

# MERCURY IN HEALTH CARE

JUNE 2006.

STAY HEALTHY!  
STOP MERCURY



## Mercury Pollution and the Health Care Industry

Mercury has a surprising number of uses in the health care sector. In health care facilities, mercury can be found in medical instruments (such as thermometers, blood pressure instruments, gastrointestinal tubes, dilation and feeding tubes), in laboratory chemicals, pharmaceutical products (such as vaccines and eye/nose drops), and dental amalgams, and also in standard electrical and electronic equipment (such as batteries and fluorescent light bulbs). Mercury is ubiquitous in health care.<sup>1</sup>

In health care settings, breakage of mercury-containing devices and improper disposal contaminate the facility and its immediate environment, often exposing staff, patients, and the community. Mercury spills can be a source of significant acute inhalation as they are often wrongly handled. In addition the spills are a significant source of contamination, as they are often mistakenly swept down the drain or collected in a container before being improperly discarded as general waste. The cumulative usage, breakage, and spills make the healthcare sector a huge contributor of mercury to the waste stream.<sup>2</sup>

Under EU law, mercury is classified and regulated as hazardous waste.<sup>3</sup> Healthcare facilities are legally obliged to manage it as such; making its management and disposal quite expensive. In particular, costs associated with mercury spills are high and can pose health risks for health care staff and patients. Whether the mercury waste is disposed of by a hazardous waste hauler or treated as clinical waste, the waste may be incinerated, which releases mercury emissions into the environment. Even regulated incinerators which comply with emissions limits are a source of mercury contamination.<sup>4</sup>

Alternative technologies to medical waste incineration are also not equipped to treat mercury-containing waste – requiring all mercury-containing products to be separated and treated individually. In addition, whilst elemental mercury recycling may keep it out of the environment in the short-term, its re-use in new products poses the problem. Each use of mercury, whatever the disposal path, ultimately returns mercury to the waste stream and then into the environment, where it eventually can contaminate the seafood we eat (see our Factsheets Mercury and Health, Mercury and Fish Consumption).



## “Stay Healthy, Stop Mercury” campaign.

EPHA Environment Network (EEN) and Health Care Without Harm Europe (HCWH) are joining forces to mobilise the health community in Europe for a global ban on mercury. The activities are focused on raising awareness of the risks to health, especially for babies and pregnant women, and on working with women and health care professionals on how they can protect themselves and the environment from mercury exposure.

## Mercury-free Devices: A Prescription for Human Health

The good news is that alternatives exist for all medical uses of mercury, and many countries and organisations are working towards this goal.<sup>5</sup> For example, in Austria, the Vienna Hospital Association and the Styrian Hospital Association have banned or restricted mercury in their hospitals, which are now almost entirely free of mercury.

The Vienna Declaration of Environmental Standards for Healthcare, signed at the CleanMed Europe conference in October 2004, also represents a positive step forward. One of the principles calls on health care institutions to: replace problematic materials such as PVC, mercury and other persistent toxic chemicals with safer substitutes.<sup>6</sup>

### The Savings from Mercury-Free Management

Health care facilities using mercury-containing products face costs that mercury-free facilities avoid. Although individual mercury-free products may have higher purchase costs than conventional products, the overall costs associated with mercury products are much higher. When spills do occur, not only is there the risk of occupational exposure, but also clean-up costs often amount to thousands of Euros. Mercury disposal is expensive and few disposal options exclude the eventual release of mercury into the environment where it poses health risks by contaminating seafood. Moreover, other costs associated with mercury-free alternatives may be lower: such as the lower labour costs of using IVAC thermometers, which takes temperature more quickly. Using non-mercury alternatives enables health care facilities to avoid the mercury problem altogether.

### Thermometers

There are many alternatives to both clinical and other mercury thermometers, including electrical and electronic thermometers, glass thermometers containing a gallium/indium/tin (Ga/In/Sn) "alloy", etc. Electronic clinical thermometers have become standard in Denmark, Sweden and some other countries. They are somewhat more expensive than glass mercury thermometers, but their price has fallen in recent years. More generally, one electronic thermometer can be adjusted to cover several different measuring ranges, thereby substituting for several mercury thermometers.

