

# **Mercury Containing Medical Waste**

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# INTRODUCTION

- Mercury is used in many industrial and consumer products.
- Over the past century, anthropogenic sources of mercury emissions have increased dramatically. Many researches estimate that the amount of mercury entering the environment has increased manifold due to a wide variety of human activities, ranging from coal-burning in power plants and waste incinerators to common consumer products that contain mercury such as thermometers, electronic goods and dental amalgams. Mercury is a global contaminant and transports over long distances and is even found in the Arctic ice though the sources which are thousands of miles away.
- Mercury is a toxic substance that is detrimental to the environment and human health when released.

# **SOURCES OF MERCURY**

- **Consumer goods**
- **Health care establishments**
- **Gold Mining**
- **Thermal Power Plants**
- **Incinerators**
- **Cement Kilns**
- **Electronic Goods**
- **CFL, High intensity discharge (HID) bulbs**
- **Laboratories**

- **Chloro alkali industries**
- **Thermostats**
- **Top-loading freezers**
- **Washing machines, etc.**
  
- The amount of mercury from a broken thermometer would be considered as a small spill. If more mercury than this is spilled, it would be considered as a large spill. Some people store mercury in containers. This is dangerous because mercury can escape from broken and incorrectly sealed containers. Individuals can often be exposed without their knowledge.

# HEALTH IMPACT

- Mercury exposure can occur by breathing vapours, by direct skin contact or by eating food or drinking water contaminated with mercury. The lungs, as a result of exposure to breathing vapours, readily absorb mercury vapours. Mercury can enter the body through the skin, especially a wound or cut.
- Health problems caused by mercury depend on the amount that has entered our body, how it entered our body, how long we have been exposed to it, and how our body responds to it. Children are more susceptible to mercury poisoning than adults because their brains are not yet fully developed. Exposure to small amounts of mercury over a long period of time may cause negative health effects. These include damage to the brain, kidneys and lungs. The foetus of pregnant women can also be damaged.

Other health impacts include the following:

- Impairment of vision,
- Disturbance in sensations (prickling feeling, numbness) usually in the hands and feet and sometimes around the mouth.
- Lack of co-ordination of speech, hearing and walking.
- Muscle weakness,
- Skin rashes,
- Mood swings,
- Memory loss and mental disturbances.

# Health impact Contd.

- While Mercury is one of the most useful of the heavy metals found in our daily lives, it is also one of the most deadly metal. When carelessly handled or improperly disposed of, mercury gets into drinking water source, lakes, rivers and streams and becomes a clear threat to human health and the environment. Recent studies have linked mercury exposure to increased risk of heart attack in men, to mental retardation and neurological disorders in children, and to dangerous levels of mercury in the blood of women of childbearing age.
- Not only is Mercury a threat to our quality of life when it is not safely handled or not properly recycled, it can also be a significant threat to the overall health of our business. Local and national environmental regulations should include provisions for safe handling and proper treatment and disposal of mercury containing wastes.

- Elemental mercury can travel a large range of distances, may remain in the atmosphere up to one year and may travel globally before undergoing transformation.
- Particle-bound mercury can fall out of the air over a range of distances.
- Oxidized mercury [sometimes called ionic or reactive gaseous mercury (RGM)] is found predominantly in water-soluble forms, which may be deposited at a range of distances from its source of generation depending on a variety of factors, including topographic and meteorological conditions, downwind of a source.



# MANAGEMENT OF MERCURY WASTE

Best Management Practices (BMPs) for the management of mercury within hospitals might involve:

- Use of alternatives for products that contain mercury.
- Recycling of mercury-containing products when they can no longer be used.
- Correct handling and disposal of mercury, mercury-containing equipment and laboratory chemicals.
- Proper cleanup of spills involving mercury.
- Hospital policies that support BMPs.

# Management of mercury waste

## Contd...

Mercury pollution prevention in the hospital provides many benefits:

- Protection of human health and wildlife by reducing occupational exposures and releases of mercury to the air, water and land from wastewater discharges, spills, land filling or incineration.
- Avoidance of increased regulations in the future.
- Increase in the public awareness about the dangers of mercury through publicity about the hospital's program.
- Enhancement of the positive public image of the medical facility due to publicity about success stories.

