Environmental and Occupational Disease Case Reporting and Investigation Protocol
Arsenic Poisoning

I. Identification and definition of cases

A. Clinical description

Arsenic is a heavy metal that occurs naturally in soil and minerals; it may therefore enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching. For the general population, oral exposures are predominant. Acute oral arsenic poisoning symptoms include nausea, vomiting, diarrhea, cardiovascular effects such as arrhythmias and hypotension, and encephalopathy. Symptoms of chronic oral arsenic poisoning include dermal changes and peripheral neuropathy. Chronic exposures may also increase the risk of skin cancer and bladder cancer. Occupational exposures are predominantly inhalational and can result in symptoms including respiratory irritation, nausea, skin effects, and an increased risk of lung cancer.

Clinical testing

Clinical testing is through urine (preferred for immediate exposures) or blood (for exposures within the past 6–12 months). Arsenic exists in two forms (inorganic and organic), so further speciation testing is required for positive results. While both inorganic and organic arsenic are absorbed through the gastrointestinal tract, organic is less metabolized, more easily excreted, and is considered non-toxic. High levels of arsenic that are due to organic arsenic are not investigated by public health.

Common exposures

Dietary exposures may occur from the consumption of certain fish and shellfish, rice, or Hijiki seaweed. Occupational exposures may occur when working in copper or lead smelting, wood treatment, or the production or application of organic arsenical-containing pesticides. Among those exposed to arsenic in Wisconsin, a common source is drinking water from contaminated private wells.

B. Laboratory criteria

Confirmatory

- Blood arsenic levels ≥ 70 µg/L **or**
- Urine arsenic levels ≥ 100 µg/L in an **adult** (18 years old or older) **or**
- Urine arsenic levels ≥ 50 µg/L in a **child** (under 18 years old)

C. Wisconsin surveillance case definition

Confirmed case

A case, with or without symptoms, that is laboratory confirmed.

II. Reporting

A. Wisconsin disease surveillance category II – methods for reporting

This disease shall be reported to the patient's local health officer or to the local health officer's designee within 72 hours of recognition of a case or suspected case, per Wis. Admin. Code § DHS 145.04 (3) (b).

Report electronically through the Wisconsin Electronic Disease Surveillance System (WEDSS), or mail or fax a completed Acute and Communicable Disease Case Report (F-44151) to the address on the form. If reporting through WEDSS, arsenic poisonings are within the Metal Poisoning (Non-Lead) section.

B. Responsibility for reporting

According to Wis. Admin. Code § DHS 145.04(1), persons licensed under Wis. Stat. ch. 441 or 448, laboratories, health care facilities, teachers, principals, or nurses serving a school or day care center, and any person who knows or suspects that a person has a communicable disease identified in Appendix A.

C. Clinical criteria for reporting

Clinical diagnosis in an adult or child.

D. Laboratory criteria for reporting

Blood arsenic levels ≥ 70 µg/L **or** urine arsenic levels ≥ 100 µg/L in an **adult or** urine arsenic levels ≥ 50 µg/L in a **child**.

III. Case investigation

A. Responsibility for case investigation

It is the responsibility of the local health department (LHD) to request the medical records of suspect cases as soon as it is reasonably possible. The medical records should be uploaded into WEDSS. The Bureau of Environmental and Occupational Health (BEOH) performs case investigations unless local health departments choose to conduct routine follow-up for all cases in their jurisdictions. A case investigation may include information collected by phone, in person, in writing, or through review of medical disease report forms, as necessary and appropriate.

B. Required documentation

- Upload medical records for suspect arsenic poisoning cases into WEDSS. Speciation results should be requested and submitted as well.
- Upload completion of medical record upload, set WEDSS disease incident process status to “Sent to State.”

IV. Public health interventions and prevention measures

Local public health should provide routine education to the public on ways to prevent arsenic poisoning, including the following:

- For individuals using private wells for drinking water, DHS recommends that well users test for arsenic once every five years. Well users in Outagamie, Winnebago, or Brown counties should test every year. DHS’s Arsenic in Private Wells fact sheet (P-45012) has more information on when to test and what to do if elevated levels are found.
- Certain fish (including tuna, mackerel, salmon, sardines, bluefish, and swordfish) can be high in arsenic, although it is mostly organic arsenic. Shellfish (including clams, oysters, mollusks, crab, and lobster) can also be high in arsenic. Organic arsenic is more common, but clams and crab may contain inorganic arsenic as well. Limit these fish and shellfish in the diet, especially for the three days preceding an arsenic test.
- Hijiki seaweed is a brown seaweed used in Japanese and Korean cooking. It is not the seaweed used in sushi. Hijiki seaweed can contain high amounts of inorganic arsenic and dietary consumption should be limited.

- Rice grown in areas with high soil arsenic can contain high levels of inorganic arsenic. Brown rice has higher levels of arsenic than white rice. Rice-containing products for infants (such as rice cereal) should be consumed in moderation.
- Soil tests for arsenic are generally not recommended unless individuals live near a site of known contamination or there is a reason to suspect the soil contains arsenic. However, practicing safe gardening habits can lower exposure to all kinds of soil contaminants, including arsenic. These habits include:
  - Wearing gloves when working in the garden.
  - Using raised garden beds with clean soil, such as store-bought soil, topsoil, or clean fill from certified sources.
  - Adding natural matter like composts and manure to the soil.
  - Not eating food, drinking, and smoking when working in the garden.
  - Not track dirt from the garden into the house.
  - Washing hands after gardening and before eating.
  - Washing fruits and vegetables before eating.
  - Peeling root crops and removing outer leaves of leafy vegetables before eating.
- Individuals should avoid skin contact with treated lumber from 2003 or before. If treated wood is burned, individuals should avoid smoke inhalation. Prior to phase out in the US in 2003, wood intended for outdoor use was often treated with chromated copper arsenate (CCA). It can still be found in older decks, play sets, and picnic tables where exposure can happen through the skin of the hands. Burning of old pressure-treated wood is also a source of exposure if the smoke is inhaled.
- Limit or avoid tobacco use. Tobacco contains arsenic, so inhalation of tobacco-containing products such as cigarettes or cigars could result in inhalational arsenic exposure.

V. Contacts for consultation

- Local health departments and Tribal health agencies: https://www.dhs.wisconsin.gov/lh-depts/index.htm
- Wisconsin Bureau of Environmental and Occupational Health: 608-266-1120 or dhsenvhealth@dhs.wisconsin.gov
- Wisconsin State Laboratory of Hygiene: 1-800-862-1013
- Medical management of arsenic poisoning: Wisconsin Poison Control Center: 1-800-222-1222

VI. Related references

- Agency for Toxic Substances and Diseases Registry, Centers for Disease Control and Prevention. (October 2007). ToxGuide for arsenic. Retrieved from https://www.atsdr.cdc.gov/toxguides/toxguide-2.pdf, on December 16 2024.
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