

Mercury (Hg) Poisoning

PROTOCOL CHECKLIST

- Enter available information into Merlin upon receipt of initial report.
- Review background information on the disease ([section 2.A](#)), case definition ([section 3](#)), and laboratory testing ([section 4](#)).
- Contact the physician or hospital ([section 5.A](#)).
- Interview individual(s) and complete the case report form (CRF).
 - Provide background information about mercury ([section 2.A](#)), modes of exposure ([section 2.D](#)), and symptoms ([section 2.B](#)).
 - Collect:
 - Demographic information
 - Exposure information
 - Health effects and medical information
 - Information about other individuals exposed or experiencing symptoms
 - Provide education and prevention recommendations ([section 6.A](#)).
 - Address individual's questions or concerns.
- Follow up on special situations, including outbreaks or clusters of exposures.
- Enter additional data obtained from interview into Merlin ([section 5.D](#)).

Mercury Poisoning

1. DISEASE REPORTING

A. Purpose of reporting and surveillance

1. To determine if there is a source of intoxication of public health concern (e.g., fish, broken thermometer or blood pressure cuffs, dental amalgams)
2. To prevent further/continued exposure by eliminating the source or reducing exposure
3. Additionally, surveillance and investigation data may be used to:
 - Recognize patterns and evaluate trends in environmental conditions, population exposures, and rates of disease
 - Identify opportunities for research and/or public health interventions to reduce exposures to potential environmental health hazards and prevent disease
 - Identify populations most affected or most vulnerable
 - Measure impacts of public health interventions

Note: This document serves as guidance for case investigations. For mercury spills see <http://www.floridahealth.gov/environmental-health/mercury-spills/index.html> or contact the Public Health Toxicology section at the Bureau of Epidemiology (850-245-4401).

B. Legal reporting requirements

Laboratories and physicians are required to report mercury poisonings to the local county health department (CHD) within one working day of identification/diagnosis. Mercury poisoning is listed as a notifiable disease in the State of Florida under Statute 381.0031, Rule 64D-3, Florida Administrative Code. Local health departments, health care providers, laboratories, and other public health personnel are required to report the occurrence of notifiable diseases as defined in the rule.

C. County health department investigation responsibilities

1. Begin investigation on the same day as notification.
2. Immediately notify the Chemical Disease Surveillance Program (CDSP) at the Bureau of Epidemiology (850-245-4401) when a cluster (two or more related cases) of mercury poisoning is suspected. Epidemiologists and toxicologists are available to assist CHDs with investigations as needed.
3. Enter available data for cases into Merlin. Attach the CRF and other related documents (e.g., medical records) in Merlin.
4. Provide the individual with the following phone number for more information: 1-800-222-1222 (Florida Poison Information Center Network [FPICN], available 24/7).

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2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic agent

Mercury is a naturally occurring element. Liquid mercury is shiny with a silver-white color and is odorless. Its distribution in the environment is the result of both natural and manmade processes. There are three categories of mercury with unique characteristics and potential health effects:

- Elemental or metallic mercury
- Organic mercury compounds
- Inorganic mercury compounds

The forms of mercury most likely encountered by the general public include:

- **Elemental or metallic mercury:** This is the pure form of mercury (i.e., not combined with other elements). It is the form of mercury found in mercury thermometers, dental amalgam, some blood pressure cuffs, and fluorescent light bulbs. Mercury vapor can result when elemental mercury or products that contain elemental mercury break and release mercury into the air.
- **Methylmercury:** Microorganisms in the environment can convert inorganic mercury to the organic form, methylmercury. This form can build up in the environment and accumulate in certain freshwater and saltwater fish, and marine mammals.
- **Ethylmercury:** This is an organic form of mercury found in some medical preservatives (e.g., thimerosal).
- **Inorganic mercury (mercuric salts):** This is oxidized mercury that combines with other chemical elements to create salt forms.