# Management of mercury waste

## Contd...

- Medical facilities, because of the large variety of uses for mercury-containing equipment/items, have an increased responsibility for proper disposal and treatment of their mercury waste. One goal of medical mercury management programs is to replace mercury-containing devices with mercury-free alternatives. Currently, various states have proposed or enacted legislation or established voluntary programs focusing on mercury in medical facilities. There also are national and state organisations that promote mercury management and reduction strategies such as identifying and purchasing alternative products and materials with less or no mercury, recycling mercury and mercury-containing products and devices, and training of staff for mercury waste handling.

# Management of mercury waste

## Contd...

### Packaging Mercury for Storage and Transportation

- All mercury-containing products or containers of mercury should be placed inside a larger container with a tight fitting lid.
- Kitty litter or oil-absorbent matter should be placed around the product to protect it from breaking or sudden shocks.
- Clearly label the storage container as "MERCURY - DO NOT OPEN."
- If you must wait for a hazardous waste collection day, store products safely in their original containers with the labels intact, and keep them out of reach of children and pets.
- Transport the container to a household hazardous waste collection center in a cardboard box. Secure them so that they do not tip over. This will minimize shifting or sliding during sudden stops or turns.
- Transport the containers in the back of a pick-up truck or in a car trunk. If you must transport in the passenger compartment, make sure there is adequate ventilation.

## **Management of mercury waste Contd...**

Many national and local agencies have developed collection/exchange programs for mercury-containing devices, such as thermometers, manometers, and thermostats, and recycling programs for fluorescent bulbs. Some countries and cities also have household hazardous waste collection programs.

## Management of mercury waste

### Contd...

- Immediately after a spill, keep all people and pets away from the spill area.
- To minimize the mercury that vaporizes, turn off all heaters and turn on air conditioners.
- Ventilate the area by opening windows, and when possible, keep open for at least two days.
- Never use a vacuum cleaner to clean up the spill. Not only will the mercury contaminate the vacuum cleaner; the heat from the vacuum cleaner will evaporate the mercury, further distributing it throughout the house.

- Assemble the necessary supplies before attempting clean up of the spill. These include gloves, and eyedropper, two stiff pieces of cardboard or paper, two plastic bags, a large tray or box, duct tape or packing tape, a flashlight and a large mouth container.
- Remove all jewellery and watches from your hands as mercury will bond to the metal.
- Put on the gloves, preferably rubber gloves to minimize contact with mercury.
- Use the flashlight to locate mercury. The light will reflect off the mercury beads and make them easier to find.

## **SPILL MANAGEMENT**

- Use the stiff paper to push beads of mercury together, or working over the tray to catch any spills, lift the beads of mercury with the stiff paper.
- Carefully place the mercury in a wide mouth container.
- Pick up any remaining beads of mercury with sticky tape and place the contaminated tape in a plastic bag along with the eye dropper, stiff paper and gloves.
- Label the waste as mercury waste and place this bag and the sealed container in a second bag.
- Label it as mercury waste and call your local Department of Health, for appropriate disposal.



# GLOBAL INITIATIVES

## •WHO

In September 2005, the World Health Organization (WHO) issued a Policy Paper on mercury in healthcare, calling for short, medium and long-term strategies to address the problem. WHO stressed on assessment of mercury usage and waste management programmes in all countries and proposed to work with them in a phased manner. As far as alternatives are concerned, WHO states that both mercury and aneroid BP apparatus have been in use for 100 years and both give accurate readings when working properly.

## •Health Care Without Harm

•Health Care Without Harm (HCWH) and the WHO are together leading a global partnership to achieve virtual elimination of mercury-based thermometers and sphygmomanometers over the next decade and their substitution with accurate, economically viable alternatives.  
([www.mercuryfreehealthcare.org](http://www.mercuryfreehealthcare.org))

## **GLOBAL INITIATIVES contd...**

- The WHO Policy Paper calls for short, medium and long-term steps to achieve the gradual substitution of mercury-based medical devices. It is also grounded in Health Care Without Harm's experience of more than ten years, of working with the health care sector and national governments in North America, Europe, Asia, Africa and Latin America to successfully achieve mercury substitution.