The frequency of breakage of glass mercury thermometers is also higher than electronic thermometers, such that an annual, rather than a unit, price comparison would suggest the price of the electronic device is

probably no higher than the mercury one. Other alternatives are also more expensive on a unit basis, although the recently introduced Ga/In/Sn thermometers should approach the cost of old mercury thermometers over time. For a very small number of precision applications, mercury thermometers are still preferred for technical reasons, e.g. for calibration of other thermometer types, for international standards, etc.

There are plenty of brands and types of mercury-free thermometers on the European market including digital and infrared sensing thermometers: Technomed, Geratherm, Tyco Healthcare, Alaris Medical Systems, Microlife, Welch Allyn, SAAT, and Braun among others.<sup>7</sup>

### MERCURY IN THERMOMETERS ADDS UP:

Although thermometers typically contain the smallest amount of mercury per unit compared to other medical devices, they probably represent the largest overall use, due to their relatively high sales. For example, estimates for the UK have suggested annual sales of 350 000 medical thermometers and 350 000 other thermometers, with a total mercury content of 1 080 kg, compared to 5 700 sphygmomanometers (485 kg) and 875 barometers (35 kg).<sup>8</sup>

### Sphygmomanometers

These are used widely in hospitals, in private medical practices, etc. Of all mercury instrumentation used in health care, the mass of mercury is used in sphygmomanometers (80-100 g/unit). Their widespread use collectively make them one of the largest mercury reservoirs in the health care setting. By choosing a mercury-free alternative, a health care institution can have a tremendous impact in reducing the potential for mercury exposure to patients, staff, and the environment.

Both mercury and aneroid sphygmomanometers have been in use for about 100 years, and when working properly, give accurate results. Both require maintenance and only give accurate results when properly calibrated. The Swedish Chemicals Inspectorate – KEMI conducted a review recently of mercury-free blood pressure measuring equipment. They concluded

that only positive experiences from the phase out of mercury in sphygmomanometers – the most widespread instrument – were reported. This phase-out is now complete in Sweden. Mercury-free blood pressure measuring equipment does not cause problems in clinical diagnosis and monitoring, including in the presence of arrhythmias, preeclampsia and in accelerated (malign) hypertension.<sup>9</sup>

Mercury sphygmomanometers have been viewed in the past as the “gold standard”, often used as a reference for determining the accuracy of automated devices. However, some medical professionals have questioned their accuracy and suggested they should be phased out on the grounds of unreliability, regardless of any environmental considerations.<sup>10, 11</sup> Moreover, environmental concerns have led to a change in attitude: in the UK, for instance, it is now generally recommended that consideration be given to the selection of a mercury-free product when the opportunity arises. Some countries have restricted or entirely banned the use of mercury sphygmomanometers.

It is important to recognise that no matter what type of blood pressure measurement device is used, both aneroid and mercury sphygmomanometers must be checked regularly in order to avoid errors in blood

pressure measurement, and consequently the diagnosis and treatment of hypertension.

There are plenty of brands of mercury-free sphygmomanometers that can easily be obtained on the European market from major medical equipment suppliers, e.g.:

- > Omron
- > Bosch & Sohn GmbH
- > AC Cossor & Son Ltd
- > Welch Allyn Medical Products
- > W.A Baum Co. Inc.
- > American Diagnostic Corporation
- > Heine Optotechnik GmbH
- > Rudolf Riester GmbH
- > Trimline Medical Products

### Other medical devices

The Swedish study also examined other mercury-containing medical devices used for blood pressure measurement. In the case of strain gauge plethysmographs, mercury-containing products are now being successfully replaced by equipment using photocell or laser-Doppler techniques.<sup>12</sup> Manufacturers include Moor Instruments in the UK, Hakanson in the US, and Perimed AB and Elektromedicin AB in Sweden.<sup>13</sup>