B. Description of illness

The following information is directly from the Agency for Toxic Substances and Disease Registry ToxFAQs™ for Mercury and the Centers for Disease Control and Prevention National Biomonitoring Program Chemical Factsheet on Mercury.

The different forms of mercury have distinct patterns of adverse health effects. Not everyone is equally susceptible to the effects of mercury. The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are more harmful because, in these forms, more mercury reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems.

Short-term exposure to high levels of metallic mercury vapors may cause health effects such as lung damage, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

Elemental mercury: The human health effects from exposure to low environmental levels of elemental mercury are unknown. Very high mercury vapor concentrations can quickly cause severe lung damage. At low vapor concentrations over a long time, neurological disturbances, memory problems, skin rash, and kidney abnormalities may occur.

Inorganic Mercury: When eaten in large amounts, some inorganic mercury compounds can be very irritating and corrosive to the digestive system. If repeatedly eaten or applied to the skin over a long time, some inorganic mercury compounds can cause effects similar to what is seen with long-term mercury vapor exposure, including neurological disturbances, memory problems, skin rash, and kidney abnormalities.

Organic Mercury: Large amounts of methylmercury eaten over weeks to months have been shown to cause damage to the nervous system. Infants born to women who were poisoned with methylmercury had developmental abnormalities and cerebral palsy.

C. Reservoirs

Can be naturally occurring or may be found in thermometers, blood pressure cuffs, dental amalgams, and some fish.

D. Modes of transmission

Ingestion of fish or inhalation of mercury vapors.

E. Incubation period

N/A

F. Period of communicability

N/A

G. Treatment

Seek medical treatment immediately. Decontamination may be performed by removing clothes and washing the skin with soap and water. The most effective chelating agents are dimercaprol (British Anti-Lewisite, BAL), succimer (DMSA, 2,3-dimercaptosuccinic acid), and penicillamine. Consult a clinical toxicologist or the Florida Poison Information Center Network (1-800-222-1222) for treatment recommendations.

H. Prophylaxis

None indicated.

I. Mercury poisoning in Florida

Mercury poisoning has been reportable in Florida since 1991. From 2002 through 2013, 236 cases of mercury poisoning were reported in Florida. There was a decrease in the number of cases reported, beginning in 2009, mainly due to a change in the case definition. In 2013, five mercury poisoning cases were reported to the Florida Department of Health, all of which were sporadic. No one was hospitalized and no deaths were reported. Two cases were in non-Hispanic white men, one case was in a non-Hispanic white woman, one case was in a non-Hispanic man of other race, and one case was in a white woman of unknown ethnicity. Ages ranged from 4 to 66 years-old (average age was 39 years, median was 33 years). Four of the cases reported fish consumption within a month of illness identification. Two cases reported eating ≤ 12 ounces of fish per week, one case reported 36 to 60 ounces per week, and one case did not report their fish consumption. One case did not report any high-risk exposures for mercury poisoning.

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3. CASE DEFINITION

A. Clinical description

See [section 2B](#) above for additional details. The clinical presentation of mercury poisoning varies depending upon the form of mercury (elemental, organic, or inorganic), as well as the route of exposure and the dose (if ingested). All organ systems can be affected.

For elemental mercury, acute toxicity might result in fever, fatigue, and clinical signs of pneumonitis. For inorganic mercury, symptoms might include profuse vomiting and diarrhea that is often bloody, followed by hypovolemic shock, oliguric renal failure, and possibly death. Symptoms from delayed toxicity (>1 month) are typical of organic mercury poisoning and usually involve the central nervous system. These symptoms might include paresthesia, headaches, ataxia, dysarthria (motor speech disorder), visual field constriction, blindness, and hearing impairment.

