Mercury Spills – How to act?

Antoni G. Lopez

Mercury is a highly toxic heavy metal that poses a threat to human health

Mercury vapour, when inhaled, **can affect the central nervous system** and, depending on exposure levels, can **impair cognition and in some cases cause death**. Mercury is also harmful if absorbed through cuts and abrasions of the skin.

Symptoms of mercury poisoning include shortness of breath, dyspnoea, and cough with acute exposure; chronic exposure to lower doses generally leads to irritability, depression, tremors, and slurred speech.

Mercury spills, a major inhalation hazard

Due to its high surface tension and volatility, elemental **mercury** forms small drops when spilled and **vaporizes rapidly into the air**. Indoors, mercury spills become an inhalation hazard.

Exposure to elemental mercury in health care settings from spills or broken equipment, such as mercury-containing **thermometers and sphygmomanometers**, **is a serious health problem for employees, patients and visitors**, as well as those tasked with repairing and cleaning up such broken equipment.

Mercury Spill Kit

Healthcare facilities must be prepared for accidental spills in any area of the hospital where mercury-containing devices are used. Thus, **appropriate spill kit for any size of mercury spills must be available, and a clean-up procedure must be implemented.**

Personal Protective Equipment (PPE)*

- ✓ **Rubber or nitrile gloves**.
- ✓ **Safety googles**.
- ✓ **Face mask** (tightly sealing and with and air-purifying respirator with mercury cartridges)[1].
- ✓ **Protective clothing** (coverall and apron).
- ✓ **Disposable shoe covers**.

Tools

- ✓ **Flashlight.**
- ✓ **Utility knife blade**.
- ✓ **Disposable tweezers**.
- ✓ **Disposable brush**.
- ✓ **Duct tape or sticky tape**
- ✓ **Vapor suppression agents**[2].
- ✓ **Plastic-coated cards or thin pieces of plastic** (alternatively index cards or cardboard)
- ✓ **Small plastic scoop or plastic dustpan**.
- ✓ **Eyedropper or syringe** (without the needle).

Containers

- ✓ **Air-tight, sealable plastic bags.**
- ✓ **Small, air-tight, rigid plastic container.**
- ✓ **Air-tight, puncture-resistant, rigid plastic or steel jar or container.**
- ✓ **Disposable plastic tray.**
- ✓ **Regular plastic waste bags.**

Materials for decontamination

- ✓ **Decontaminant solution** or commercial decontaminant[3].
- ✓ Vinegar, hydrogen peroxide, and cotton swabs for final cleaning when using sulphur powder.

1. Alternatively:
a) Tightly sealing face mask with sulphur or iodide impregnated activated carbon.
b) Tightly sealing face mask made of sandwiched activated charcoal-impregnated cloth.
c) Other specialty mask or respirator designed particularly for mercury.
d) If none of the masks stated above are available, a face mask with a 0.3-micron HEPA filter to capture amalgam particles and mercury-laden dust.

2. Such as:
a) Sulphur powder (available from pharmacies) to absorb mercury by forming mercuric sulphide.
b) Zinc or copper flakes (available from hardware stores) to absorb mercury by forming amalgams.
c) Commercial absorbent pads or vapor suppressants.

3. Such as:
a) Sodium thiosulfate solution (photographic fixer).
b) Mixture of sodium thiosulfate and EDTA.
c) Commercially available decontaminant solutions.

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Quick guide for the clean-up of mercury spills

Step 1 - Determine the extent of the spill

Identify the surfaces where the mercury spilled and the distance the beads have spread. This is called the "contaminated area."

Step 2 – Block off foot traffic and evacuate the area

Clear the room or the general area and prevent anyone from entering it. If the extent of a small spill is not immediately visible, block off traffic for a radius of about 2 meters around the center of the spill.

Step 3 – Check people's health state

Check if anyone's skin, shoes, or clothing was splashed with mercury, and provide first-aid to those who need it.

Step 4 – Put on PPE and content the spill

Put on personal protective equipment (PPE) before re-entering the spill site. Close all interior doors and turn off central ventilation, heating, or air conditioning systems that circulate air from the spill site to other areas of the building. Open windows and exterior doors to dilute the vapor concentrations in the room.

Step 5 – Reduce vapor concentrations in the spill area

Remove and replace any contaminated "J", "U", or "S" traps over a drain, sink, or washbasin with the help of a facility engineer. Place a sheet of plastic under the work area and transfer the mercury to an air-tight container. Dispose of the old trap as hazardous waste.

Step 6 – Clean-up procedure

Remove visible mercury beads and broken glass with tweezers, playing cards, or pieces of plastic. Search for and remove tiny mercury droplets and glass pieces by shining a flashlight at different angles. Sprinkle sulphur powder on cracks and hard surfaces that had come in contact with mercury, followed by zinc or copper flakes to amalgamate any residual mercury. Use a brush or small broom to remove the powder and/or metal flakes.

Step 7 – Remove contaminated materials

Cut out pieces of carpet, padding, and other soft materials that are contaminated with mercury. Place contaminated materials and all used clean-up materials in a sealable plastic bag.

Step 8 – Dispose of or decontaminate clean-up material

Dispose of contaminated items in a leak-proof, sealable plastic bag. Thoroughly clean the equipment used in the clean-up process with a commercially available mercury decontaminant solution, thiosulfate solution, or a mixture of sodium thiosulfate and EDTA.

Step 9 – Label and seal all contaminated material

Ensure that the air-tight jar and container are filled with enough water to cover the elemental mercury and broken glassware, close the jar and container tightly, label it as "hazardous waste" and store it in a secure place.

Step 10 – Ventilate the area and write a report on the incident

Place a fan next to the spill area to volatilize mercury and a second fan in a window or doorway to move air to the outside air for 48 hours or more. Document the incident in keeping with the procedures of the health facility to improve safety.