- The partnership is a component of the UN Environment Programme's (UNEP) Mercury Products Partnership, which is led by the US Environmental Protection Agency. This broader UNEP Products Partnership seeks action to eliminate mercury in products such as batteries, lighting and lamps, electrical and electronic devices, dental products and measuring and control devices.
- With specific regard to the WHO/HCWH Health Care partnership, the Products Partnership has set the following objectives:
  - *By 2017, to phase out the demand for mercury-containing fever thermometers and sphygmomanometers by at least 70% and to shift the production of all mercury-containing fever thermometers and sphygmomanometers to accurate, affordable and safer non-mercury alternatives.*
  - The UNEP Products Partnership is in turn part of a larger global effort to address the toxic environmental health impacts of mercury accumulation in the global environment. This effort consists of a series of other voluntary partnerships in areas of major mercury emissions such as chlor-alkali production, artisanal gold mining, coal fired power plants, and mercury waste management.

# UNEP

- In 2001, governments requested UNEP to produce a global study on mercury. The Global Mercury Assessment Report was published in December 2002, and was presented to UNEP's Governing Council in 2003.

The Governing Council considered the assessment at its 22nd session in February 2003, and:

- concluded that there was sufficient evidence of significant adverse global impacts from mercury and its compounds to warrant further international action to reduce the risks to human health and the environment
- decided that national, regional and global actions, both immediate and long-term, should be initiated as soon as possible.
- urged all countries to adopt goals and take national actions, as appropriate, with the objective of identifying exposed populations and ecosystems, and reducing anthropogenic mercury releases that impact human health and the environment.
- requested UNEP to initiate technical assistance and capacity building activities to support the efforts of countries to take action regarding mercury pollution.

In 2005, the Governing Council, included the possibility of a legally binding instrument in its consideration of actions to deal with the significant adverse global impacts of mercury. The Governing Council also:

- requested UNEP to develop a report on the supply, trade and demand for mercury on the global market.
- called for partnerships between governments and other stakeholders as one approach to reduce risks to human health and the environment from the release of mercury and its compounds to the environment.
- encouraged governments, the private sector and international organizations to take immediate actions to reduce the risks to human health and the environment posed on a global scale by mercury in products and production processes.

In February 2007, the Governing Council recognized that efforts to reduce risks from mercury were not sufficient to address the global challenges posed by mercury and concluded that further long term international action is required. It called for a review and assessment of the options of enhanced voluntary measures and new or existing international legal instruments in order to make progress in addressing this issue. It also:

- called for strengthening of the UNEP mercury programme partnerships.
- established an ad-hoc open-ended working group of governments, regional economic integration organizations and stakeholder representatives to review and assess options.
- for enhanced voluntary measures and new or existing international legal instruments.

# NATIONAL INITIATIVES

## **Central Pollution Control Board (Ministry of Environment and Forests)**

- In 2005, the Central Pollution Control Board wrote to all the State Pollution Control Boards to stress on the segregation of mercury containing waste and make it a condition for granting authorization to the healthcare establishments.

## **Ministry of Health and Family Welfare, Govt. of India**

- Under the National Rural Health Mission, the Ministry released the ‘Infection Management and Environment Plan’ in 2007. This document has two volumes:
  1. A policy framework document, which gives a broad overview and guidance to central and state level institutions on the type of systems and processes to be established for infection control and bio-medical waste management.
  2. A set of operational guidelines which are designed as instruction manuals for healthcare workers at primary level healthcare facilities.

Both these volumes have integrated mercury spill management and also advised the healthcare establishments to eventually start a phase-out plan for mercury containing equipment.



## **Delhi Government Policy on Mercury waste**

- ***Objectives***
- To prevent elemental mercury waste from reaching the three waste streams in healthcare and the elimination of mercury containing instrument / equipment in a time bound manner.
- ***Responsibility***
- Responsibility will rest with the Medical Superintendent / head of the hospital /health care institution.
- ***Salient features***
- Until such time that the objective of replacing existing mercury based instruments has been achieved, the mercury – containing waste would be collected as per the described protocol in this policy.