B. Laboratory criteria for diagnosis

Elevated levels of mercury found in urine, whole blood, or hair as determined by laboratory tests:

- ≥ 10 micrograms per liter ($\mu\text{g/L}$) of urine
- Or
- ≥ 10 $\mu\text{g/L}$ of whole blood
- Or
- ≥ 5 micrograms per gram ($\mu\text{g/g}$) of hair

No definitive correlation exists between blood or urine mercury levels and mercury toxicity. Urine mercury levels are not useful in evaluating organic mercury poisonings.

C. Case classification

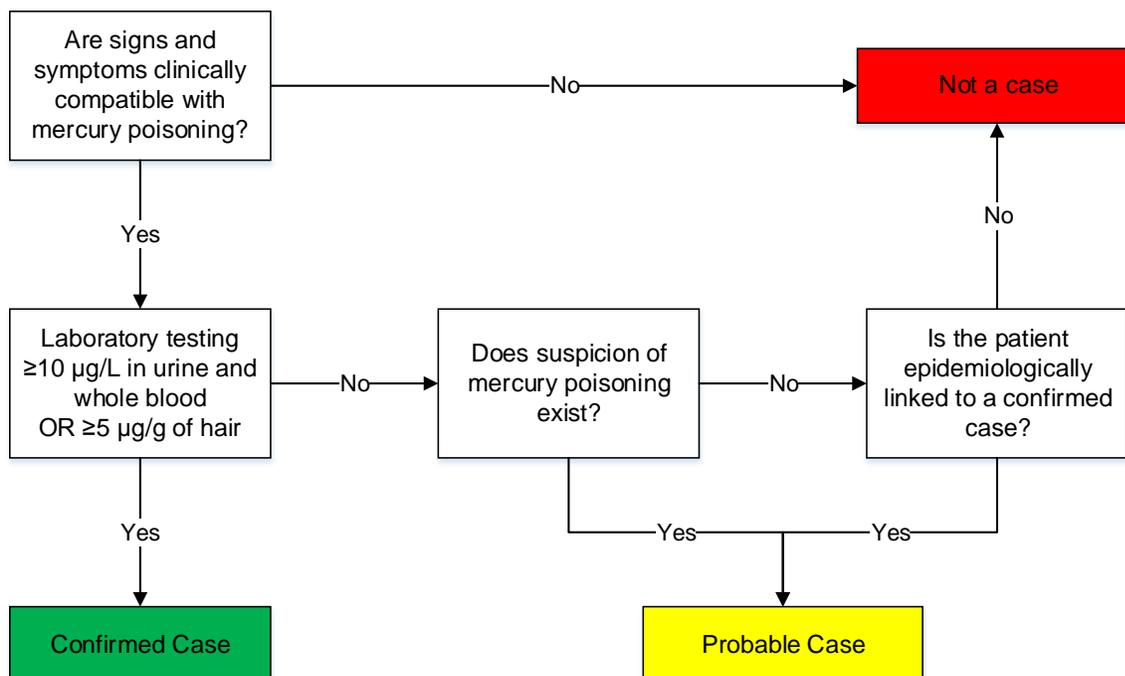
Confirmed: A clinically compatible illness in a person with laboratory evidence

Probable:

- A clinically compatible illness in a person with a high index of suspicion (patient's exposure history regarding location and time)
- Or
- A clinically compatible illness in a person with an epidemiologic link to a case with laboratory evidence

D. Comment

None

Mercury Poisoning Flowchart:[Top](#)**4. LABORATORY TESTING****A. Criteria for diagnosis**

There are laboratory tests available to identify mercury poisoning. Elevated levels of mercury are defined as $\geq 10 \mu\text{g/L}$ of urine, $\geq 10 \mu\text{g/L}$ of whole blood, or $\geq 5 \mu\text{g/g}$ of hair. However, urine mercury levels are not useful in evaluating organic mercury poisonings.

