Yersinia Pestis Exposure Medical Response Guidance
for the University of Wisconsin-Madison

1.0 Instructions: Information in this guidance is meant to inform both laboratory staff and health professionals about the risks and treatment in the event of an infectious agent exposure. In using this guidance, please consider that multiple routes of exposure may occur in a lab and that organism strains will sometimes be genetically modified to incorporate traits such as antimicrobial resistance. Research protocols and other available guidance such as Health Canada material safety data sheets will be provided as supporting information when available. It should be assumed that when exposures do occur, that the healthcare provider will be provided with information about the specific organism and strain involved, route of exposure, inoculum concentration, and victim vaccination and serological status, when available. This document was developed by UW Occupational Medicine in consultation with the UW Division of Infectious Disease. The information provided below is intended to provide guidance for treating physicians. Treatment and evaluation plans should be individualized to the patient based on the patient’s symptoms, exposure risk, and underlying health status.

If there are any questions about this document, please contact University Health Services, Occupational Medicine at 265-5610.

2.0 Signs and Symptoms of Infection- Describe signs and symptoms associated with the agent.

Yersinia pestis is a gram negative coccobacillus causing plague syndromes. The three most common forms of plague are bubonic plague, septicemic plague, and pneumonic plague. Bubonic plague is transmitted via infected fleas. Pneumonic plague arises from inhalation of infectious respiratory droplets or other airborne materials.

Bubonic plague, the most common form from naturally occurring infections, presents with sudden onset of fevers, chills, weakness, headache, and painful regional lymphadenitis. Lymph node swelling typically occurs in the groin, axillary and cervical areas.

Septicemic plague is typically plague without bubos (lymph node swelling) and can rapidly progress to shock.

Pneumonic plague can occur as a complication of bubonic plague OR from inhalation exposure to aerosols or droplets from infected animals or humans. Pneumonic plague presents with sudden onset of dyspnea, high fever, pleuritic chest pain, cough, and hemoptysis.

Rare additional manifestations can include meningitis, pharyngitis and tonsillitis.
3.0 Infectivity- Describe infective dose, relevant exposure routes (considering laboratory use), incubation period and potential severity of infection.

The infectious dose of plague is quite low with estimates in the range of 100 colony forming units. *Y. pestis* is sensitive to sunlight and heating and does not survive for long outside of the host. WHO estimates that aerosols of plague organism are infectious up to 1 hour only.

Routes of exposure to *Yersinia pestis* include bites from infected rodent fleas, scratches or bites from infected animals, handling of infected animal tissue, inhalation of respiratory secretions or aerosolized droplets from infected animals or humans, and laboratory exposure.

Six cases of laboratory acquired plague have been reported since 1901. The only fatal case occurred in 2009.

Exposure concerns for laboratory personnel include direct contact with or aerosols from cultures, infectious materials from human or animal (small mammal) hosts, and percutaneous injury from contaminated lab equipment. The primary risk is of inhalation of droplets or aerosols generated from manipulation and procedures. In addition, lab exposures can occur while handling infected animals or field exposures can occur from field rodent flea bites.

The incubation period for bubonic plague ranges from 2 – 6 days following exposure and for pneumonic plague is 1 -6 days.

4.0 Description of First Aid - Provide an overview of first aid treatment of exposures considering that multiple routes of exposure could occur (needlestick, aerosol, eye, skin and ingestion).

For skin exposure, immediately and thoroughly wash exposed skin surfaces with the antibacterial scrub approved for the laboratory for 15 minutes.

For splash to the eyes or mucous membranes, flush, preferably in an eyewash station, for 15 minutes.

5.0 Urgency of Medical Care- Describe how soon medical attention should be sought, i.e. is an ER visit necessary, a visit to University Health Services, or simply schedule a visit with a personal physician.

All exposures, after initial first aide, should be immediately reported to UW-Madison RO or ARO's (Responsible Official or Alternate Responsible Official) and PI. RO/ARO's can be reached at their direct office numbers or through the UW-Madison Police Department at 262-2957 or by dialing 9-1-1. RO/ARO will contact UW Infectious Disease or UHS to arrange for appropriate medical attention. Further evaluation and consideration for prophylactic treatment will be discussed. All exposures should also be reported to UHS Occupational Medicine (608-262-5610 or 608-262-0955).

