MERCURY-FREE HEALTH CARE

PHILIPPINES

Guide to Alternatives

FOR HEALTHCARE PERSONNEL

HEALTH CARE WITHOUT HARM

Guide to Alternatives

for Healthcare professionals

KEEPING HEALTH CARE MERCURY-FREE

Disclaimer:

The information provided is believed to be accurate, based on the references provided at the end of the publication. HCWH disclaims any responsibility for possible inaccuracies or omissions and consequences that may flow from them.

Health Care Without Harm supports the switch to alternatives to mercury-containing products but does not in any way, endorse any one of the brands mentioned or the suppliers mentioned in the directory. Suppliers not in the list who also have alternatives to offer are welcome to provide us with information regarding their products.

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HEALTH CARE WITHOUT HARM

Health Care Without Harm (HCWH)

Health Care Without Harm is an international coalition of hospitals and health care systems, medical professionals, community groups, health-affected constituencies, labor unions, environmental and environmental health organizations and religious groups. Its mission is to transform the health care industry worldwide, without compromising patient safety or care, so that it is ecologically sustainable and no longer a source of harm to public health and the environment.

HCWH's campaign began after the US Environmental Protection Agency identified medical waste incinerators as the leading source of dioxin, one of the most potent carcinogens known. In response to this serious problem, a group of 28 organizations came together to form HCWH in Bolinas, California in 1996.

By late 2005, more than 440 organizations in 52 countries had joined HCWH. With offices in Washington, D.C., Prague, Buenos Aires and Manila, HCWH works in partnership with governments, non-governmental organizations and mainstream health care institutions around the world.

In just one decade, HCWH's campaign has had a significant impact on major health systems, health care workers, medical device manufacturers, group purchasing organizations and government regulators. HCWH's successes include:

- Virtually eliminating the market for mercury-based medical equipment in the United States, and generating demand for safe alternatives.
- Closing thousands of medical waste incinerators and promoting safer technologies and waste management practices in the US and around the world.
- Creating new markets for safe and healthy products by leveraging the purchasing power of the health care industry.
- Initiating a Green Building program specifically geared to hospitals.
- Developing a Healthy Food project that is changing the way hospitals purchase food to support sustainable agricultural practices.

Health Care Without Harm's work affects the health of every person in every community. Each one — nurses, doctors, patients, our families and community members — has a role to play in transforming the health care industry so it is no longer a source of harm. By choosing to use safe, sustainable products and practices, the health care industry can reduce disease and be a catalyst for healing, not only in the health care setting, but in society at large.

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Introduction

In early 2006, 11 students fell ill from mercury poisoning after being exposed to the toxic substance that was passed around in an open beaker in a science class at St. Andrew's School in Parañaque City. The students who were treated at the Philippine General Hospital manifested symptoms such as skin rashes and respiratory difficulties. More than a hundred students and teachers were feared to have also been exposed to mercury. The health department and the Environment Management Bureau proceeded to facilitate an extensive and expensive cleanup and decontamination but later asked for the assistance of the United States Environmental Protection Agency (EPA) to assess the status of the mercury spill.

The EPA team of scientists and environmental experts, while in Manila, trained local government officials in using specialized equipment that could accurately analyze the presence of mercury. The team was also involved in consultations with local government agencies to develop plans and improve preparedness in reaction to future such emergencies. St. Andrew's School, meanwhile, was forced to close for a few months until the school grounds were deemed safe for use.

The incident, though extremely unfortunate, has helped raise public awareness on the issue of mercury and its hazards to people and the environment, more so as it happened merely weeks after the first Southeast Asia Conference on Mercury in Health Care was held in Manila. The conference, which was organized by Health Care Without Harm (HCWH) in association with the United Nation's Environment Programme (UNEP), and with support from the Philippine Heart Center (PHC), Department of Health (DOH) and the Department of Environment and Natural Resources (DENR), called on medical professionals — doctors, dentists, nurses and other healthcare workers — to be the primary advocates in reducing and eliminating mercury-use in hospitals and other healthcare facilities. Recognizing the key role of the healthcare sector in this initiative, the DOH through Secretary Francisco Duque III, early in the conference, committed to issuing an Administrative Order (AO) for the gradual elimination of the use of mercury-containing medical devices.

More than a year after the conference though, the DOH has yet to issue the promised AO. But hospitals and other health care facilities need not take their cue from this proposed AO. In fact, a number of hospitals, especially those who attended the conference, have started their own steps in switching to alternatives.

This Guide to Alternatives, prepared by HCWH, aims to assist hospital administrators and healthcare professionals in their efforts in choosing existing alternatives for two of the most common and widely-used mercury-containing medical devices — fever thermometers and sphygmomanometers.

The guide discusses basic information on the issue of mercury in health care and offers detailed steps in managing small mercury spills. A list of existing alternatives for fever thermometers and sphygmomanometers is also provided followed by the types and brands locally available. Directories of suppliers and the cost price of each brand/model of mercury-free products available in the Philippine market are also included.

A section is also provided as a quick overview on mercury-containing fluorescent lamps, and guidelines on proper handling and disposal of busted/broken fluorescent lamps. The last section makes available a list of other mercury-containing devices and their alternatives.

Contained in the annexes are detailed product specifications for some mentioned brands, a directory of the EMB's recognized treaters of hazardous waste, sample quotations from fluorescent lamp treaters, and related HCWH fact sheets.

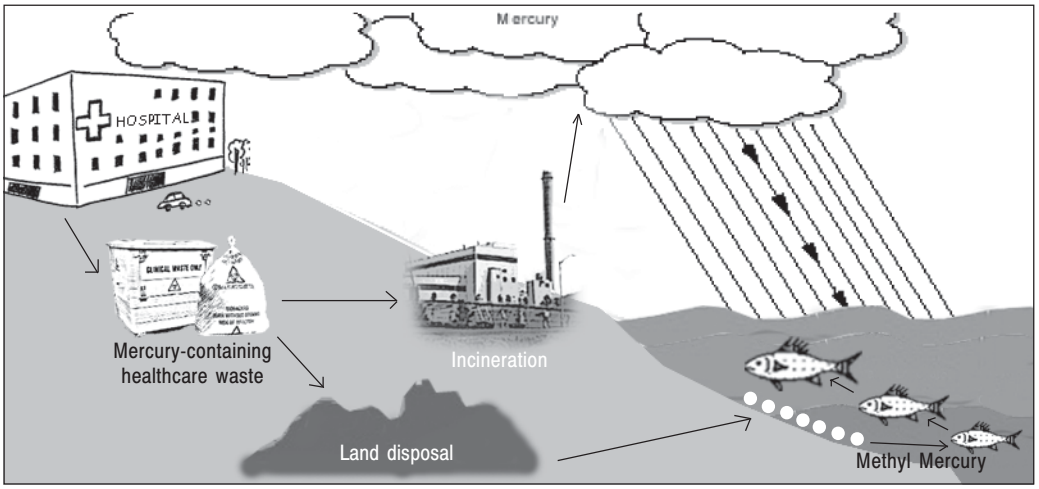
Mercury in Health Care

Hospitals may be unaware that they harbor deadly health risks that could harm both hospital personnel and the patients who rely on them to take care of their health. Mercury or its compounds are prevalent in hospitals and medical institutions as it is used in thermometers, sphygmomanometers, dental amalgam, gastrointestinal products, laboratory chemicals, and in other hospital devices or equipment. In the case of thermometers and sphygmomanometers, mercury is enclosed in glass cases, fragile and prone to breakage.

Mercury spills that occur in hospitals, clinics and other health facilities expose doctors, nurses, other health care workers and patients to elemental mercury. Liquid mercury, even at room temperature can evaporate and significant amounts may lead to highly toxic levels of exposure.

As a known toxic substance, mercury and its harmful effects have been widely documented. Exposure to mercury may cause harm to one's kidneys, brain, liver, lungs and spinal cord. A prolonged exposure to mercury can lead to a person going into a coma or experiencing erratic changes in his or her personality. Pregnant women are at most risk as mercury may cause permanent harm to the developing fetus. Mercury also poses much risk to children as it causes developmental delays during childhood. Other adverse effects include impaired vision and hearing, paralysis and insomnia.

Another cause for concern is the improper disposal of broken thermometers, sphygmomanometers and other mercury-containing medical products which leads to mercury entering the waste stream, resulting in environmental contamination. In the Philippines where strict enforcement and compliance to environmental laws is clearly wanting, hospitals more often than not tend to dump their mercury-containing



wastes along with other hospital wastes or even directly into the general waste stream. Once mercury is deposited into lakes and rivers, it is transformed into *methylmercury*. This highly toxic form of mercury travels through the food chain and accumulates at deadly levels in some fish species. Rising mercury levels in fish have been the concern of most food advisories by international and local environmental agencies.

Methylmercury interferes with the nervous system of the human body and can result in a decreased ability to walk, talk, see, and hear. In extreme cases, high levels of methylmercury consumption has resulted in coma or death.

Sadly the health care sector has been identified as a contributor to the global emission of mercury. In 2002 the UNEP released the Global Mercury Assessment, a report that cites various health care-related products and activities as important sources of man-made releases of mercury. Significant concentrations of mercury, according to the report, are generated from improper treatment and disposal of medical waste including incineration of products containing mercury.

Since the release of the UNEP study, efforts toward mercury-use reduction have been undertaken by governments, particularly in North America and Europe. The World Health Organization (WHO) has also issued a policy promoting the elimination of mercury in the health care sector. This has prompted thousands of hospitals and pharmacies in the U.S. and Europe to phase out mercury-based medical devices. The European Union has even gone so far as pursuing a mercury export ban that will take effect in the next few years.

Unfortunately, most developing countries continue to lag behind in mercury reduction measures due mostly to lack of information regarding the serious health and environmental risks associated with mercury, and the availability of safe, cost-effective and viable alternatives. But increasing efforts towards awareness in the global South are paving the way for mercury-reduction practices in hospitals and

other healthcare facilities, which it is hoped, would eventually lead to an elimination of mercury in the healthcare sector.

Switching to Alternatives

The market demand for digital thermometers, digital blood pressure monitors and aneroid sphygmomanometers is only starting to emerge in the Southeast Asian region. This may indicate the existing level of awareness — or the lack of — on the mercury issue and on the alternative options available.