B. Services available at the Bureau of Public Health Laboratories (BPHL)

- In suspected acute mercury poisoning, it is recommended to test blood specimens. Blood is mainly tested to detect the presence of methylmercury. Other forms of mercury can also be detected in the blood, but according to the Agency for Toxic Substances and Disease Registry (ATSDR), the amount present will decrease by half about every three days from the date of exposure as the mercury moves into other organs.
- Urine is used to test for metallic mercury and inorganic forms of mercury, but it cannot be used to determine exposure to methylmercury.
- Hair testing may be useful to detect methylmercury exposures that occurred several months earlier, but hair testing is relatively complex and is mainly used in research studies.
- Although not routinely tested, mercury has been shown to be present in nails, breast milk, stool, and breath.

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5. CASE INVESTIGATION**A. Contact the physician or hospital**

1. Determine the presence of clinically compatible signs and symptoms and differential diagnoses.
2. Obtain the following:
 - a. Date of onset
 - b. Signs and symptoms
 - c. Predisposing conditions (e.g., immunosuppression)
 - d. Tests performed
 - e. Treatment
3. Identify what information has been given to the individual, including whether the individual knows about the diagnosis.
4. Obtain as much demographic information as possible, including contact information (home, cellular, pager, and/or work phone number). Identify how and where the individual can be contacted (e.g., at hospital or home).
5. Notify the physician that you will be contacting the individual as the Florida Department of Health follows up on all reports of mercury poisoning to assess exposure and to identify potential means for preventing further poisonings. It may also be appropriate at this point to determine if the physician has any concerns about the FDOH contacting the individual.

B. Interview the individual and complete the case report form

The CHD conducts follow-up and investigation, including the collection of additional situational and risk-related information. Collect information using the mercury poisoning CRF. The CRF and guidelines for completing it can be found below.

- Case report form: http://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/_documents/crf-mercury.pdf
- Case report form guidelines: http://www.floridahealth.gov/healthy-environments/mercury-spills/mercury-poisoning/_documents/guidelines-for-mercury.pdf

1. Contact the individual to complete an interview as soon as possible.
 - a. Make at least three phone call attempts.
 - b. Calls should be made at different times of the day, with at least one attempt in the evening.
2. Items to cover during the interview include the following:
 - a. Provide a brief background about mercury poisoning, including possible modes of exposure and symptoms
 - b. Demographic information
 - c. Exposure information
 - i. Potential sources of mercury
 - ii. Travel outside Florida or the United States (determine dates of travel)
 - iii. Ingestion or use of folk medicines

- d. Health effects and medical information
 - i. Signs and symptoms
 - ii. Pre-existing conditions
 - iii. Physician visits
 - iv. Pregnancy status
- e. Ask if other household members or co-workers were exposed or are experiencing similar symptoms
- f. Provide education on prevention recommendations ([section 6A](#))
- g. Address individual's concerns

C. Environmental evaluation

Environmental investigations, when necessary, will generally focus on documenting exposure and documenting health complaints from the alleged exposure(s) in order to complete the information on the CRF. Field investigations may also involve gathering information for determining if there is an ongoing public health threat or if additional individuals have been exposed and are experiencing symptoms. CHD staff must try to identify the source of mercury involved in the exposure, although confirmation may have to come from an outside source, such as a laboratory. When multiple people are potentially exposed, the CDSP can provide CHDs with incident specific guidance for gathering the necessary information in a more efficient manner. CHD staff should coordinate field activities with the CDSP. For mercury spills, please contact the Public Health Toxicology section at the Bureau of Epidemiology (850-245-4401).

D. Merlin data entry

Create a case in Merlin under disease code **MERCURY POISONING-94899**. Enter the data collected into Merlin, being sure to include all required fields on the Basic Data screen, and attach all relevant laboratory results. Attach ALL laboratory results received via electronic laboratory reporting (ELR). Attach the completed CRF.