Any plague consistent symptoms which develop following exposure should be immediately followed up with UW infectious disease.
6.0 Description of Medical Response - Provide an overview for clinical treatment of exposures to the agent considering that multiple routes of exposure could occur (needlestick, aerosol, eye, skin and ingestion) and that strains of agents will vary and sometimes include antimicrobial resistance.

Exposure to plague in the laboratory is treated first by vigorous cleansing (scrubbing or irrigation).

Post-exposure prophylaxis following laboratory exposure will be considered with either doxycycline (100 mg twice daily for 7 days) or ciprofloxacin 500 mg twice daily for 7 days). Prophylaxis is also recommended for individuals doing field studies during an outbreak and either exposed to bites of potentially infected rodent fleas or handling known infected animals.

Prophylactic antimicrobial treatment with doxycycline (100 mg orally twice daily for 7 days) is recommended for close case contacts of a patient suspected of having pneumonic plague. Close exposure is defined as within 2 meters of the patient and includes household contacts. Alternate treatment regimens include levofloxacin 500 mg orally once daily for 10 days or, in pregnant women, trimethoprim-sulfamethoxazole one DS tablet twice daily for 7 days. Individuals refusing treatment should be observed closely for 7 days. The plague bacillus is sensitive to antibiotics. Symptomatic plague infection is treated with gentamicin. Doxycycline is an acceptable alternative agent. Early treatment of cases is essential to avoid plague mortality and morbidity.

Treatment for plague infection should be managed by UW infectious disease.

The diagnosis of plague can be made from a smear and culture of bubo aspirate or sputum in cases of pneumonic plague. It can be grown from blood and involved body fluids as well. The laboratory should be notified of suspected plague at the time of order.

The diagnosis can also be verified by either a fourfold increase in a serum plague antibody hemagglutination test or a single titer of 1:16. Most patients seroconvert 1-2 weeks after onset of symptoms. Early initiation of antibiotic treatment can delay seroconversion by several additional weeks.

7.0 Description of Medical Surveillance - Describe the advisability of medical surveillance strategies (in particular baseline and annual serology) for those working with the agent. If doing so would likely improve the identification, diagnosis or treatment of exposures, please indicate so.

Routine surveillance for work with plague is not recommended.

The plague vaccine was found not to be very effective and has been discontinued. There is currently no licensed vaccine to prevent plague.
8.0 Considerations for Infection Control—Describe any special precautions required to prevent the further spread of infection. Include precautions for the healthcare, workplace, and home setting.

Arrival at a healthcare facility should preferably be prearranged with the healthcare facility to arrange for appropriate isolation. Health care personnel should be immediately informed regarding the plague organism exposure and a surgical mask should be placed on the patient.

Patients suspected of having plague infection should be placed in isolation with respiratory droplet precautions (surgical mask, gown, gloves, and eye protection are required) until pneumonia has been excluded and the patient has received 48h of effective antimicrobial therapy. Patients should wear surgical masks. Bubonic plague is not transmissible person to person. Pneumonic plague is transmissible person to person.

Prophylactic antimicrobial treatment is recommended for close case contacts of a patient suspected of having pneumonic plague.

9.0 Reporting—Describe any public health or federal regulatory reporting requirements. Include the timing and mechanism for reporting.

Public Health: Confirmed or suspect cases of disease are Category I, immediately reportable by telephone or fax to the patient’s local health officer. In addition to the immediate report, within 24 hours, complete and submit a case report electronically through the Wisconsin Electronic Disease Surveillance System (WEDSS), by mail, fax, or other means.

Other:
Exposure or potential exposure will be reported to the state health department communicable disease section by the Responsible Official at 608-267-9003(7:45 AM-4:30 PM) or through the 24 hour WI health department clinical emergency contact number 608-258-0099 (after hours). The CDC Division of Select Agents and Toxins will also be notified by the Responsible Official.

10.0 References:

11.0 Document Revisions

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<th>Description of Revision</th>
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