Cost has been a primary discouraging factor especially since mercury-containing devices have become even more inexpensive as large quantities are produced in India and China at cheaper prices. Affordability is an issue that causes delays in shifting to mercury-free alternatives.

But mercury-free thermometers and blood pressure monitors are also economical in the long run as they eliminate the risk of mercury spills and associated training costs. And considering the rate of breakage (an annual average of 3.4 breakages per 100 beds*) of mercury thermometers in hospitals, costs do balance out in the case of using more durable digital alternatives.

Unfortunately, there is also resistance from quite a number doctors and health care personnel who have long been trained in mercury-containing devices. As a response to questions on the accuracy of alternatives, reputable medical standards associations have conducted tests on existing alternatives, and have found most mercury-free products as suitable replacements.

Managing Small Mercury Spills

(This section is condensed from the HCWH October 2006 Fact Sheet, the complete version is included in the annex.)

This portion aims to aid hospitals in implementing mercury disposal practices to help minimise the exposure of workers, patients, and the environment to the toxic metal. Many of the recommendations and guidelines on how to effectively deal with mercury spill can also be used in schools, offices and private homes. However, the measures outlined below can only be a temporary solution. The best way to eliminate the risks of exosure is to phase out mercury devices in favour of the many safer alternatives available on the market.

The following guide only applies to small spills, such as a broken thermometer. In the event of large spills, turn down the temperature, turn off internal ventilation, open the window, and inform your pollution control officer or local health and safety authority.

*based on data from a 2002 EPA Fact Sheet on Mercury Management

Contents of a mercury spill kit

- Four to five ziplock-type bags
- Yellow waste bags with black band or tape to use as a black band* (2 to 6mm thick)
- Plastic container with lid that seals (35mm film canister, for example)
- Nitrile or latex gloves
- Paper towels
- Cardboard strips (index cards, for example)
- Eyedropper or syringe (without needle)
- Face mask
- Duct or other sticky tape (30cm or so)
- Flashlight
- Powdered sulphur or zinc
- Set of instructions with waste collection and disposal protocols

*As stated in the DOH Health Care Waste Manual (See Annex)

ELEVEN-STEP GUIDE TO CLEANING-UP A MERCURY SPILL

1 **EVACUATE AREA**
Remove everyone from the area that has been contaminated and shut the door. Turn off interior ventilation system to avoid dispersing mercury vapour throughout the facility.

2 **PUT ON FACE MASK**
In order to prevent breathing of mercury vapor, wear a protective face mask.

3 **PUT ON OLD CLOTHES**
Change into old clothes and shoes that can be discarded if they become contaminated.

4 **REMOVE JEWELRY**
Remove all jewelry from hands and wrists so that the mercury cannot combine (amalgate) with the precious metals.

5 **WEAR GLOVES**
Put on rubber or latex gloves. If there are any broken pieces of glass or sharp objects, pick them up with care. Place all broken objects on a paper towel. Fold the paper towel and place in a zip lock bag. Secure the bag and label it as containing items contaminated with mercury. When labelling bags, do so as directed by your local health or fire department to prevent confusion about contents.

6 **IDENTIFY SURFACE**
Wood, linoleum, tile and any other like surfaces can easily be cleaned. Carpet, curtains, upholstery or other such surfaces cannot. These items should be thrown away according to the method outlined below. (For carpets, only the affected portion needs to be cut out and removed.)

see next page ▶

7 LOCATE MERCURY BEADS

Locate all mercury beads, then carefully use the cardboard to gather them together. Use slow sweeping motions to prevent accidentally spreading the mercury. Small and hand-to-see beads can b located with the flashlight: hold it at a low angle close to the floor in a darkened room and look for additional glistening beads of mercury that may be sticking to the surface. Mercury can move a surprisingly long distance on hard and flat surfaces: be sure to carefully inspect the entire room.

8 USE EYEDROPPER AND STICKY TAPE

Use an eyedropper or syringe (without a needle) to draw up the mercury beads.
Slowly and carefully transfer the mercury into an unbreakable plastic container with an airtight lid (such as a plastic film canister). Place the container in a zip-lock bag. Label the bag as containing items contaminated with mercury.

The DENR's Chemical Control Order for Mercury (See Annexes: DENR AO No. 38, Series of 1997, CCO for Mercury and Mercury Compounds) states that labels for mercury-bearing or mercury-containing wastes shoud contain the following information:

- Chemical Name of the Material
- Chemical Composition/Formula
- Warning: Contains a Toxic Material
- First Aid Measures
- Accidental release/spillage measures
- Handling and Storage
- Exposure Controls

After you remove larger beads, use sticky tape to collect smaller hard-to-see beads. Place the sticky tape in a zip-lock bag and secure. Powdered sulphur or zinc stains mercury a darker color and can make smaller beads easier to see. Be careful not to breathe the powder, as it can be mildly toxic.

9 LEAK-PROOF BAG

Place all materials used during the cleanup, including gloves, into a leak-proof plastic bag or container. Seal and label it.

10 FINAL DISPOSAL

Contact your local hospital manager responsible for toxic clean up to ensure that all mercury contaminated waste now secured in labelled bags will be disposed properly.

11 OUTSIDE VENTILATION

Keep the affected area ventilated to the outside (with windows open and ventilation running) for at least 24 hours after your successful cleanup. If sickness occurs, seek medical attention immediately.

It is advisable that a hospital keep a mercury spill clean up kit in every nurse station (or at 1 per 20 bed ratio). Clean up kits can be easily assembled by the Hospital's Waste Management Committees or purchased from suppliers.

Thermometers

The use of mercury fever thermometers has been a common practice of the medical profession for a long time. But the small amount of liquid elemental mercury—a silvery white substance—contained in these thermometers is a known toxic substance, posing hazards to human health and the environment.

A broken thermometer contains about 0.5 to 1.5 grams of mercury, an amount that is enough to contaminate a 20 acre lake or approximately 5 percent of Laguna de Bay's surface area to a degree where its fish would be unsafe to eat. This small amount of mercury from a broken thermometer, under some conditions, can seriously harm the health worker or health professional and the staff and patients inside the health facility. Such incidents occur when the health worker is either unaware that a thermometer has broken or the spilled mercury has seeped into the carpet, in which case the mercury can easily volatilize and could reach dangerous levels in indoor air. (See sidebar: Effects of Exposure to Fever Thermometers)

As mercury thermometers requires "shaking down" for almost each use, the potential for breakage is very high. These pressing concerns have brought the issue of switching to safer mercury-free alternatives to the fore.

Although safer, non-mercury alternatives are readily available in most hospital equipment shops; there is still a considerable amount of hesitation from the health care sector due mostly to questions concerning the adequacy and accuracy of these available alternatives.

Exposure to mercury from fever thermometers

Source: Great Lakes Binational Toxics Strategy (FAQ) – US EPA and Enviroment Canada
http://www.p2pays.org/reg/06/05732.htm

CASE 1

A 32-month old girl was afflicted by hypertension, tachycardia, apathy, irritability, excessive sweating and acrodynia as a result of exposure to mercury spilled from a broken thermometer onto the carpet. Three months of treatment were required before her condition improved.

[S. Cloarec, G. Deschenes, M. Sagnier, J.C. Roland, and H. Nivet, "Arterial hypertension due to mercury poisoning: diagnostic value os captopril", Arch Pediatr 2 (1) (1995):43-46]

CASE 2

Three children, ranging in ages from 20 months to six years old, were exposed to mercury from a thermometer that had been spilled on a carpet. They developed symptoms including anorexia, weight loss, light sensitivity, and pink, sweaty, and scaly palms. Papulovesicular eczema with superinfections, severe prurigo, and itching exanthema were also manifested. The two more severely affected children required four months of therapy before complete recovery.

[Karl Ernst von Mühlendahl, "Intoxication from mercury spilled on carpets", Lancet (1990), 1578]

continued next page ▶

As a response to this growing concern among health workers in the United States, the American Medical Association reviewed the benefits and drawbacks of the more-readily available types of alternatives and quoted the following in their statement:

> "Both glass mercury thermometers and digital thermometers will give you an accurate reading. What's most important is that you choose a thermometer that's easy to use and read.
>
> The newest thermometers available are ear thermometers that quickly and easily measure temperature inside the ear canal. They are still fairly expensive compared with glass and electronic models, and learning how to use them correctly takes some training. But they can be quick and relatively comfortable for children.
>
> Forehead thermometers are convenient and comfortable to use, but they are not very accurate. They may be handy for quick screening, but for exact readings use a glass thermometer or a digital one."[1]

Exposure to mercury...continued

CASE 3
Exposure resulted when 1.1 grams of mercury from a broken fever thermometer were collected and placed in a pan that was laid on a hot kitchen stove. As a result, the mercury vaporized quickly. Two elderly patients developed severe pulmonary edema, diarrhea, confusion, tremors, and coma, and died after 7 and 17 days of hospitalization. A third patient developed erythematous and pustuliform skin rash which resolved after three weeks.

[A. Jaeger, "Accidental Acute Mercury Vapor Poisoning", Veterinary and Human Toxicology, 1979, 21: 62-63]

Quite a number of mercury-free thermometers that are manufactured from countries in the region like China, Japan and Taiwan are currently available in the local market. They usually cost much less than the internationally-known brands. When considering the purchase of such digital thermometers, it is recommended that the measurement accuracy of the product does not exceed the allowed maximum error. The following table shows the maximum error allowed for electronic thermometers based on standards set by the American Society of Testing and Materials (ASTM).

