The global infectious disease epidemic is very complex. Globally, there are natural sources of infectious diseases such as yellow fever, plague, tick-borne regression fever, encephalitis B, leptospirosis, scrub typhus, renal syndrome hemorrhagic fever, anthrax, Lyme disease, and other infectious diseases, which have existed for a long time locally, and there are regional epidemics and dissemination; Globally, there are also seasonal pandemics of dengue fever, measles, influenza and other infectious diseases in the world, which usually show cyclical and seasonal widespread transmission and outbreaks in many regions; there is also the possibility of new outbreaks of infectious diseases, resurgence of pre-existent infectious diseases or sudden outbreaks in all parts of the world; and there are also characteristics of the risk of infection of infectious diseases in different geographical regions of the world. Therefore, the pri-

mary challenge of infectious disease protection during overseas missions of naval ship units comes from monitoring and early warning. Infectious disease surveillance and early warning usually include Internet surveillance and biosafety sentinel surveillance and early warning.

#### *2.1.2 Quick identification and screening of infectious diseases on the spot*

Screening for high-risk infectious disease pathogens in a population is another extremely difficult technical challenge, where rapid and effective methods are needed to identify and screen out the risks infectious disease.

Typically, on-site rapid identification and screening techniques for infectious diseases include two methods: a non-confirmatory method that determines the risk of infectious diseases through symptom reporting and general testing; and a confirmatory method that collects human samples for on-site rapid pathogen screening. The former requires preliminary identification and screening of infectious diseases by means of temperature measurement, active symptom reporting, and categorical health management, which requires accurate technology and equipment for rapid temperature measurement in the population, formatted active symptom reporting cards (electronic and multilingual is preferred) containing the main epidemiological symptoms of the respiratory and digestive tracts, and zoned placement of people at different infectious risks, as well as sanitation and respiratory and gastrointestinal isolation equipment. The latter involves on-site rapid pathogen detection screening (POCT) techniques and equipment. It should be noted that on-site rapid pathogen detection and screening in naval forces should pay attention to the adaptability of the screening strategy and on-site application scenarios, and it is recommended that the technological route of multi-disease joint detection or high-risk infectious disease detection and exclusion be used to realize on-site rapid pathogen detection and to combined with non-confirmatory methods to achieve the purpose of rapid identification, detection and categorization of health management.

#### *2.1.3 Technology and equipment for the management of infectious agents on board ships*

The management of infectious sources in ships needs to be carried out under the

conditions of controllable risk of transmission and infection, harmless to the ship's drinking water and food security chain, and conducive to the safe supply of sanitary facilities. It usually requires respiratory, digestive isolation and public health facility technology and equipment with biosafety protection capability, AI intelligent surveillance technology and equipment for symptom monitoring and early warning, and medical evacuation technology and equipment with biosafety protection capability. Although it is very difficult to halt the spread of infectious diseases in ships, the necessary technology and equipment for classification management, individual and collective isolation and protection are still needed.

### 2.2 Immunization protection plan

Naval troops on overseas missions are known to be imported susceptible to infectious disease outbreaks around the globe, and the most cost-effective way is to establish an immunization barrier for the mission officers and soldiers population. The technology and equipment involved in immunization protection consists of three main areas.

#### *2.2.1 Immunization protection strategy and plan*

For the global risk level of infectious diseases, we need to study and formulate immunization plans for different overseas military operations and establish institutional immunization protection strategies to promote the implementation of the whole military.

The purpose of immunization and vaccine selection in the "recruit enlistment (cadet enrollment) stage" is to construct a basic immunization barrier for the military population, and make up for the shortcomings of the military population's immunization protection. The purpose of immunization and vaccine selection during the "overseas mission service phase" is to implement basic immunization for overseas missions, and to select vaccines that have low risk, long immune protection periods, and little geographic selection differences. The purpose of immunization and vaccine selection during the "overseas mission preparation and implementation phase" is to comply with the regulations on the management of international travelers' entry and exit and to adapt to the objective constraints of the short time of pre-mission preparation. The purpose of immunization

and vaccine selection during the “overseas mission preparation and implementation phase” is to meet the existing constraints of short pre-mission preparation time and to selectively vaccinate for the overseas mission. This arrangement maximizes the construction of a herd immunity barrier for naval forces and avoids the dilemma of not being able to complete the immunization before the overseas mission due to time constraints.

