



ECDC TECHNICAL DOCUMENT

Guidance for the management of suspected bubonic plague cases identified on aircraft and ships

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Key messages

- The common route of transmission of bubonic plague to humans is the bite of an infected flea. The disease can be transmitted between humans by contact with infected bodily fluids; humans can be also infected by touching or skinning infected animals.
- The infection can cause a severe disease in humans but can be successfully treated with early administration of antibiotics. If bubonic form is not treated, the infection can spread through the bloodstream to the lungs, resulting in pneumonic or septicaemic form of plague.
- A case of bubonic plague can be suspected on aircraft or ships when a passenger or a crew member leaving an affected area has a fever associated with swollen lymph nodes.
- The presence of trained crew members and their awareness of the disease could help reduce the risk of on-board transmission.
- The main risk of transmission on aircraft and ships lies in infected fleas infesting a passenger and/or his/her belongings. The transmission by bodily fluids (e.g. the fluid from the buboes) requires exposure to infected material through a break in the skin; this can be considered unlikely on aircraft and ships, but it cannot be excluded.
- Members of the cabin crew assisting an ill passenger should wear gloves; the ill passenger and the crew member assisting him/her should follow standard infection control precautions.
- Local authorities at the arrival airport/mooring port of call should be informed immediately after the identification of a suspected case of bubonic plague on board so they can plan mitigation measures aimed at reducing the risk of further spread.
- If there is a suspected plague case on board, passengers should be informed about how to self-monitor for plague-compatible symptoms; the collection of passenger contact details is crucial for further contact tracing.
- Physicians should consider early post-exposure prophylaxis for passengers and crew members who have come in direct contact with body fluids of the ill passenger.
- Arrangements for post-event disinfection and disinsection procedures for the aircraft and the ill passenger's belongings should be considered after disembarking.
- On a ship, the WHO's *International medical guide for ships* suggests that the patient's quarters and all other passenger quarters should be treated with insecticide powder in order to ensure the extermination of fleas.
- After disembarking from a ship, the sickbay and/or the cabin where the ill passenger was isolated should be disinfected and disinsected. All biohazard materials should be disposed of properly and in accordance with the relevant national and international rules and recommendations.

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Bubonic plague

What is bubonic plague?

Plague is a bacterial zoonotic disease caused by the gram-negative bacterium *Yersinia pestis*. Bubonic plague is one of three clinical presentations of plague; other clinical presentations are pneumonic and septicaemic plague. The infection can cause a severe disease in humans but can be successfully treated with early administration of antibiotics. If the bubonic form is not treated, the infection can spread through the bloodstream to the lungs, resulting in pneumonic or septicaemic form of plague [1].

Bubonic plague is the most common form of human plague; usually it results from a bite of an infected flea [2]. People infected with plague usually develop flu-like symptoms after an incubation period of 1–7 days. After the bite, the bacterium travels through the lymphatic system to the lymph nodes, which then become inflamed, tense and painful (buboes). At advanced stages of the infection, the buboes can turn into suppurating open sores [3].

The infection can be also transmitted by contact with infected human/animal bodily fluids, or by touching or skinning infected animals [3,4]. The transmission by these routes can result in primary bubonic plague or in septicaemic plague [3].

More information can be found in the ECDC and WHO factsheets about plague and in an ECDC rapid risk assessment: *Outbreak of plague in Madagascar, 9 October 2017* [5-7].

Identification of suspected bubonic plague cases on aircraft and ships

A case of bubonic plague is suspected when a passenger or a crew member leaving an affected area has fever associated with swollen lymph nodes. If untreated, bubonic plague can evolve into two forms: pneumonic or septicaemic. The management of ill passengers or crew members who show persistent coughing and/or impaired breathing associated with fever is described in ECDC's *Guidelines for the management of suspected pneumonic plague cases identified on aircraft and ships* [5b].

The main risk of transmission on aircraft and ships lies in infected fleas infesting a passenger and/or his/her belongings. The transmission by bodily fluids (e.g. the fluid from buboes) requires exposure to infected material through a break in the skin [1]; this is considered unlikely on aircraft and ships, but cannot be excluded.

Options for the management of suspected cases identified on aircraft

During the flight

- According to International Air Transport Association (IATA) guidelines, if a traveller shows symptoms of bubonic plague, the cabin crew has to inform the captain of the situation as soon as possible. This is also required by the International Health Regulations [8,9]. The captain will inform air traffic control and the destination airport about the suspected case so that cleaning and disinfection procedures [9] can be prepared and ambulance transport of the patient to an appropriate healthcare venue can be arranged [10]. The pilot needs to be advised by air traffic control on where to park the aircraft [10].
- Advice for medical support from the ground should be considered immediately after the identification of a suspected bubonic plague case [11].
- If there are several free seats on the aircraft, passengers adjacent to a case should be relocated to empty seat rows or sections.
- A cabin crew member (preferably the one who has already been dealing with the ill traveller), should be designated to interact with him/her. The cabin crew member should wear gloves (included in the universal precaution kit [12]) and standard infection control precautions should be followed by the ill passenger and the crew member assisting him/her. Hand hygiene should be practiced frequently by the ill passenger and the assisting crew member. Gloves should be changed as soon as they become soiled; used gloves should be disposed of in a biohazard disposal waste bag only (included in the universal precaution kit) [12]. If a biohazard disposal waste bag is not available, an airsickness bag marked as biohazard bag by a crew member can be used instead.
- A lavatory should be designated for the exclusive use of the ill traveller and marked appropriately [9].
- All passengers accompanying the ill passenger should be asked if they experience similar symptoms [13].

