Tufts University / Tufts Medical Center

Exposure Response Plan for Laboratory Handling of *Vibrio cholerae*

**Background Information:**

*Vibrio cholerae* is a gram negative, non-spore forming, curved rod. It is very motile. The bacterium is 1-3 µm by 0.5-0.8 µm, is a facultative anaerobe and part of the Vibronaceae family. Serogroups O1 (El Tor biotypes) and O139 are primarily responsible for cholera outbreaks. Pathogenic serogroups produce cholera toxin (CT). Recently, *V. cholerae* serogroup O75 strains possessing the cholera toxin gene were isolated from patients with severe diarrhea, and serogroup O141 has been associated with sporadic cholera-like diarrhea and bloodstream infections in the United States. Some serotypes may serve as a reservoir for the cholera toxin phage genome. Serotypes that do not produce cholera toxin can still cause illness in humans (i.e. enteritis).

**LABORATORY-ACQUIRED INFECTIONS:** 13 cases resulting in 4 deaths were reported. The deaths were associated with mouth pipetting, contact with infectious feces and contaminated laboratory laundry. The primary hazards when working with this agent are ingestion and accidental parenteral inoculation. Contact with non-intact skin or mucosa and ingestion have previously been described as routes of laboratory-associated infection with *V. cholerae*. The risk of aerosol exposure is not known.

**INFECTIOUS DOSE:** The infectious dose ranges between $10^6$ and $10^{11}$ ingested Vibrios.

Risk factors for cholera include reduced or nonexistent stomach acid (hypochlorhydria or achlorhydria). Cholera bacteria cannot survive in an acidic environment, and ordinary stomach acid often serves as a first-line defense against infection. However people with low levels of stomach acid — such as children, older adults and people who take antacids, H-2 blockers or proton pump inhibitors — lack this protection, so they are at greater risk of cholera.

**INCUBATION PERIOD:** The incubation period can range from a few hours to 5 days after infection.

**Pre-exposure Health Screening:** Employees must be given a copy of this information at the initiation of work in laboratories in which *Vibrio cholerae* is used. Workers with concerns about pre-existing medical conditions should make an appointment with Occupational Health to discuss with physician.
IMMUNIZATION: Routine vaccination for laboratory workers and travelers is not recommended. Traditional parenteral inactivated vaccine strains are available though not recommended for widespread use as they only provide protection for 3-6 months. Oral vaccines that provide protection for several years (up to 3) are no longer available.

**Before an Exposure Incident Occurs:**

Exposure Incident: Any exposure of the agent to the eyes, nose or mouth. Percutaneous exposure via needle stick, bite or scratch. Cutaneous exposure via damaged skin. Inhalation of aerosols.

Reporting Exposure Incidents: All exposure incidents must be reported immediately to the supervisor, the Biosafety Officer and the attending physician.

In the event of a non-overt exposure but the individual develops sign and symptoms consistent with *Vibrio cholerae* infection, the individual must seek medical attention from the Tufts Occupational Medical Service provider, TCSVM Occupational Medicine Program, emergency room, or personal physician.

Massachusetts Department of Public Health classifies *Vibrio cholerae* disease as a reportable disease. In accordance with Massachusetts regulation, any clinical laboratory identifying an infection caused by *Vibrio cholerae* may report to the Massachusetts Department of Public Health.

**After an exposure incident occurs: immediate action by route of exposure**

- **Needle stick, laceration, bite, and contact with non-intact skin:** Wash the area with soap and running water. Do not apply bleach, alcohol or other disinfectant to the skin.

- **Mucous membranes (eye, nose, mouth):** If contaminated material is ingested, rinse mouth out with clean water. If contaminated material is splashed or sprayed into the eyes, flush the eyes for 10-15 minutes.

- **Inhalation:** If contaminated materials are aerosolized outside of a biological safety cabinet and the cloud inhaled, rinse mouth twice expelling the rinsate. Do not swallow.

- **Contact with intact skin and clothing:** Remove contaminated clothing using gloves and process as medical waste. Wash skin with soap and water.

- **Ingestion of contaminated materials:** Seek medical attention. Monitor for symptoms.
Report all exposures to the Principal Investigator and seek medical evaluation.

**After an exposure incident occurs: medical evaluation and follow-up:**

Following immediate actions, contact the TMC Employee Health Clinic (Boston), TCSVM Occupational Medical Clinic (Grafton) or the Mt. Auburn Occupational Health Services (Medford) and arrange for medical diagnosis and treatment.

During this medical evaluation, the employee will be instructed on the signs or symptoms of infection and instructed how to identify specific signs and symptoms.

If exposed individual develops signs and symptoms of suspect infection, s/he must be evaluated in the Clinic or referred to a Specialist as soon as possible and within 24 hours. Any infection will be assumed to be laboratory acquired until proved otherwise.

**Post-exposure pre-symptom prophylaxis:**

The decision to implement post exposure prophylaxis will depend on a risk assessment made by the physician based on the risk of infection as compared with the risk of antimicrobial drugs.

Resistance has been shown to nalidixic acid, furazolidone, and co-trimoxazole, *V. cholerae* O1 Inaba isolates have been found to be multi-antibiotic resistant, with increasing resistance to ciprofloxacin.