		Maximum Error over Temperature Range Shown				
Thermometer type	ASTM Procedure	< 96.4 °F (<35.7 °C)	96.4 < to 98 °F (35.7 < to 36.6 °C)	98.0 to 102 °F (36.6 to 38.8 °C)	> 102 to 106 °F (> 38.8 to 41.1 °C)	> 106 °F (> 41.1 °C)
Electronic thermometers	E1112-86 (reapproved 1991)1	±0.5	±0.3	±0.2	±0.3	±0.5

Source: Sustainable Hospitals (http://sustainablehospitals.org/HTMLSrc/IP_Merc_FTNonmerc.html)

Alternative Mercury-free Thermometers

Type of thermometer/description	Technical Comparison	Market Availability (Philippines)
Chemical strip  Single-use disposable Made of plastic or paper strips with dots filled with different chemical mixtures, each formulated to melt and change color at a given temperature	Accuracy comparable but not highly recommended Time for reading: 1 minute (oral) to 3 minutes (axilla) Limited temperature range [does not record below temperatures below 35°C (95°F)] No calibration required	Available Limited retailers/ suppliers
Forehead strip  Reusable Made of plastic or paper strips with liquid crystals that change color at a given temperature	Accuracy comparable but not highly recommended Time for reading: 15 seconds	Availability to be confirmed
Glass alcohol thermometer Contains either red (Kerosene, Toluene or Pentane with aniline dye) or blue (Isoamyl Benzoate) fill	Accuracy comparable Time for reading: 3 minutes Breakable No calibration required	Currently not available locally or in the region Where available, not widely distributed
Glass liquid non-mercury  Filled with alloy of gallium, indium and tin (liquid at room temperature) Also known as the brand name Geratherm non-mercury liquid thermometers containing galistan (gallium, indium, tin alloy)	Accuracy comparable Time for reading: 3 minutes Breakable No calibration required	Currently not available locally or in the region Where available, not widely distributed

Type of thermometer/description	Technical Comparison	Market Availability (Philippines)
Electronic (digital)  Easy-to-read digital display Oral/rectal reading	Accuracy comparable Time for reading: Seconds Requires batteries Calibration recommended every 6 mos. or annually	Available
Electronic infrared (digital)  Easy-to-read digital display Tympanic (ear) reading	Accuracy comparable Time for reading: Seconds Requires batteries Calibration recommended every 6 mos. or annually	Available
Electronic infrared (digital)  Easy-to-read digital display Forehead reading Certain models have "talk" (temperature reading can heard through a built-in speaker) features	Accuracy comparable Time for reading: Seconds Requires batteries Calibration recommended every 6 mos. or annually	Available
Pacifier thermometer  Designed for infants Infrared (digital) Easy-to-read digital display Water resistant Certain models have musical features	Accuracy comparable but recommended more for home use, low-volume ambulatory care settings as opposed to an emergency department Time for reading: 3 – 5 minutes Requires batteries	Available
Note: Care should be taken in choosing brands that have been approved by regulatory agencies.		

Type of thermometer/description	Technical Comparison	Market Availability (Philippines)
Battery-free electronic (digital)  Solar-powered Easy-to-read digital display Oral/rectal reading Currently marketed as SolarTherm	Accuracy comparable Time for reading: Seconds Retains solar charge up to 72 hours Calibration recommended every 6 mos. or annually	Currently not available locally or in the region Where available, not widely distributed

Brands available and brands used by hospitals in the Philippines*

Brand name	Type	Model	Measurement Accuracy	Manufacturer/Source
Amitemp	Chemical strip	Standard (oral/rectal)  Wearable 	±0.1°C between 35.5°C to 40.4°C	Advanced Meditech International, Inc.86-38 53rd Avenue, Suite 100Flushing, NY 11373 USA Local distributor: Newmed Distributors, Inc.Unit 1017 CitylandShaw TowerShaw Blvd. cor. Saint Francis STt.
Braun Thermoscan Pro 4000**	Infrared (ear)		± 0.2°C between 35.5 – 42.0°C	Welch Allyn7420 Carroll Road, San Diego, CA 92121-2334 USA Welch Allyn Singapore10 Hoe Chiang Road#19-03/ 04Keppel TowersSingapore 089315
GEON**	Digital (axillary)	MT-B162A 	±0.1°C between 35.5°C and 42.0°C	GEON Digital Thermometer Corp.No.77 Chang Shui Road, Sec.1, Pu Yen Hsiang, Changhua Hsien, Taiwan R.O.C.
HuBDIC**	Infrared (forehead)	FS-100 	±0.2°C between 20°C to 42.2°C	HuBDIC Co., Ltd.195-42, Anyang-7dong, Manan-gu, Anyang-si, Gyeonggi-do, Korea 430-815
Microlife**	Infrared	IR 1DB1 	±0.2°C between 32.0°C to 42.2°C	Heerbrugg / Switzerland Microlife Corp. 9F, 431, RuiGang Road, NeiHuTaipei 114, Taiwan, R.O.C.

Brand name	Type	Model	Measurement Accuracy	Manufacturer/Source
OMRON**	Digital (oral/rectal)	MC 110B 		OMRON Corporation3-4-10, Toranomon, Minato-Ku, Tokyo 105-0001
		MC 110BW MC 111BW 	0.1°C between 35.6°C to 41.1°C	OMRON Healthcare Singapore PTE Ltd.83 Clemenceau Avenue#11-01, UE Square Singapore 239920
		MC 303BW 	±0.2°C at less than 35.6°C and greater than 41.1°C	
	Infrared (Gentle Temp)	MC 510 	±0.3°C between 34.0 to 35.9°C, 39.1°C to 42.2°C	
		MC 510C MC 512	±0.2°C at 36.0°C to 39.0°C	
Sure Temp	Digital (oral/rectal/ axillary)	Plus 690 	±0.1°C between 26.7°C to 43.3°C	Welch Allyn7420 Carroll Road, San Diego, CA 92121-2334 USA Welch Allyn Singapore10 Hoe Chiang Road#19-03/ 04Keppel Towers Singapore 089315
Temp Teller	Infrared (ear)		±0.3°C between <36.0°C to >39.0°C	Taiwan

**Based on survey results conducted by the Bureau of Health Devices and Technology and market research by HCWH.*
***Technical data provided in the Annex.*

Other "generic" non-mercury thermometers are being marketed by medical supply retailers. These are manufactured in countries from the region like China, Japan and Taiwan, and usually cost much less. Unfortunately, there is not much data currently available regarding their individual brands and technical specifications. In the directory list of suppliers they will simply be marked as "generic" along with their manufacturer's origin.

Directory of suppliers of non-mercury thermometers

■ EXCLUSIVE DISTRIBUTORS

Company Name	Brands available	Current market price (as of Oct 2006)
COLLINS INTERNATIONALTRADING CORP. 412 Amang Rodriguez Ave. cor. V.V. Soliven St. Manggahan, Pasig City ✆ (632) 6816161/ 6816163 Fax (632) 6465979 EMAIL: marketing@collins-international.com.ph WEBSITE: www.collins-international.com.ph	OMRON MC 110B MC 111BW MC 303BW MC 512	 P 398.00 P 398.00 P 428.00 P 2,980.00
NEWMED DISTRIBUTORS, INC. Unit 1017 Cityland Shaw Tower Shaw Blvrd. cor. Saint Francis St. Mandaluyong City 1550 ✆ (632) 6312546 Fax (632) 6347365	AMITEMP Standard Wearable	 P3,556.00/box of 100s P3,500.00/box of 100s
REBMANN INC.* #20 11th Jamboree St. Sacred Heart, Diliman, Quezon City ✆ (632) 9258255/ 9251457/ 9267909 Fax (632) 9215103	BRAUN Thermoscan Pro 4000	P6,750.00 (special 10% disc. from regular price of P7,500.00)
WELLNESS PRO 903 Richmond PlazaSan Miguel cor. Lourdes St., Ortigas Center Pasig City ✆ (632) 7421557/ 6363580/ (632) 6367542/ 6370930 Fax (632) 7112695 EMAIL: info@wellnessinc.com WEBSITE: www.wellnessinc.com	A&D Infrared ear thermometer	 P 2,200.00

**DOH-accredited supplier*

■ DOH-REGISTERED SUPPLIERS

Company Name	Brands available	Current market price (as of Oct 2006)
BDM ENTERPRISES 1746 Rizal Ave. Sta. Cruz, Manila ✆ (632) 7118650 Fax (632) 7118474	OMRON MC 510 Generic digital (Japan)	P 2,714.00 P 180.00
CHAMPION INTERLINK CORPORATION 165 Don Manuel Agregado St. Sto. Domingo Ave., Q.C. ✆ (632) 7817440/ 7323242/ (632) 4154204/ 4154048 Fax 7817446	Generic tympanic (China)	P 850.00
CHEMLINE SCIENTIFIC ENTERPRISES 28 Law St.,Victoria Subd. Tandang Sora, QC ✆ (632) 9841198/ 9841203 Fax (632) 9841201	Generic digital (China) Generic tympanic (China)	P 243.00 P 338.00
JORDAL MEDICAL SYSTEMS INC. Ground Flr. Belman Building 78 Cordillera St. cor. Quezon Avenue Quezon City ✆ (632) 7123026/ 4136619 Fax (632) 7425767 EMAIL: jordal@compass.com.ph jordal@pldtvibe.com	Generic digital (Taiwan) Generic tympanic (Taiwan)	P 165.00 P 1,450.00
MEDICAL CENTER TRADING CORP. Pioneer St. cor. Shaw Blvd. Pasig Ctiy ✆ (632) 6311715/ 6319355 Fax (632) 6317869	Medica HARTMANN Thermoval Classic Thermo Buddy	P 200.00 P 380.00 P 2,800.00
NPK MEDICAL TRADING, INC. 62 Cordillera St. (near E. Rodriguez) Quezon City ✆ (632) 7425986/ 7127384 Fax (632) 7430016 EMAIL: info@npkmedical.ph WEBSITE: www.npkmedical.ph	Thermo Buddy	P4,000.00

■ OTHER SUPPLIERS

Company Name	Brands available	Current market price (as of Oct 2006)
4LIFE MEDICAL		
(formerly R. MEDINA GROUP OF COMPANIES)	Dr. Zen	P 1,400.00
1443-47 Rizal Avenue, Sta. Cruz, Manila		
✆ (632) 4950156/ 4950213-16	Temp Teller	P 1,000.00
Telefax (632) 4950215		
AI-MED		
1240 Rizal Avenue, Sta. Cruz, Manila	OMRON MC 110B	P 380.00
✆ (632) 7342320	OMRON MC 510C	P 2,500.00
Fax (632) 4939176	Generic digital (Taiwan)	P 150.00
	Generic tympanic (Taiwan)	P 1,000.00
ALLIED MEDICAL		
1506 Rizal Avenue, Sta. Cruz, Manila	Medline	P180.00
✆ (632) 3146869/ 3146814		
Telefax (632) 7421389		
ANSCOM MEDICAL SUPPLY		
1416 Rizal Avenue, Sta. Cruz, Manila	Citizen	P 1,800.00
✆ (632) 7117166/ 7122090	OMRON MC 110B	P 380.00
Fax (632) 3146750	OMRON MC 510C –	P 2,500.00
	Generic digital (China)	P 180.00
AVENIDA MEDICAL SUPPLY & HOSPITAL EQUIPMENT	Citizen	P 1,600.00
1508 Rizal Avenue, Sta. Cruz, Manila	Omron MC510	P 2,500.00
✆ (632) 3099755	Generic tympanic (China)	P 1,000.00
Telefax (632) 7434298	Generic digital (China)	P 200.00
BENREX		
1325-1327 Rizal Avenue,Sta. Cruz, Manila	Temp Teller	P 1,000.00
✆ (632) 4950209	OMRON MC 111BW	P 400.00
Telefax (632) 7423834		
CALMED		
1312 Rizal Avenue, Sta. Cruz, Manila	MSR	P 2,200.00
Telefax (632) 7357819	Generic digital (China)	P 150.00