## Regulations on a National Level

**SWEDEN** Mercury-containing thermometers have been banned since 1991 with only a few requests for exemptions for specific applications. Swedish national authorities banned the commercial manufacturing in Sweden and sale of the following products containing mercury in 1992<sup>14</sup>: thermometers, blood pressure measuring devices (sphygmomanometers), electrical devices, level switches, pressure controls, thermostats, and certain medical equipment. In 1998 a comprehensive ban of sales, imports, and exports of thermometers and other additional measuring instruments was passed.<sup>15</sup> Sales have gradually decreased and were very low in 2003.<sup>16</sup> For the majority of medical devices containing mercury as well as other products in health care, well-performing suitable alternatives were found. For thermometers and blood pressure measuring equipment, Swedish healthcare professionals are now generally using digital, aneroid and other alternative devices.

**DENMARK** In Denmark there has been a general ban on the sales of mercury and mercury containing products since 1994. Beginning in 1998, the ban has also applied to exports.<sup>17</sup>

**FRANCE** Since 1 March 1999, there has been a prohibition on the sale of medical mercury thermometers for measuring human internal temperature.<sup>18</sup>

**NORWAY** A ban on mercury thermometers has been in place since 1998. The ban was accompanied with campaigns to collect such thermometers. More than 100 000 thermometers were collected (1 thermometer per 14 households), accounting for more than 220 kg mercury, in just a couple of months in 1998.<sup>19</sup>

**THE NETHERLANDS** The sale of mercury-containing products has been banned since 1 January 2000 and the ban includes imports. There are a few specific exemptions including for mercury thermometers used in analytical tests and calibration.<sup>20</sup>

**UNITED KINGDOM** No ban has been imposed on the use of medical devices containing mercury in the UK. However, the Executive Agency of the Department of Health recommends that consideration be given to the selection of mercury-free products when the opportunity arises.<sup>21</sup>

## EU Policy to Restrict the Mercury Use

There will soon be EU-wide restrictions on some (non-electric and non-electronic) mercury-containing products used in health care. The Commission has presented a proposal banning new fever thermometers, manometers, barometers and sphygmomanometers in consumer uses and new fever thermometers for health care and veterinary uses. The proposal will go through the European Parliament and Council under the co-decision procedure in 2006.

In addition, electrical and electronic equipment that contains mercury will be subject to restrictions from 1 July 2006. Various exemptions to the Restriction of Hazardous Substances Directive have been proposed,

some of which have already been decided. The Commission is currently considering the expansion of the scope of the Directive to include categories of medical devices and measuring and control devices (which are electrical or electronic).

## EEN & HCWH Recommendation

The EU should enact a general ban on all remaining uses of mercury in medical and other products, and allow requests for exemptions only in cases where there are no mercury-free alternatives.

---

## Suggestions and Recommendations for Health Care Facilities to Avoid Mercury

### Mercury Audit

Conduct a mercury audit to identify all uses and sources of mercury in your institution. See [www.noharm.org/europe/mercury/resources](http://www.noharm.org/europe/mercury/resources)  
[www.noharm.org/details.cfm?ID=582&type=document](http://www.noharm.org/details.cfm?ID=582&type=document)

### Mercury Management Policy

If you are still using mercury, ensure that there is a mercury management policy and a spill response plan for emergencies.

### Mercury-Free Purchasing Policy

Establish a "mercury-free purchasing policy" which is communicated to suppliers, and work with staff to find non-mercury alternatives.

### Information and Training

Educate and train your employees about facility protocols, and provide information about mercury and its effects on human health and the environment.

### Replace Mercury-Containing Products

Commit to eliminating mercury by phasing out mercury-containing items where immediate steps can be taken. For example, replace

- mercury-filled patient thermometers with digital or electronic thermometers;
- mercury containing bougies or esophageal dilators with silicon ones;
- mercury-filled blood pressure gauges (sphygmomanometers) with aneroid units.