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6. CONTROLLING FURTHER SPREAD

A. Individual/household education on prevention recommendations

- The Florida Department of Health, Division of Environmental Health provides health advisories related to fish consumption in Florida. The 'Florida Commercial Fish Wallet Card for Women of Child-Bearing Age' has been developed to educate all consumers about mercury levels found in fish commonly available in Florida (both commercial and recreational fish species) and their safe consumption levels during pregnancy. Available at:
http://www.floridahealth.gov/programs-and-services/prevention/healthy-weight/nutrition/seafood-consumption/_documents/purdue-wallet-card-as-one.pdf
- Do not vacuum up spilled mercury. Vacuuming turns the liquid mercury into a vapor. Mercury vapor can get into the air, which increases risk of exposure. Avoiding vacuuming also keeps the vacuum cleaner free from contamination.
- A mercury spill is considered a small spill if the amount of mercury released is same as that of a typical broken thermometer. If the spill is more than one broken thermometer, it is considered a large spill. Contact the Bureau of Epidemiology for guidance on mercury

cleanup (850-245-4401) and for coordination with the Department of Environmental Protection.

- Some people save mercury and store it in containers. This is dangerous because mercury may escape from broken or improperly sealed containers.
- Properly dispose of older medicines that might contain mercury. For how to dispose of unused medicines see:
<http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm101653.htm>.
- Mercury-containing products should not be thrown in the household trash. Determine if your city or county has a hazardous waste round up and bring it there, or you may call the Bureau of Epidemiology (850-245-4401) for advice.
- Teach children at an early age not to play with shiny, silver liquids.
- Replace mercury-containing products with safer options. Buy electronic thermometers and blood pressure devices. Carefully open shipped packages containing older glass/mercury equipment as fragile items can break; mercury beads spread quickly.

B. Isolation of cases

N/A

C. Management of contacts

N/A

D. Food or water is implicated as the source of an outbreak

Consult the Florida Fish Consumption Advisories website for information about fish high in mercury: <http://www.floridahealth.gov/prevention-safety-and-wellness/healthy-weight/nutrition/seafood-consumption/fish-advisories-page.html>.

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7. MANAGING SENSITIVE SITUATIONS

N/A

8. IMPORTANT LINKS

A. Information for County Health Departments

<http://www.floridahealth.gov/healthy-environments/mercury-spills/mercury-poisoning/information-for-county-health-departments.html>

B. Mercury Brochures

http://www.floridahealth.gov/healthy-environments/mercury-spills/mercury-poisoning/_documents/mercury-spills-factsheet.pdf

C. Mercury FAQ

<http://www.atsdr.cdc.gov/toxfaqs/faq.asp?id=113&tid=24>

D. Florida Fish Consumption Advisory

<http://www.floridahealth.gov/prevention-safety-and-wellness/healthy->

[weight/nutrition/seafood-consumption/fish-advisories-page.html](http://www.floridahealth.gov/weight/nutrition/seafood-consumption/fish-advisories-page.html)

E. Food and Waterborne Disease Program

<http://www.floridahealth.gov/diseases-and-conditions/food-and-waterborne-disease/index.html>

F. Don't Mess with Mercury Videos (English and Spanish versions)

<http://www.dontmesswithmercury.org/>

9. REFERENCES

- A. Agency for Toxic Substances & Disease Registry, ToxFAQs™ for Mercury.
<http://www.atsdr.cdc.gov/toxfaqs/TF.asp?id=113&tid=24#bookmark05>
- B. Centers for Disease Control and Prevention, National Biomonitoring Program, Chemical Factsheet on Mercury. http://www.cdc.gov/biomonitoring/chemical_factsheets.html
- C. Centers for Disease Control and Prevention, Case Definition for Elemental Mercury.
<http://emergency.cdc.gov/agent/mercury/mercelementalcasedef.asp>
- D. Centers for Disease Control and Prevention, Case Definition for Inorganic Mercury.
<http://emergency.cdc.gov/agent/mercury/mercinorgcasedef.asp>
- E. Centers for Disease Control and Prevention, Case Definition for Organic Mercury.
<http://emergency.cdc.gov/agent/mercury/mercorgcasedef.asp>