Company Name	Brands available	Current market price (as of Oct 2006)
ENG KO TRADING 553 Nueva St1000 Manila ✆ (632) 2415705/ 2432980/ 2432981 Fax 2432986	MSR GEON	P 1,800.00 P 220.00
GEMRY Medical Supply 1540-44 Rizal Avenue, Sta. Cruz, Manila ✆ (632) 7314953 Fax (632) 7436931	OMRON MC 510	P 2,600.00
HOSPITAL EQUIPMENT SERVICE AND MAINTENANCE INC. (HESMI) 1650 San Lazaro St., Sta. Cruz, Manila Telefax (632) 7118732	Generic digital (China) (Taiwan)	P 130.00 P 175.00
INTER MEDEQUIP, INC MAIN OFFICE 86 West AvenuePhilam, QC BRANCH OFFICE 1613 Rizal AvenueSta. Cruz, Manila ✆ (632) 3146829 Fax (632) 7407330	Generic digital (China)	P 150.00
K & N MEDICAL SUPPLY 1437-1439 Rizal Avenue, Sta. Cruz, Manila ✆ (632) 7324670 Telefax (632) 7314906	Generic digital (Japan)	P 150.00
THE MEDICAL SHOP 488 Gregorio Araneta Ave. cor. Del Monte Ave.,Q.C ✆ (632) 7321030 Fax (632) 716789	Temp Teller	P 2,694.75

Sphygmomanometers

A global concern over the harmful effects of mercury and its accompanying waste management problems has made switching to safer alternatives more urgent. A standard mercury sphygmomanometer contains approximately 80 to 100 grams of mercury while its accompanying service kit usually contains a 30ml bottle of liquid mercury. This makes the sphygmomanometer the largest source of mercury in hospitals. Healthcare personnel are at much risk if a mercury manometer breaks especially in areas where mercury can seep into the carpet or in cracks and crevices on tiled floors. The British Medical Journal has published an article on mercury poisoning which can be read in a related sidebar. (See sidebar: Case Study of Mercury Poisoning)

Case Study of Mercury Poisoning

Source: Managing Small Mercury Spills, HCWH Fact Sheet October 2006

In 1999 the British Medical Journal reported a case of a nine year old boy who came to his local hospital with symptoms of abdominal pain, constipation, lethargy, limb pain and unsteadiness. The doctors found out that three months before coming to the hospital, the patient had dismantled a sphygmomanometer in his bedroom. This caused the mercury to spill onto his bed and carpet. He then played with the mercury by vacuuming it and even by flushing it down the toilet.

The occupational health department found very high atmospheric concentrations of mercury in the child's bedroom, particularly in the carpet. Doctors at the hospital suspected mercury poisoning and this was confirmed with a blood test that showed serum mercury concentration of 1000nmol/l where the normal reference value is (less than) 30nmol/l.

Apart from detoxification treatment for the patient, the parents had to properly dispose of the vacuum cleaner, bedding, carpets and clothing. A mercury vapor absorbing system had to be installed and used continuously in the room for three months.

Mercury sphygmomanometers have been regarded as the gold standard in blood pressure measurement for a long time. But this may no longer be the case as studies from independent standards authorities like the British Hypertension Society and other medical associations from both the EU and the US have shown otherwise.

Since most of our doctors, nurses and other health care personnel were trained in using the mercury manometer, there is understandably some amount of skepticism in switching to mercury-free alternatives. This stems primarily from concerns on the accuracy of these devices. Medical literature cited in the recent HCWH fact sheet (See Annex: Substituting Mercury Sphygmomanometers) notes that inaccuracies can occur with both mercury and non-mercury sphygmomanometers. But it also clarifies that the inaccuracy is related to poor maintenance and calibration.

Hospitals who have successfully phased out mercury sphygmomanometers, peer-reviewed studies and even a well-known manufacturer[2] of both mercury and aneroid sphygmomanometers have concluded that non-mercury blood pressure monitoring devices are acceptable and very much at par with the traditional mercury manometer. (See sidebar: Experiences with mercury-free equipment)

Experiences with mercury-free equipment

Source: Mercury-free blood pressure equipment, Experiences in the Swedish healthcare sector
http://www.noharm.org/details.cfm?type=document&id=1167

Swedish hospitals started phasing out mercury sphygmomanometers in the 1980's and the phase out is complete. Since 1998 only non-mercury techniques are used for all upper arm measurements. Mercury sphygmomanometers are occasionally still discovered at smaller private practitioners.

There is no evidence in this study that the elimination of mercury in sphygmomanometers in Sweden has caused problems in diagnosing any condition. Semi-automatic oscillometric devices are for practical reasons often used for a first screening. Aneroid manometers with adequate maintenance and regular calibration have proved to be well fit for routine but also precise blood pressure measurements. The only difference from the equipment containing mercury is an increased need for calibration. All blood pressure measuring equipment is recommended to be checked once a year and calibrated when necessary. There is no evidence that the need for checks and calibrations cause practical problems or diagnostic problems. There are no reports of problems or inconveniences related to the change in routines.

Other Peer-reviewed studies[1] show that electronic and aneroid sphygmomanometers are accurate within acceptable clinical practice limits if calibrated regularly according to manufacturer directions. Mercury-free blood pressure measuring devices have been used by most major medical facilities and accepted by medical personnel for many years.

An American study[2] from 2003 concluded in summary that "Research on sphygmomanometers suggests that there are numerous good alternatives to

[1]N.D. Markandu *et al.*, "The Mercury Sphygmomanometers Should Be Abandoned Before it is Proscribed," *Journal of Human Hypertension* (2000) 14, 31-36; Vincent J. Canzanello *et al.*, "Are Aneroid Sphygmomanometers Accurate in Hospital and Clinic Settings?" *Archives of Internal Medicine*, March 12, 2001, 729-731.

[2]An Investigation of Alternatives to Mercury Containing Products. Prepared for Maine Department of Environmental Protection at Lowell Center for Sustainable Production, University of Massachusetts Lowell

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Experiences with mercury-free equipment...continued

mercury sphygmomanometers. Aneroid sphygmomanometers are cost competitive, have a long history in the field, and have been found acceptable by many hospitals."

In a UK study[3] an aneroid device achieved an A grade for both systolic and diastolic pressures and fulfilled the requirements of the Association for the Advancement of Medical Instrumentation. The mean and standard deviation for systolic and diastolic pressures respectively were -0.6(4.6) mmHg and -1.3(3.5) mmHg in sequential analysis, and -1.3(2.2) mmHg and -1.9(2.7) mHg in simultaneous analysis. And the conclusion was that the Maxi Stabil aneroid device could be recommended for use in an adult population.

[3]Reinders, Annemarie; Jones, Clare R; Cuckson, Alexandra C; Shennan, Andrew H. The Maxi Stabil 3: validation of an aneroid device according to a modified British Hypertension Society protocol. Blood Pressure Monitoring. 8(2):83-89, April 2003.

Alternative Mercury-free blood pressure devices

BP device	Types	Advantages	Disadvantages
Aneroid	Hand (traditional) 	Mercury-free Inexpensive Widely available Easily transportable	Manual devices can be prone to observer bias Wear and mechanical shock to mechanism may result in incorrect readings
	Pocket 	Well understood by users Easy to check calibration Can be used on most patients	Requires regular calibration check (recommended every 6 months)
	Wall-mounted 	Semi-automated and automated devices have no observer bias	
	Mobile 		
Semi-automated	Arm 	Mercury-free Easy to use No observer bias	Must be validated Cannot be used in all circumstances Requires regular calibration Requires batteries (and battery maintenance)

BP device	Types	Advantages	Disadvantages
Automatic	Finger  Wrist  Ankle  Toe  	Mercury-free Easy to use No observer bias	Must be validated Cannot be used in all circumstances Requires regular calibration Requires batteries (and battery maintenance)

Brands available and brands used by some hospitals in the Philippines*

The clinical validation status indicated in the following tables were based on the HCWH Fact Sheet: Substituting Mercury Sphygmomanometers, Promoting Action on clinical Effectiveness (PACE) Hypertension Tool Kit, Clinical validation status of OMRON blood pressure monitors (July 2006) and A & D Clinical validation. These references can be found in the annexes.