### Battery Collection Program (Battery Round-Ups)

A battery round up is a permanent hospital-wide battery collection and recycling program for employees and their family members. A number of different types of batteries are utilised in hospitals and special care should be taken to separate the different types, because they require different disposal paths.

### Mercury Thermometer Exchange

A mercury fever thermometer exchange is an event at which participants turn in mercury fever thermometers from their homes and, in return, receive a non-mercury fever thermometer or a voucher for an alternative thermometer.

## Resources

[www.noharm.org/us/mercury/issue](http://www.noharm.org/us/mercury/issue)

[www.mercurypolicy.org](http://www.mercurypolicy.org)

[www.epa.gov/glnpo/bnsdocs/merchealth](http://www.epa.gov/glnpo/bnsdocs/merchealth)

Hospitals for a Health Environment (H2E):

[www.h2e-online.org](http://www.h2e-online.org)

Sustainable Hospitals: [www.sustainablehospitals.org](http://www.sustainablehospitals.org)

Physicians for Social Responsibility: [www.psr.org](http://www.psr.org)

### Health Care Without Harm

Going Green Factsheets:

[www.noharm.org/us/mercury/resources](http://www.noharm.org/us/mercury/resources)

- “Thermometer Fact Sheet”, HCWH, Nov 2002
- “Making Medicine Mercury-Free” HCWH, July 2003
- “How to plan and hold a Mercury Thermometer Exchange”, HCWH,
- “Instruments, Products, and Laboratory Chemicals used in Hospitals that May Contain Mercury”, HCWH, Nov 2002
- “A New Era: the Elimination of Mercury Sphygmomanometers”, HCWH, June 2003
- “Battery Round Ups” HCWH, Nov 2002

### Brochures & Reports

[www.noharm.org/us/mercury/resources](http://www.noharm.org/us/mercury/resources)

- “Protecting By Degrees: What Hospitals Can Do To Reduce Mercury Pollution” Environmental Working Group and HCWH, 1999

### Other Resources

[www.sustainablehospitals.org/cgi-bin/DB\\_Index.cgi](http://www.sustainablehospitals.org/cgi-bin/DB_Index.cgi)  
Database on Sustainable Products – Non Mercury  
(SEARCH FOR international companies)

### Government Sources/Reports

#### 1. Swedish Chemicals Inspectorate KEMI

– Evaluation of use of non-mercury blood pressure measuring products  
[www.kemi.se/upload/Trycksaker/Pdf/PM/PM\\_7\\_05web.pdf](http://www.kemi.se/upload/Trycksaker/Pdf/PM/PM_7_05web.pdf)

#### 2. UK MEDICAL DEVICES AGENCY:

Blood Pressure Measurement Devices – Mercury and Non-mercury  
[www.mhra.gov.uk/home/idcplg?ldcService=SS\\_GET\\_PAGE&useSecondary=true&ssDocName=CON007350&sTargetNodeId=572](http://www.mhra.gov.uk/home/idcplg?ldcService=SS_GET_PAGE&useSecondary=true&ssDocName=CON007350&sTargetNodeId=572)

#### 3. USA EPA Reducing Mercury Use in Healthcare:

Promoting a Healthier Environment  
[www.epa.gov/glnpo/bnsdocs/merchealth/mercury.pdf](http://www.epa.gov/glnpo/bnsdocs/merchealth/mercury.pdf)

#### 4. Denmark Factsheet on the Ministry of Environment and Energy Statutory Order on Prohibition of Sale and Export of Mercury and Mercury-containing Products

[www.mst.dk](http://www.mst.dk)