### 2.2.2 Planning and development of infectious disease vaccines

At present, vaccine research and development for adult immunization should be focused on to satisfy the need of naval overseas missions. For example, the research and development of the COVID-19 vaccines in the pandemic plays a very good role, and can also effectively promote the progress and development of biotechnology and bio-industry in our country's military. In addition to naval forces, army peacekeeping forces as well as other overseas mission forces can refer to the immunization planning and scheduling to implement herd immunity barriers for troops.

### 2.2.3 Immunization tracked and evaluation

With the continuous expansion of the number and scale of the Navy's overseas mission forces, long-term group immunization tracking and assessment should be carried out for the overseas mission forces to continuously improve and strengthen the protection of group immunization for the forces, reduce the invasion of infectious diseases on the troops and soldiers, and maintain the combat effectiveness of the forces and the high cost of the emergency response and treatment brought about by it.

## 3. Protection program for infectious diseases in overseas missions of naval fleet formations

In accordance with the technical requirements for the three phases of health protection work for ships at sea, the protection program against infectious diseases can be strengthened and perfected according to the operational style of the Navy's naval fleet for overseas missions, i.e., “one operation, one program”. Infectious disease protection program for overseas military operations of ships represented mainly by port visits is the basic program, overseas military operations of hospital ships represented mainly by medical diagnostic and treat-

ment activities, overseas rescue military operations of ships characterized by accepting refugees and expatriates, etc. are all added to the basic program to form a systematic infectious disease protection program, which can be used to standardize the protection measures against infectious diseases in overseas military missions of naval ships to ensure that the program is used to accomplish the protection measures and to provide reliable biosafety for overseas military use.

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# 25th LoAC Course 2025 (hybrid)

## General Information

The **25th ICMM Specialized Course for Military Medical Personnel on the Law of Armed Conflict (LoAC)** will take place from **14-19 September 2025**. As in the previous years, it will be organised by the Medical Services Directorate of the Swiss Armed Forces.

The **venue** of the course has changed and it will now take place in the facilities of the Hotel and Bildungszentrum Matt in Schwarzenberg Lucerne, Switzerland. The venue offers both modern hotel facilities as well as an up-to-date teaching infrastructure. Some of Switzerland's most famous sights are located in the immediate vicinity of the course location.

The LoAC course will be offered both as an **on-site course in Schwarzenberg Lucerne (Switzerland)** and as a **hybrid course** as well.

## Course Content & Program

The course aims to

- Familiarise course participants with International Humanitarian Law (IHL) and, in particular, to develop the responsibilities of medical personnel.
- Explain the possibilities and limitations of the international law of armed conflict.
- Analyse current problems and challenges related to IHL in the context of military operations, including peacekeeping operations.

Program

- The provisional **Course program** can be downloaded here (<https://www.melac.ch/courses-workshops/loac-courses/loac-hybrid-2025>). Changes to the program may occur.



If you have questions, please contact [mme-loac.lba@vtg.admin.ch](mailto:mme-loac.lba@vtg.admin.ch)

## Application

- Please register via the **registration form** (<https://www.melac.ch/apply/loac-mme-2025>).
- For **questions** regarding the course or the registration, please contact [mme-loac.lba@vtg.admin.ch](mailto:mme-loac.lba@vtg.admin.ch)



## Language

The course will be held in English and French language. Separate syndicates will be available in both languages and plenary lectures are translated simultaneously. Please note: online participation is only possible in English language.

## Course Fee

### On-site-participation

- A **fee of 1'100.00 CHF** will be charged and **has to be paid by course participants in advance**. Details about the payment modalities will be communicated to confirmed participants.
- It includes
  - Accommodation in the hotel, all meals, non-alcoholic beverages for the course duration.
  - Extensive course documents, cultural events and excursions with transfers are free of charge for participants and will be paid by the Swiss Confederation.
- Participants shall bear their travelling costs to and from Switzerland.
- **The course organization can financially support a small number of participants**. In this case, we normally cover the course costs and the hotel, while the participants bear their own travel costs.

The application for financial support must be **submitted online and include a letter of motivation and CV**.

A limited number of sponsorships are available, and these are allocated in such a way as to ensure a balanced overall group. There is no entitlement to sponsorship.

## Online-participation (English only)

The online course can be attended free of charge.

A **motivation letter** is required and the online class will be limited to 15 participants in order to allow for discussions and exchange among the participants.