■ ANEROID

Brand	Model/Validation/Certification		Manufacturer/Distributor
3M		Validation not available	US
ALP K2		Validation not available	Japan
Fazzini		TÜC SÜV Product Service certification	SS Padana Superiore, 317 2009 Vimodrone (MI), Italy Tel. ++39/02.27.40.92.43 Fax ++39/02.27.40.92.42 E-mail: fazzini@fazzini.it Website: http://www.fazzini.it/index_uk.asp
Heine Optotechnik	 Gamma G5  Gamma XXL LF-W Wall  Gamma XXL LF-S Wheeled Stand	Validation not available	HEINE Optotechnik Kientalstrasse7 D-82211 Herrsching, Germany Tel: (49) 8152 380 Fax: (49) 8152 38202 Email:info@heine.com Local distributor Praktika Philippines, Inc. (see directory)

Brand	Model/Validation/Certification		Manufacturer/Distributor
KaWe		Validation not available	KaWe Kirchner & Wilhelm GmbH + Co. KG Eberhardstr. 56 71679 Asperg – Deutschland Tel: 0 71 41 68 18850 - 54/-56 Fax: 0 71 41 / 68 188 - 11 E-mail: info@kawemed.de Website:www.kawemed.de/
Kenz	 Kenz 500  Kenz 532	Validation not available	Suzuken Co.,Ltd. International Marketing Kenz Product Department, 8 Higashikataha-Cho, Higashi-Ku, Nagoya 461-8701, Japan. Tel : +81-52-971-5161 Fax : +81-52-962-7440 Website: www.suzuken-kenz.com/ Local distributor: RG Meditron Inc. (see Directory)
Sicoa		Validation not available	WOWTECH INTL. CO., LTD. 1555 Chao Bau Rd. Shanghai Tel 86-21-64192076
Reister	 	Validation not available	Rudolf Riester GmbH & Co. KG · Bruckstr. 31 D-72417 Jungingen Germany Email: info@riester.de Website: http://www.riester.de/ Local distributor Impexcos Co. Philippines Rm. 706 Royal Plaza Bldg.648 Remedios St. MalateManila, Philippines Telefax 632 5230721 Email: impexcos@philonline.com

■ SEMI-AUTOMATED

Brand	Type	Model	Validation	Manufacturer
AnD	Arm	UA 704  UA 705 	BHS (A/A)	A&D Medical1555 McCandless DriveMilpitas, CA 95035 Tel:1-408-263-5333 Fax:1-408-263-0119 Website: www.lifesourceonline.com Local distributor: Wellness Pro (see Directory)
Citizen	Arm	CH-31B 	NA	Citizen Systems Japan Co. Ltd.6-1-12 Tanashi-cho, Nishi-Tokyo-Shi Tokyo, Japan 188-8511 Tel 042-468-4771 Fax 042-468-4740 Website: http://www.citizen-systems.co.jp
OMRON	Arm	M1 M2 	International Protocol	OMRON Healthcare Ltd.

■ AUTOMATED

Brand	Type	Model	Validation	Manufacturer
A & D	Arm	UA 767 	BHS (A/A)	A & D Medical Local distributor Wellness Pro (see Directory)
		UA 767 Plus 	BHS (A/A)	
		UA 774 	BHS (A/A)	
		UA 787 	International Protocol	
Citizen	Wrist	Ch-605 	International Protocol	Citizen Systems Japan Co., Ltd.
KaWe	Arm	Mastermed 	NA	KaWe Germany
	Wrist	V3Mastermed 	NA	
OMRON	Arm	MX3 Plus 	International Protocol	OMRON Healthcare Ltd.

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Brand	Type	Model/s*		Manufacturer
OMRON	Arm	T5 	R5 	OMRON Healthcare Ltd.
		T8 	R7 	
		T9P 	RA-1 	
		TF1 	REM-1 	
		IA1 	REM-2 	
		IA2 	IW-1 	
		SEM-1 	IW-2 	
		SEM-2 		
Tensoval	Wrist	Tensoval Comfort 		PAUL HARTMANN Pty Ltd Unit 27-28 Homebush Business Village 11–21 Underwood Road Homebush NSW 2140 Tel. + 61/2 87 62 70 00 Fax + 61/2 87 62 71 00 Email: info@au.hartmann.info

*Validation not available

Directory of suppliers of mercury-free blood pressure monitoring devices

■ EXCLUSIVE DISTRIBUTORS

Company Name	Brands available	Current market price (as of Oct 2006)
COLLINS INTERNATIONALTRADING CORP. 412 Amang Rodriguez Ave. cor. V.V. Soliven St. Manggahan, Pasig City ✆ (632) 6816161/ 6816163 Fax (632) 6465979 EMAIL: marketing@collins-international.com.ph WEBSITE: www.collins-international.com.ph	OMRON M2 MX3 M5 R7 R8IT RA-1 T5 T8 T9P TF1 IA1 IA2 IW-1 IW-2 SEM-1 SEM-2 REM-1 REM-2 HEM 907	 P 3,180.00 P 2,980.00 P 4,980.00 P 5,880.00 P 9,780.00 P 3,880.00 P 5,280.00 P 6,380.00 P 9,780.00 P 6,980.00 P 6,480.00 P 5,880.00 P 4,380.00 P 6,380.00 P 3,680.00 P 3,880.00 P 3,580.00 P 4,080.00 P29,480.00
PRACTIKA PHILIPPINES, INC.* 3/F Dispophil Bldg. Saint Josemaria Escriva Drive Ortigas Center, Pasig City Philippines ✆ (632) 6311518 Fax (632) 6336810	Heine Optotechnik Aneroid sphygmomanometers	NA
WELLNESS PRO 903 Richmond PlazaSan Miguel cor. Lourdes St., Ortigas Center Pasig City ✆ (632) 7421557/ 6363580/ (632) 6367542/ 6370930 Fax (632) 7112695 EMAIL: info@wellnessinc.com WEBSITE: www.wellnessinc.com	AnD BP Monitors UA 704 UA 705 UA 767 UA 767 Plus UA 774 UA 787 TM 2430 TM 2564 G	 P 2,500.00 P 3,000.00 P 3,800.00 P 4,500.00 P 5,400.00 P 8,200.00 NA NA

**DOH-accredited supplier*

■ DOH-REGISTERED SUPPLIERS

Company Name	Brands available	Current market price (as of Oct 2006)
BDM ENTERPRISES 1746 Rizal Ave. Sta. Cruz, Manila ✆ (632) 7118650 Fax (632) 7118474	ANEROID SPHYGMOMANOMETER	
	Unbranded (China)	P 290.00
	3M (US)	P 1,000.00
	Baxtel	P 1,050.00
	DIGITAL BP MONITOR	
	OMRON SEM-1	P 2,990.00
	REM	P 3,450.00
BLUE SKY TRADING COMPANY INC. Blue Sky Bldg. 416 Dasmariñas, Binondo Manila 1006 ✆ (632) 2418501/ 2432941	ANEROID SPHYGMOMANOMETER	
	Unbranded (China)	P 750.00
	Unbranded (Japan)	P 1,000.00
CHAMPION INTERLINK CORPORATION 165 Don Manuel Agregado St. Sto. Domingo Ave., Q.C. ✆ (632) 7817440/ 7323242/ (632) 4154204/ 4154048 Fax 7817446	ANEROID SPHYGMOMANOMETER (manufactured in China) Great Medicos Cardiocare Precise	P 175.00
	DIGITAL BP MONITOR	
	BP Expert (China) - arm	P 1,500.00
	BP Expert (China) - wrist	P 1,400.00
CHEMLINE SCIENTIFIC ENTERPRISES 28 Law St.,Victoria Subd. Tandang Sora, QC ✆ (632) 9841198/ 9841203 Fax (632) 9841201	ANEROID SPHYGMOMANOMETER	
	Unbranded (China)	P 369.00
	DIGITAL BP MONITOR	
	Unbranded (China) - arm	P 2,430.00
	OMRON - arm	P 5,000.00
	Unbranded (China) - wrist	P 2,640.00
	OMRON - wrist	P 5,460.00
JORDAL MEDICAL SYSTEMS INC. Ground Flr. Belman Building 78 Cordillera St. cor. Quezon Avenue Quezon City ✆ (632) 7123026/ 4136619 Fax (632) 7425767 EMAIL: jordal@compass.com.ph jordal@pldtvibe.com	ANEROID SPHYGMOMANOMETER	
	KaWe	P 2,070.00 P 2,215.00
	DIGITAL BP MONITOR	
	KaWe - arm	P 4,245.00
	KaWe - wrist	P 3,630.00

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Company Name	Brands available	Current market price (as of Oct 2006)
MEDICAL CENTER TRADING CORP. Pioneer St. cor. Shaw Blvd. Pasig Ctiy ✆ (632) 6311715/ 6319355 Fax (632) 6317869	ANEROID SPHYGMOMANOMETER ALP K2 Medica (China) DIGITAL BP MONITOR AnD UA 704 UA 767 ALP K2 DS132 ALP K2 DS182 Meditek auto-inflate Meditek manual Tensoval Comfort Tensoval HG 140	 P 1,100.00 P 450.00 P 2,500.00 P 4,500.00 P 2,600.00 P 3,700.00 P 2,800.00 P 1,950.00 P 4,000.00 P 4,600.00
NPK MEDICAL TRADING, INC. 62 Cordillera St. (near E. Rodriguez) Quezon City ✆ (632) 7425986/ 7127384 Fax (632) 7430016 EMAIL: info@npkmedical.ph WEBSITE: www.npkmedical.ph	ANEROID SPHYGMOMANOMETER Baxtel DIGITAL BP MONITOR OMRON - arm	 P 1,600.00 P 4,000.00
R.G. MEDITRON, INC. 82 LFG Bldg. Panay Avenue Quezon City ✆ (632) 3723846 to 55 Fax (632) 3723256	ANEROID SPHYGMOMANOMETER Kenz 500 Portable 532 Mobile	 P 1,700.00 P 12,500.00
ZENITH MEDICAL EQUIPMENT, INC. (ZEMED) Liboro Bldg. 1123 Rizal Avenue Sta. Cruz, Manila ✆ (632) 7116870/ 7117909 Fax (632) 7322982	DIGITAL BP MONITOR ALP K2 - wrist	 P 3,750.00