1. HCWH (2002) Instruments, Products, and Laboratory Chemicals Used in Hospitals That May Contain Mercury. Health Care Without Harm Pub 2-03, November 5, 2002. Available at [www.noharm.org/library/docs/Going\\_Green\\_List\\_of\\_Mercury-Containing\\_Items\\_i.pdf](http://www.noharm.org/library/docs/Going_Green_List_of_Mercury-Containing_Items_i.pdf)
2. European Council (1991) Council Directive 91/689/EEC of 12 December 1991 on hazardous waste Official Journal L 377 , 31/12/1991 P. 0020 – 0027. Available at <http://europa.eu.int/eur-lex/lex/LexUriServ/LexUriServ.do?uri=CELEX:31991L0689:EN:HTML>
3. Ibid.
4. European Commission (2000) DIRECTIVE 2000/76/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 December 2000 on the incineration of waste 28.12.2000 Official Journal of the European Communities L 332/91. Available at [http://europa.eu.int/comm/environment/wasteinc/newdir/2000-76\\_en.pdf](http://europa.eu.int/comm/environment/wasteinc/newdir/2000-76_en.pdf)
5. See: An Investigation of Alternatives to Mercury Containing Products January 22, 2003. Prepared for The Maine Department of Environmental Protection by Catherine Galligan, Gregory Morose, Jim Giordani; KEMI - Swedish Chemical Inspectorate (2005a) Mercury – Investigation of a general ban available at [www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4\\_04.pdf](http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf) accessed 13 June 2005; Mercury-Containing Products and Alternatives in the Health Care Setting available at [www.informinc.org/fsmerchealth.pdf](http://www.informinc.org/fsmerchealth.pdf); and Mercury Sources and Alternatives in Health Care available at [www.sustainablehospitals.org/HTMLSrc/IP\\_Merc\\_Tools\\_List.html](http://www.sustainablehospitals.org/HTMLSrc/IP_Merc_Tools_List.html)
6. Health Care Leaders Issue Historic Vienna Declaration at International Congress ‘Cleaned Europe’ available at [www.noharm.org/details.cfm?ID=963&type=document](http://www.noharm.org/details.cfm?ID=963&type=document) accessed 24 June 2005
7. Medicines and Healthcare products Regulatory Agency MHRA:Thermometers Review. MHRA 04144. January 2005
8. European Commission (2002). Risks to Health and the Environment Related to the Use of Mercury Products. Risk & Policy Analysts Limited. August 2002. Available at <http://ec.europa.eu/enterprise/chemicals/docs/studies/rpa-mercury.pdf> accessed 15 May 2006.
9. KEMI – Swedish Chemical Inspectorate (2005b) Mercury-free blood pressure measurement equipment – Experiences in the Swedish healthcare sector. Sundbyberg. November 2005, p. 4.
10. Mion D, Pierrin AMG. How accurate are sphygmomanometers? Journal of Hypertension, 12: 245- 248 (1998).
11. Markandu NK, Whitcher F, Arnold A, Carney C. (2000) The mercury sphygmomanometer should be abandoned before it is proscribed. Journal of Human Hypertension 14(1): 31-6 (2000).
12. KEMI (2005b) op.cit., p. 13.
13. KEMI (2005b) op.cit., p. 10.
14. Ibid, p. 2.
15. KEMI (2005a) op.cit., p. 97.
16. KEMI (2005b) op.cit., p. 59.
17. HCWH (2004) Comments on the Consultation Document: Development of an EU Mercury Strategy from 15 March 2004. Available at [http://europa.eu.int/comm/environment/chemicals/mercury/pdf/health\\_care\\_without\\_harm.pdf](http://europa.eu.int/comm/environment/chemicals/mercury/pdf/health_care_without_harm.pdf) accessed 6 July 2005 p. 9
18. Arrêté du 24 décembre 1998 relatif à l'interdiction de mettre sur le marché des thermomètres médicaux à mercure destinés à mesurer la température interne de l'homme NOR: MESH9824147A J.O n° 303 du 31 décembre 1998 page 20169 available at [www.legifrance.gouv.fr/VAspad/UnTexteDeJorf?numjo=MESH9824147A](http://www.legifrance.gouv.fr/VAspad/UnTexteDeJorf?numjo=MESH9824147A) accessed 8 August 2005
19. Royal Ministry of the Environment (2005) Ref 200401100. Available at [http://odin.dep.no/filarkiv/212180/kvikksolv\\_norsk\\_hoeringsinnspill.doc](http://odin.dep.no/filarkiv/212180/kvikksolv_norsk_hoeringsinnspill.doc) accessed 8 August 2005
20. Bulletin of Acts and Decrees of the Kingdom of the Netherlands No. 553 Decree of 9 September 1998, comprising regulations regarding products containing mercury (Decree on Products Containing Mercury, 1998 Environmentally Hazardous Substances Act). Available at [www.chem.unep.ch/mercury/2001-gov-sub/netherlands.pdf](http://www.chem.unep.ch/mercury/2001-gov-sub/netherlands.pdf) accessed 8 August 2005
21. HCWH (2004) op. cit., p. 10
22. European Commission. (2003) Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003. (RoHS), OJ L37, 13.2.2003. Available at [http://europa.eu.int/eur-lex/pre/en/obj/dat/2003/L\\_037/L\\_03720030213en00190023.pdf](http://europa.eu.int/eur-lex/pre/en/obj/dat/2003/L_037/L_03720030213en00190023.pdf) accessed 8 August 2005