## **Department of Health and Family Welfare, Government of NCT of Delhi**

- The Department of Health and Family Welfare was very proactive and arranged a meeting with all the stakeholders. This meeting led to the formation of a 'Mercury Phase-Out Committee', to look into the use and reduction possibilities of this heavy metal in healthcare. The committee plans to expand its scope with time. The health department has asked all the healthcare facilities to budget for mercury free alternatives in the next fiscal year. Any breakage needs to be managed properly by staff and requisite training should be provided to them. Broken or new instrument requirements (thermometer/sphygmomanometer) need to be replaced with digital/aneroid products.
- The department drafted and circulated a written policy to all the government hospitals, which asks the hospitals to curb the use of mercury equipment. It also plans to take up a study on the occupational exposure of mercury on healthcare workers and the health assessment of workers with regular exposure.
- Delhi government now has three task forces - one each for alternatives, training and monitoring

# GLOBAL INDIA-UNDP/GEF PROJECT

- A global India-UNDP/GEF project on “Demonstrating and Promoting Best Techniques and Practices for Reducing Healthcare Waste” is being implemented by the Ministry of Environment & Forests, Government of India.

# **COUNTRIES INVOLVED IN THE GLOBAL PROJECT**

- ARGENTINA
- INDIA
- LATVIA
- LEBANON
- PHILIPPINES
- SENEGAL
- TANZANIA
- VIETNAM

# **BUDGET AND FUNDING SOURCES**

- **TOTAL GLOBAL PROJECT COST: USD 24.022 m**
- **GEF GRANT FOR GLOBAL PROJECT: USD 10.327 m**
- **INDIA'S SHARE OF GLOBAL PROJECT: USD 1.28 m**
- **GEF GRANT FOR INDIA: USD 800,000 m**
- **INDIA'S CO-FINANCING: USD 480,555**

## **MAJOR ACTIVITIES OF THE INDIA COMPONENT OF THE GLOBAL PROJECT**

- To develop models of good health care waste management in one State (Tamil Nadu) where a Central Treatment Facility (CTF) and its service area will be improved.
- To develop models of good health care waste management in a underserved area (Uttar Pradesh).
- With the Indira Gandhi National Open University (IGNOU) as a partner in this training program, the project will develop capacity building for replicating the best practices in health-care waste management at a national and regional levels.

## **Present Status of the Project**

- Based on the endorsement by India of the project proposal the India component of the project was approved by the GEF Council and endorsed by the GEF CEO.
- The Annual Work Plan (AWP) for the year 2010 has been prepared by the GEF/UNDP. The inception meeting of all the stakeholders will be held in Delhi on 23.3.2010 and thereafter the project will be implemented.

# CONCLUSION AND FUTURE STRATEGY

- Mercury is an elemental substance, that once released into the environment, easily and rapidly changes form to several organic and inorganic states that transfer from soil to air to water and back again;
- The organic form of mercury, methylmercury, bioaccumulates in aquatic ecosystems to magnify concentrations in animal tissue in increasing degrees up to 250,000 times;
- Methylmercury, the most toxic form of mercury, can affect the reproductive efforts of top predators in aquatic environments;
- The neurotoxic effects of high levels of methylmercury poisoning in humans has been established, and low-level doses of methylmercury consumption can potentially effect human health, especially that of a foetus;



- The elemental mercury is a highly toxic substance which can vaporize easily and cause both acute and chronic health effects including severe respiratory irritation and damage to the central nervous system;
- Mercury has been identified internationally as a toxic substance of concern, and mercury contamination has led to fish consumption advisories in many countries,
- The majority of mercury entering water bodies comes from anthropogenic sources, and one-quarter of these emissions are the result of the purposeful use of mercury;
- Mercury is used widely in consumer and industrial products, where, in most cases, alternative, mercury-free products are available;

- Pollution prevention or product substitution is a progressive approach to protecting the environment that eliminates or minimizes the generation of mercury-bearing waste, making it one of the most favorable strategies for maintaining a clean environment;
- Pollution prevention for mercury can help environmental conditions, as well as protect the health and safety of workers;
- We have to adopt safe mercury handling Standard International Procedure so as to collect ,store the mercury spilled in a suitable container without affecting the occupational health , or environment;

*Thank You*