OTHER SUPPLIERS

Company Name	Brands available	Current market price (as of Oct 2006)
4LIFE MEDICAL	ANEROID SPHYGMOMANOMETER	
(formerly R. MEDINA GROUP OF COMPANIES)	Baxtel	P 1,000.00
1443-47 Rizal Avenue, Sta. Cruz, Manila	ALP K2	P 1,300.00
✆ (632) 4950156/ 4950213-16	Unbranded (China)	P 350.00
Telefax (632) 4950215	DIGITAL BP MONITOR	
	Ameritek - arm	P 2,200.00
	OMRON - arm	P 2,700.00
	Ameritek - wrist	P 2,700.00
	OMRON - wrist	P 3,200.00
AI-MED	ANEROID SPHYGMOMANOMETER	
1240 Rizal Avenue, Sta. Cruz, Manila	Unbranded (China)	P 300.00
✆ (632) 7342320	Unbranded (Japan)	P 1,300.00
Fax (632) 4939176	Unbranded (Taiwan)	P 1,000.00
	DIGITAL BP MONITOR	
	Unbranded (Taiwan) - arm	P 1,800.00
	OMRON SIM-1	P 2,800.00
	Unbranded (China) - wrist	P 2,200.00
	OMRON RA-1	P 3,300.00
	LW-1	P 3,500.00
	LW-2	P 4,400.00
	R7	P 4,900.00
ALLIED MEDICAL	ANEROID SPHYGMOMANOMETER	
1506 Rizal Avenue, Sta. Cruz, Manila	Discovery (China)	P 350.00
✆ (632) 3146869/ 3146814	Baxtel	P 1,100.00
Telefax (632) 7421389		
ANSCOM MEDICAL SUPPLY	ANEROID SPHYGMOMANOMETER	
1416 Rizal Avenue, Sta. Cruz, Manila	ALP K2	P 1,300.00
✆ (632) 7117166/ 7122090	Baxtel	P 950.00
Fax (632) 3146750	Unbranded (China)	P 300.00
	DIGITAL BP MONITOR	
	Citizen - arm	P 2,400.00
	OMRON - arm	P 2,700.00
	Citizen - wrist	P 3,200.00
	OMRON - wrist	P 3,500.00
AVENIDA MEDICAL SUPPLY & HOSPITAL EQUIPMENT	DIGITAL BP MONITOR	
	Citizen - arm	P 2,400.00
1508 Rizal Avenue, Sta. Cruz, Manila	Unbranded (China) - arm	P 2,500.00
✆ (632) 3099755	Citizen - wrist	P 2,900.00
Telefax (632) 7434298	Unbranded (China) - wrist	P 2,300.00

Company Name	Brands available	Current market price (as of Oct 2006)
BENREX	ANEROID SPHYGMOMANOMETER	
1325-1327 Rizal Avenue,Sta. Cruz, Manila	Baumanometer	P 2,500.00
✆ (632) 4950209	DIGITAL BP MONITOR	
Telefax (632) 7423834	OMRON SIM-1	P 2,800.00
	IW-1	P 3,500.00
	RA-1	P 3,000.00
CALMED	ANEROID SPHYGMOMANOMETER	
1312 Rizal Avenue, Sta. Cruz, Manila	ALP K2	P 1,300.00
Telefax (632) 7357819	Baxtel	P 1,100.00
	Inmed (China)	P 350.00
	DIGITAL BP MONITOR	
	OMRON - arm	P 3,500.00
	OMRON - wrist	P 3,500.00
		P 4,200.00
ENG KO TRADING	ANEROID SPHYGMOMANOMETER	
553 Nueva St1000 Manila	Baxtel	P 700.00
✆ (632) 2415705/ 2432980/ 2432981	DIGITAL BP MONITOR	
Fax 2432986	Unbranded (China)	
	- arm	P 2,500.00
	LORD NIR - wrist	P 2,700.00
GEMRY Medical Supply	DIGITAL BP MONITOR	
1540-44 Rizal Avenue	OMRON - arm	NA
Sta. Cruz, Manila	OMRON - wrist	NA
✆ (632) 7314953		
Fax (632) 7436931		
HOSPITAL EQUIPMENT SERVICE AND MAINTENANCE INC. (HESMI)	DIGITAL BP MONITOR	
	Unbranded (China) - arm	P 2,500.00
1650 San Lazaro St.		
Sta. Cruz, Manila		
Telefax (632) 7118732		
INTER MEDEQUIP, INC	ANEROID SPHYGMOMANOMETER	
MAIN OFFICE	Baxtel	P 1,000.00
86 West AvenuePhilam, QC	3M (US)	P 1,000.00
BRANCH OFFICE	Unbranded (China)	P 350.00
1613 Rizal Avenue	DIGITAL BP MONITOR	
Sta. Cruz, Manila	MEDTEX - arm	P 2,100.00
✆ (632) 3146829	MEDTEX BP3BZ1-1	P 2,500.00
Fax (632) 7407330		
K & N MEDICAL SUPPLY	ANEROID SPHYGMOMANOMETER	
1437-1439 Rizal Avenue	ALP K2	P 1,200.00
Sta. Cruz, Manila	Inmed (US)	P 480.00
✆ (632) 7324670	Unbranded (China)	P 280.00
Telefax (632) 7314906		

Fluorescent Lamps

Mercury in vapor form is contained in fluorescent lamps. The mercury that is enclosed in these lamps can be emitted into the atmosphere when they break, are disposed in landfills or incinerated.

Hospitals generate a considerable amount of spent and broken fluorescent lamps. In the absence of a fluorescent lamp recycling facility in the country, proper disposal measures become the priority to eliminate mercury emissions from this source. Busted and broken fluorescent lamps are considered as hazardous waste[3] and should be disposed through the Environment Management Bureau's (EMB) recognized treaters of hazardous wastes.[4]

Samples of quotations from accredited treaters for the proper disposal of busted or broken fluorescent lamps are included in the annexes (See Annex E).

SAFE HANDLING AND STORAGE FOR SPENT LAMPS

Source: Hospitals for a Healthy Environment (H2E)
http://www.h2e-online.org/docs h2e10stepfluorescent121802.pdf
LampRecycle.org http://www.nema.org/lamprecycle/epa.html

Storage Option 1: Put used lamps in original boxes, with no packing material. make sure you completely seal the box to prevent leaks from bulb breakage. If you are combining used lamps with new ones, mark the used lamps with a piece of tape or a permanent marker (be sure tape or marker is located next to receptacle.)

Storage Option 2: Purchase specially-made lamp containers for used lamp storage. These containers are often reusable, very durable and won't tip over easily. Your lamp recycler may have a container that they like to use to make shipping or pick-up easier.

Never leave spent lamps unattended or in a compromising position (leaning against a wall or in an area where they can be easily broken).

Do not tape lamps together.

Store boxes/containers in a dry place.

Clearly identify containers of used lamps. For example, "used fluorescent lamps for proper disposal" and the accumulation start date. **You cannot store the used bulbs for longer than one year.**

MANAGING BROKEN FLUORESCENT LAMPS

Ventilate area where breakage occurred.

Take usual precautions for collection of broken glass.

Do not use a standard vacuum cleaner. Place materials in closed container to avoid generating dust.

Keep broken lamps in a secure location away from patients and staff, separate from the intact tubes.

Mercury Sources in the Health Care Environment

Product	Applications	Alternatives
Analytical instruments (mercury chloride as reagent)	SMAC AU 2000	ISE (Ion Selective Electrode)
Barometer	weather condition	weather condition
Batteries Mercuric oxide Silver oxide	□ hearing aids □ pacemakers □ defibrillators □ fetal monitors □ hofler monitor □ pagers □ picker caliber □ spirometer alarm □ telemetry transmeter □ temperature alarm □ blood analyzer	lithium, zinc, alkaline
Blood gas analyzer reference electrode	Radiometer (brand)	
Cathodary ociloscope	cathode ray tube	
Dental amalgam	tooth restoration	gold, silver, porcelain and polymer
DC watt hour meters	e.g., Duncan, no longer manufactured but may still be in use	
Displacement/Plunger relay	power supply switching (1 to 4 poles, NO, NC, many voltage and current ratings, generally for high current, high voltage applications)	
Electron microscope	mercury used as vibration dampner	
Esophageal Dilators (also called Maloney or Hurst Bougies)/ Cantor tubes/ Miller Abott tubes/ Feeding tubes	mercury is used as a weight at the bottom of the tube	tungsten, water (used as weight) Anderson tube can replace the Cantor tube
Flame sensor/ Safety valve	□ Some infrared heaters (Robershaw and Harper-Wyman) □ Some furnaces (White Rodgers)	
Hitachi chem analyzer	Hitergent Reagent has 65 ppb mercury	
Lamps	□ fluorescent □ germicidal lamps □ metal halide □ high pressure sodium vapor □ ultra-violet (TB patient) □ spectral lamps	□ ordinary glow lights; opticals; high-energy, long lasting lights □ low pressure sodium □ forced draft and well lit room can be designed for

Mercury Sources in the Health Care Environment

Product	Applications	Alternatives
Lamps	□ high intensity discharge	the TB PATIENT
Lead analyzer electrode	ESA (brand) model 3010B	
Commercial-industrial-laboratory manometers	Many types and uses	
Sphygmomanometers	blood pressure	electronic vacuum gauge, expansion, aneroid
Switches	Displacement/Plunger relays: high currant/voltage lighting power supply switching tungsten lighting wetted reed relay/wetted reed switch: test, calibration, measurement equipment Tilt switches □ airflow/fan limit control □ building security systems □ chest freezer lid switches □ fire alarm box switch □ fluid level control □ lap-top computer - screen shut off when closed □ pressure control □ silent light switches □ washing machine lids	□ silent light switches believed to be totally discontinued (GE in 1991), reportedly also manufactured by Leviton, which now produces a non-mercury device □ mechanical switches
Thermometers	□ blood bank □ clerget sugar test □ fever/temperature □ incubator/water bath □ minimum/maximum □ tapered bulb (amored)	electronic (digital), expansion, aneroid
Thermostats	Thermostats	thermostat with bi-metallic strip or with other alternatives

Endnotes

[1]Great Lakes Binational Toxics Strategy (FAQ) – US EPA and Enviroment Canada
http://www.p2pays.org/reg/06/05732.htm

[2]Welch Allyn: Clarification on the Efficacy of Aneroid and Digital Blood Pressure Devices
www.noharm.org/library/docs/Welch_Allyn_Clarification_on_the_Efficacy_of_A.pdf

[3]See Annex C: Part I, Procedural Manual Title III of DAO 92-29 "Hazardous Waste Management"

[4]See Annex D: List of Recognized Treaters of Hazardous Waste

References

News Articles

Mercury poisoning in school
http://www.noharm.org/details.cfm?type=news&ID=181

Parañaque school shut, 11 treated for mercury poisoning
http://news.inquirer.net/breaking/index.php?index=2&story_id=66948

U.S. Government Scientists Discuss Mercury Spill Decontamination Processes
http://manila.usembassy.gov/wwwhr841.html

Online publications and web resources

A&D Clinical Validation
http://www.aandd.jp/products/medical/validation.html

American Heart Association
http://americanheart.org

Blood pressure measuring devices: recommendations of the European Society of Hypertension
http://www.bmj.com/cgi/content/full/322/7285/531

British Hypertension Society
http://www.bhsoc.org/default.stm

Clinical Validation status of Omron blood pressure monitors
http://eu.omron-medizintechnik.de/images/extranet/Clinical%20Information%20and%20Press%20Coverage/Clinical_validation_overview_of_OMRON_devices_July_17___2006.pdf