## What Can You Do?

If you are a health care professional, recommend that your facility works to become mercury free, or ensure that new items purchased do not contain mercury. Hospitals can also take a mercury-free pledge – a commitment from the management and the entire hospital staff to phase out and not to purchase mercury for their facilities. A sample mercury-free pledge is available on this HCWH website:

[www.noharm.org/europe/mercury/alternatives](http://www.noharm.org/europe/mercury/alternatives)

Responsible handling aims to keep all mercury from medical facilities out of any incineration waste stream. In general there are three ways:

- ☞ Use alternative products that do not contain mercury whenever possible.
- ☞ Remove mercury-containing products or spill waste before they enter the incineration waste stream, so that it can be placed into permanent storage.
- ☞ At a minimum, until permanent safe storage of disposed mercury has been achieved, recycle mercury-containing products as much as possible to keep mercury out of the environment.

### In Case of a Mercury Spill!

- ☞ Keep all people, especially children, away from the spill area.
- ☞ To minimise the mercury that vaporises, turn off any heaters and turn up any air conditioners.
- ☞ Ventilate the area by opening windows, and keep open as long as possible.
- ☞ Do not touch the mercury.
- ☞ Obtain instructions on how to clean up a spill at home, or in public facilities by calling your local authorities, or consult a website, such as:

The US Environmental Protection Agency's Clean Up Instructions:  
[www.epa.gov/epaoswer/hazwaste/mercury/spills.htm](http://www.epa.gov/epaoswer/hazwaste/mercury/spills.htm) or

Environment Canada's Cleaning Up Small Mercury Spills:  
[www.ec.gc.ca/MERCURY/EN/cu.cfm](http://www.ec.gc.ca/MERCURY/EN/cu.cfm)



EPHA Environment Network (EEN)  
 28 Bld Charlemagne, B1000 Brussels, Belgium  
 Phone: +32 2 234 3640 Fax: +32 2 234 3649  
 E-mail: [info@env-health.org](mailto:info@env-health.org)  
[www.env-health.org](http://www.env-health.org)



HCWH Europe  
 Chlumova 17, 130 00 Praha 3, Czech Republic  
 Phone/Fax: +420 222 782 808  
 Email: [europe@hcwh.org](mailto:europe@hcwh.org)  
[www.noharm.org](http://www.noharm.org)

### "Stay Healthy, Stop Mercury" campaign.

EPHA Environment Network (EEN) and Health Care Without Harm Europe (HCWH) are joining forces to mobilise the health community in Europe for a global ban on mercury. The activities are focused on raising awareness of the risks to health, especially for babies and pregnant women, and on working with women and health care professionals on how they can protect themselves and the environment from mercury exposure.