On arrival

- On arrival, the ill passenger and the people who accompany her/him should disembark before all other passengers and taken to a designated healthcare facility [14] (within or outside the airport).

- Hand baggage should be removed together with the ill passenger on disembarking [13]. Furthermore, a procedure should be in place for obtaining checked luggage [10]. Airport workers managing the checked luggage should wear disposable gloves.
- Before or immediately after disembarking, all passengers should be advised about self-monitoring of plague-compatible symptoms and about the need to seek medical care in the event of any symptoms. Passengers should also understand the importance of informing their healthcare providers about their travel history. They should also be given an information leaflet [14].
- Before or immediately after disembarking, a passenger locator card [15] should be filled in by all passengers who came in direct contact with the bodily fluids of the ill passenger; a list of passengers and a list of crew members should be made available for public health authorities.
- Early antibiotic post-exposure prophylaxis should be considered for passengers and crew members who came in direct contact with the bodily fluids of the ill passenger.
- Arrangements for post-event disinfection and disinsection procedures for the aircraft and the ill passenger's belongings should be considered after disembarking [16].

Options for the management of suspected cases identified on ships

Before departure

- Customer should receive pre-travel information about health issues related to the risk of plague in the areas of departure/port of call from travel companies and travel agencies; shipping companies should inform their crew members about these health issues.
- Awareness of the plague should be increased among crew members. Education about how to recognise signs and symptoms, route of exposure, reporting suspected cases to designated crew members, and understanding measures to prevent the spread are helpful in reducing the risk of on-board transmission [17].
- Measures for combatting disease vectors (e.g. rats and fleas) should be carried out as part of standard practice [18].

During the voyage

- The ship's master should notify the local health authorities at the first port of call if a suspected case of plague is identified on board [18].
- If available on board, medical staff should be notified immediately after the identification of a suspected bubonic plague case; if not available, medical advice from doctors stationed in ports should be requested [18].
- The ill passenger should be isolated in his/her cabin or in the sickbay [18]; isolation measures should be taken in order to avoid close contact with other passengers.
- Treatments for the removal of fleas (if present) on the ill passenger's body should be suggested to the ill passenger.
The WHO's *International medical guide for ships* [18] suggests that the patient's quarters and those occupied by the rest of the passengers should be treated with insecticide powder in order to ensure the extermination of fleas.
- Bed linen and clothes used by the ill passenger should be disposed of in a biohazard disposal waste bag, or boiled for 10 minutes [18]. If a biohazard disposal waste bag is not available, a resistant plastic bag marked as biohazard bag can be used instead.
- Standard infection control precautions should be followed by the ill passenger and the assisting crew member. Hand hygiene should be practiced frequently by the ill passenger and the crew member.
- Crew members should wear gloves, protective clothes and a surgical mask when touching the ill passenger (or any object that may have been in contact with the bodily fluids of the ill passenger, e.g. bed linen, clothes, etc.).
- The buboes should not be lanced: the pus contained in them is highly infectious. If pus is released, the buboes should be covered with a dry wound dressing [18].
- Antibiotic treatment should be initiated immediately for the suspected case if there are medical professionals on board. Otherwise, medical advice from doctors stationed in ports should be requested; a stock of doxycycline is recommended by WHO (see list of recommended medicines and equipment in the *International medical guide for ships* [18]).
- The health condition of the passenger's contacts (cabin mates, etc.) should be checked immediately after the identification of a suspected case on board; early post-exposure prophylaxis should be considered for passengers and crew members who came into contact with bodily fluids of the ill passenger.
- A medical log for the ill passenger should be established; a designated crew member should be responsible for reviewing and updating the medical data.
- Dead rats found on board should be collected with tongs and sealed in a plastic bag; after weighing, the bag should be disposed of overboard. If the ship is in port, dead rats should be disposed of in accordance with the port health authorities' rules and recommendations [18].

On arrival

- At the first port of call, after consultation with the local health authorities, the passenger should be sent to an onshore medical facility [18].
- The ill passenger should disembark together with his/her luggage and personal items without coming into contact with other travellers, ideally from a separate section of the ship or at a separate time [18].
- All passengers and crew members who came into close contact with the ill passenger should be advised about the need to continue self-monitoring of plague-compatible symptoms and seek medical care in the event of any symptoms for seven days after the last close contact with the ill passenger.
- Information on how to conduct early post-exposure prophylaxis [19], if not already provided on board, should be given to passengers and crew members who came into close contact with the ill passenger.
- Contact details of travellers who came into close contact with the ill passenger should be collected for further information before disembarking.
- Health authorities at the port of call should be informed if support is needed before the ship arrives at the port.
- After disembarkation, the cabin occupied by the ill passenger and/or the sickbay should be disinfected and all biohazard materials should be properly disposed of, in accordance with national and international rules and recommendations.
- In the event of suspected cases of bubonic plague among passengers on ships departing from an affected area or on ships calling at a port in an affected area, the presence of infected rodents on board should be taken into account. Guidelines to address the presence of rats on board can be found in Chapter 29 of the WHO's *International medical guide for ships* [18].

Disclaimer

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