Detailed Study of Non-Mercury Alternatives as an Environmental Attribute
www.mercurypolicy.org/new/documents/NonMercuryAlternativesUSMilitary0206.pdf

Fact Sheet: Mercury in Compact Fluorescent Lamps (CFLs)
http://www.nema.org/lamprecycle/epafactsheet-cfl.pdf

Fact Sheet on Mercury in Fluorescent Lamps
http://www.informinc.org/fact_P3fluorescentlamps.php

Fluorescent Lamp Recycling
http://www.h2e-online.org/pubs/tensteps/fluor10steps.pdf

Lamp Recycle
http://www.lamprecycle.org/

Lurking Menace
www.toxicslink.org

Mercury Alternatives
http://www.noharm.org/globalsoutheng/mercury/alternatives

Mercury and its Many Forms
http://www.calpoison.org/public/mercury.html

Mercury-free blood pressure measurement equipment- Experiences in the Swedish Healtcare Sector
http://www.noharm.org/details.cfm?type=document&id=1167

Mercury Thermometers: The Danger in Your Medicine Cabinet
www.cleanair.org/mercury

Mercury Use: Hospitals and Clinics
http://www.epa.gov/glnpo/bnsdocs/hgsbook/hospital.pdf

Omron Product Catalogue
http://eu.omron-medizintechnik.de/images/bymanager/EUX/PDF/Leaflets/General_Omron_Cataloque_2006.pdf_for_web.pdf

Promoting Action on Clinical Effectiveness (PACE) - Hypertension Tool Kit

Reducing Mercury Use in Health Care
http://www.epa.gov/glnpo/bnsdocs/merchealth/mercury.pdf

Selecting Non-Mercury Thermometers
http://sustainablehospitals.org/HTMLSrc/IP_Merc_FTNonmerc.html

ANNEXES

WORLD HEALTH ORGANIZATION

Mercury in Health Care

POLICY PAPER

1 - Background

Mercury is a naturally occurring heavy metal. At ambient temperature and pressure, mercury is a silvery-white liquid that readily vaporizes and may stay in the atmosphere for up to a year. When released to the air, mercury is transported and deposited globally. Mercury ultimately accumulates in lake bottom sediments, where it is transformed into its more toxic organic form, methyl mercury, which accumulates in fish tissue.

Mercury is highly toxic, especially when metabolized into methyl mercury. It may be fatal if inhaled and harmful if absorbed through the skin. Around 80% of the inhaled mercury vapour is absorbed in the blood through the lungs. It may cause harmful effects to the nervous, digestive, respiratory, immune systems and to the kidneys, besides causing lung damage. Adverse health effects from mercury exposure can be: tremors, impaired vision and hearing, paralysis, insomnia, emotional instability, developmental deficits during fetal development, and attention deficit and developmental delays during childhood. Recent studies suggest that mercury may have no threshold below which some adverse effects do not occur.

2 - Contribution from the health-care sector and Regulation

Health-care facilities are one of the main sources of mercury release into the atmosphere because of emissions from the incineration of medical waste. The Environment Minister of the Canadian province of Ontario declared on December 2002 that emissions from incinerators were the fourth-largest source of mercury.
In the United States, according to US Environmental Protection Agency (EPA) in a 1997 report, medical waste incinerators may have been responsible for as much as 10% of all mercury air releases.

Health-care facilities are also responsible for mercury pollution taking place in water bodies from the release of untreated wastewater. According to a 1999 report, health-care facilities may also have been responsible for as much as 5% of all mercury releases in wastewater. Environment Canada estimates that more than one-third of the mercury load in sewage systems is due to dental practice.

Dental amalgam is the most commonly used dental filling material. It is a mixture of mercury and a metal alloy. The normal composition is 45-55% mercury; approximately 30% silver and other metals such as copper, tin and zinc. In 1991, the World Health Organization confirmed that mercury contained in dental amalgam is the greatest source of mercury vapour in non-industrialized settings, exposing the concerned population to mercury levels significantly exceeding those set for food and for air.
(Source:http://www.who.int/ipcs/publications/cicad/en/cicad50.pdf)

According to a report submitted to the OSPAR Commission, in the United Kingdom, annually 7.41 tonnes of mercury from dental amalgam are discharged to the sewer, atmosphere or land, with another 11.5 tonnes sent for recycling or disposed with the clinical waste stream. Together, mercury contained in dental amalgam and in laboratory and medical devices, account for about 53% of the total mercury emissions.

Waste incineration and crematoria are also listed as major sources of mercury emissions. Many countries, such as Armenia, Cameroon, Ghana, Honduras, Pakistan, and Peru, recognize the contributions from hospital thermometers, dental amalgams, hospital waste and/or medical waste incinerators but lack quantitative data. Despite the lack of data, there is good reason to believe that mercury releases from the health sector in general are substantial.

Some countries have restricted the use of mercury thermometers or have banned them without prescription. A variety of associations have adopted resolutions encouraging physicians and hospitals to reduce and eliminate their use of mercury containing equipment.

3 – Occupational health hazard

The most common potential mode of occupational exposure to mercury is via inhalation of metallic liquid mercury vapours. If not cleaned up properly, spills of even small amounts of elemental mercury, such as from breakage of thermometers, can contaminate indoor air above recommended limits and lead to serious health consequences. Since mercury vapour is odourless and colourless, people can breathe mercury vapour and not know it. For liquid metallic mercury, inhalation is the route of exposure that poses the greatest health risk.

August 2005

A variety of studies demonstrate that mercury containing health-care equipment will invariably break. Small spills of elemental mercury on a smooth, non-porous surface can be safely and easily cleaned up with proper techniques. However, beads of mercury can settle into cracks or cling to porous materials like carpet, fabric, or wood, making the mercury extremely difficult to remove. Spilled mercury can also be tracked on footwear. Inadequate cleaning and disposal may expose already compromised patients and health-care staff to potentially dangerous exposures.

4 – Alternatives

A recent study found that at least one manufacturer of the non-mercury alternative was identified where the cost differences between mercury and non-mercury technologies were minimal. The research findings suggest that many non-mercury alternatives are available to address the full range of functions required by consumer products. For health care, these include blood pressure devices, gastrointestinal devices, thermometers, barometers, and in other studies, include the use of mercury fixatives uses in labs.

Both mercury and aneroid sphygmomanometers have been in use for about 100 years, and when working properly, either gives accurate results.
Of all mercury instruments used in health care, the largest amount of mercury is used in mercury sphygmomanometers (80 to 100g/unit), and 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 make a tremendous impact in reducing the potential for mercury exposure to patients, staff and the environment. Aneroid sphygmomanometers provide accurate pressure measurements when a proper maintenance protocol is followed. It is important to recognize 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.

5 – International Conventions

The UNEP Governing Council concluded that there is sufficient evidence of significant global adverse impacts from mercury to warrant further international action to reduce the risks to humans and wildlife from the release of mercury to the environment. The UNEP Governing Council decided that national, regional and global actions should be initiated as soon as possible and urged all countries to adopt goals and take actions, as appropriate, to identify populations at risk and to reduce human-generated releases.

6 – Strategy

To understand better the problem of mercury in health-care sector, it is recommended that countries conduct assessments of current mercury usage and waste management programs. WHO proposes to work in collaboration with countries through the following strategic steps.

Short-term: Develop mercury clean up and waste handling and storage procedures. Until countries in transition and developing countries have access to mercury free alternatives it is imperative that safe handling procedures be instituted which minimize and eliminate patient, occupational, and community exposures. Proper procedures should include spill clean up response, educational programs, protective gear, appropriate waste storage containment, staff training, and engineered storage facilities. Countries that have access to affordable alternatives should develop and implement plans to reduce the use of mercury equipment and replace them with mercury-free alternatives. Before final replacement has taken place, and to ensure that new devices conform with recommended validation protocols, health-care facilities will need to keep mercury as the " gold" standard to ensure proper calibration of mercury sphygmomanometers.

Medium-term: Increase efforts to reduce the number of unnecessary use of mercury equipment. Hospitals should inventory their use of mercury. This inventory should be categorized into immediately replaceable and gradually replaceable.
Replaced devices should be taken back by the manufacturer or taken back by the alternative equipment provider.
Progressively discourage the import and sale of mercury containing health-care devices and mercury use in health-care settings, also using global multi lateral environmental agreements to this end. Provide support to countries to make sure that the recovered mercury equipment is not pushed back in the supply chain.

Long-term: Support a ban for use of mercury containing devices and effectively promote the use of mercury free alternatives. Support countries in developing a national guidance manual for sound management of health-care mercury waste. Support countries in the development and implementation of a national plan, policies and legislation on mercury health-care waste. Promote the principles of environmentally sound management of health-care waste containing mercury, as set out in the UN Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Support the allocation of human and financial resources to ensure procurement of mercury free alternatives and a sound management of health-care waste containing mercury.

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MANAGING SMALL MERCURY SPILLS

FACT SHEET, OCTOBER 2006

Health and Safety Guidance to Minimise Health Risks of Mercury Spills

Mercury can be found in a variety of medical devices. Because it is a powerful neurotoxin, great care must be taken to protect people from spills. The UK Medicinal Healthcare Products Regulatory Agency (MHRA) recommends that, in order to prevent exposure, mercury-free alternative devices should be used wherever possible. Where mercury devices are in use, the agency recommends the maintenance of health and safety measures to deal effectively with spills[1].

This fact sheet should aid hospitals in implementing mercury disposal practices to help minimise the exposure of workers, patients, and the environment to the toxic metal. Many of the recommendations and guidelines on how to effectively deal with mercury spill can be also be used in schools, offices, and private homes. However, the measures outlined below can only be a temporary solution. The best way to eliminate the risks of exposure is to phase out mercury devices in favour of the many safer alternatives available on the market.

Even a small quantity of mercury can lead to mercury poisoning, particularly in children. Healthcare facilities as institutions of healing should phase out mercury devices where safer alternatives are available. Mercury equipment should not be sent home with patients under any circumstance as this increases the risk of mercury contamination in a less controlled environment and exposes a larger number of people to the risk of mercury poisoning.

Case Study of Mercury Poisoning

In 1999 the British Medical Journal [2] reported a case of a nine year old boy who came to his local hospital with symptoms of abdominal pain, constipation, lethargy, limb pain and unsteadiness. The doctors found out that three months before coming to the hospital, the patient had dismantled a sphygmomanometer in his bedroom. This caused the mercury to spill onto his bed and carpet. He then played with the mercury for a day or two before letting his mother know. The family tried to dispose of the mercury by vacuuming it and even by flushing it down the toilet.

The occupational health department found very high atmospheric concentrations of mercury in the child's bedroom, particularly in the carpet. Doctors at the hospital suspected mercury poisoning and this was confirmed with a blood test that showed serum mercury concentration of 1000nmol/l where the normal reference value is (less than) 30nmol/l.

Apart from detoxification treatment for the patient, the parents had to properly dispose of the vacuum cleaner, bedding, carpets and clothing. A mercury vapour absorbing system had to be installed and used continuously in the room for three months.

"Even a small quantity of mercury can lead to mercury poisoning, particularly in children."

Making a Plan to Avoid Exposure to Mercury:

Implementing safe management procedures for mercury can substantially reduce the risk of unnecessary exposure for patients and staff. It will also minimise the pollution of your facility and ensure that mercury does not enter the ordinary waste stream and pollute the environment around your local community.

1) Education and Training of Staff
Awareness of the hazards of mercury is crucial to maintaining the health and safety onsite. Hospitals around the world have found posters especially useful in educating staff. Annual trainings on identifying mercury sources, managing spills and locating spill kits in the facility also yield positive results. An essential training component should be on appropriate disposal methods for containing devices that are no longer in use or have broken.

2) Maintenance Protocol for Mercury devices
Mercury devices need maintenance, e.g. sphygmomanometers need regular calibration. Spills and exposure are common during maintenance. Simple strategies like working over a tray and covering drains to prevent discharge into wastewater are substantially helpful in preventing mercury from entering the environment.

3) Appropriate Labelling and Collection
Another preventive step to stop mercury from entering the medical waste stream is to label infectious waste and ensure that broken mercury devices do not enter wrong waste streams. It is vital to ensure that waste amalgam, broken equipment and elemental mercury are disposed of in designated boxes in designated areas of the hospital/medical facility or delivered to specific hazardous waste facilities.

4) Mercury Spill Management
Spill kits are essential for the management of mercury spills and breakages. These kits do not have to be very sophisticated or expensive. Each facility should have two or three kits that are replaced once used. Kits need to be used by trained personnel to prevent further exposures and each kit should have clean up instructions that are specific to the hospital/facility. A description of a sample spill kit follows below.

5) Waste Collection Plan
Mercury waste collection plans should have written procedures and responsibilities in case of a spill which also include a spill response procedure. It is vital to prevent the mercury from entering the municipal waste streams. Mercury waste should be disposed of in specific containers and labelled as per the facility's hazardous waste protocol. We recommend finding out from local waste authorities and health departments how to best dispose of your mercury waste as per the local laws and protocols.

6) Disposal Methods
Mercury is classified and regulated as hazardous waste under EU legislation and has to be treated accordingly. Separate collection schemes are developed in individual countries for mercury collection and recycling. Mercury should be recovered if possible in order to be recycled. This is currently the safest solution and has the added benefits of reducing the amount of mercury ending up in the environment, and decreasing the demand for new raw mercury.

Healthcare facilities should have designated storage spaces for waste mercury. Broken and/or obsolete mercury devices should be placed in separate collection containers along with any spilled mercury from the facility. Your local environment department should be able to give you specific directions on removing mercury waste from your facility.

7) External Management Strategies
Healthcare facilities can negotiate with vendors to take back used and obsolete mercury devices, or find a recycling facility interested in recovering the mercury from disposed products. Hospitals can also negotiate with vendors to phase in mercury-free alternatives where they are available.

Contents of a Spill Kit [3]

1. *Four to five ziplock-type bags*
2. *Waste bags (2 to 6 mm thick)*
3. *Plastic container with lid that seals. (35 mm film canister for example)*
4. *Nitrile or latex gloves*
5. *Paper towels*
6. *Cardboard strips (index cards for example)*
7. *Eyedropper or syringe (without needle)*
8. *Face mask*
9. *Duct or other sticky tape (30 cm or so)*
10. *Flashlight*
11. *Powdered sulphur or zinc (this can easily be obtained at a pharmacy)*
12. *Set of instructions with waste collection and disposal protocols.*

Eleven Step Guide to Cleaning-Up a Mercury Spill

This guide only applies to small spills, such as a broken thermometer. In the event of large spills, turn down the temperature, turn off internal ventilation, open the window, and inform your local health and safety authority.

☞ **1. Evacuate area**
Remove everyone from the area that has been contaminated and shut the door. Turn off interior ventilation system to avoid dispersing mercury vapour throughout the facility.

☞ **2. Put on face mask**
In order to prevent breathing of mercury vapour, wear a protective face mask.

☞ **3. Put on old clothes**
Change into old clothes and shoes that can be discarded if they become contaminated.

☞ **4. Remove jewellery**
Remove all jewellery from hands and wrists so that the mercury cannot combine (amalgamate) with the precious metals.

☞ **5. Wear gloves**
Put on rubber or latex gloves. If there are any broken pieces of glass or sharp objects, pick them up with care. Place all broken objects on a paper towel. Fold the paper towel and place in a zip lock bag. Secure the bag and label it as containing items contaminated with mercury. When labelling bags, do so as directed by your local health or fire department to prevent confusion about contents.

☞ **6. Identify surface**
Wood, linoleum, tile and any other like surfaces can easily be cleaned. Carpet, curtains, upholstery or other such surfaces cannot. These items should be thrown away according to the method outlined below. (For carpets, only the affected portion needs to be cut out and removed.)

☞ **7. Locate mercury beads**
Locate all mercury beads, then carefully us the cardboard to gather them together. Use slow sweeping motions to prevent accidentally spreading the mercury. Small and hard-to-see beads can be located with the flashlight: hold it at a low angle close to the floor in a darkened room and look for additional glistening beads of mercury that may be sticking to the surface or have gathered in small cracks in the surface. Mercury can move a surprisingly long distance on hard and flat surfaces: be sure to carefully inspect the entire room.

☞ **8. Use eyedropper and sticky tape**
Use an eyedropper or syringe (without a needle) to draw up the mercury beads.

Slowly and carefully transfer the mercury into an unbreakable plastic container with an airtight lid (such as a plastic film canister). Place the container in a zip-lock bag. Label the bag as containing items contaminated with mercury.

After you remove larger beads, use sticky tape to collect smaller hard-to-see beads. Place the sticky tape in a zip lock bag and secure. Powdered sulphur or zinc stains mercury a darker colour and can make smaller beads easier to see. Be careful not to breathe the powder, as it can be mildly toxic.

☞ **9. Leak-Proof Bag**
Place all materials used during the cleanup, including gloves, into a leak-proof plastic bag or container. Seal and label it.

☞ **10. Final disposal**
Contact your local hospital manager responsible for toxic clean up and proper disposal to ensure that all mercury contaminated waste now secured in labelled bags is dealt with in accordance with national and EU legislation.

☞ **11. Outside ventilation**
Keep the affected area ventilated to the outside (with windows open and ventilation running) for at least 24 hours after your successful cleanup. If sickness occurs, seek medical attention immediately.

"Do not use a vacuum cleaner to clean up a mercury spill."

The production of this factsheet has been supported by a grant from the European Commission

Six things you should NEVER do:

☞ 1. Never use a vacuum cleaner to clean up mercury: the vacuum cleaner will vaporise the mercury and drastically increase exposure in the area.

☞ 2. Never use a broom to clean up mercury: it breaks up the mercury droplets and moves them around, making it harder to decontaminate the area.

☞ 3. Never pour mercury down the drain: it can lodge in the plumbing, and contaminate the septic tank and sludge in sewage treatment plants.

☞ 4. Never wash mercury-contaminated items in a washing machine: mercury can contaminate the sewage system and the washing machine.

☞ 5. Never continue wearing shoes and clothing that might have been contaminated in the mercury spill: this increases the wearer's exposure and helps spread contamination.

☞ 6. Never burn shoes, clothing, fabric or anything that has been contaminated with mercury: this puts mercury into the atmosphere.

Resources

Mercury Spill Cleanup Kit.
HCWH factsheet. January 2006. For Global South Countries.
www.noharm.org/details.cfm?type=document&ID=1280

The US Environmental Protection Agency's Clean Up Instructions:
www.epa.gov/epaoswer/hazwaste/mercury/spills.htm

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

References

1. *MHRA UK (2005) Report of the Independent Advisory Group on Blood Pressure Measurement in Clinical Practice. June 2005. p. 6*
2. *A C Rennie, M McGregor-Schuerman, I M Dale, C Robinson, R McWilliam (1999) Mercury poisoning after spillage at home from a sphygmomanometer on loan from hospital. British Medical Journal. August 7, 1999.*
3. *Adapted by HCWH from United States Environmental Protection Agency's Guidelines on cleaning up mercury spills. See more at www.epa.gov/mercury/disposal.htm*

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** Formerly known as EPHA Environment Network (EEN)*

"Stay Healthy, Stop Mercury" campaign
Health and Environment Alliance (HEAL) 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.

SUBSTITUTING MERCURY SPHYGMOMANOMETERS

FACT SHEET, OCTOBER 2006

Why should healthcare professionals move to mercury-free blood pressure devices?

In spite of the availability of alternatives, the use of medical devices containing mercury, such as sphygmomanometers (blood pressure measuring devices), thermometers, thermostats and laboratory chemicals, continues to be widespread in many European countries. Although European authorities recently agreed to ban the sale of new mercury thermometers for home and healthcare use, sphygmomanometers remain an area of concern because they represent a large mass of mercury per device (approximately 80-100 g/unit in comparison with 1 g/unit in a thermometer)[1], and therefore pose a greater hazard in the event of breakage.

To eliminate potential risk to the health and safety of staff and patients, four European countries – Sweden, Denmark, the Netherlands, and Austria – have already phased out the use of mercury blood pressure devices, and national medical authorities including the British Hypertension Society and the UK Health and Safety Executive (HSE) are recommending that clinically tested mercury-free alternatives be used instead.

This fact sheet outlines the arguments for moving to mercury-free devices and exposes common misconceptions about the accuracy of non-mercury sphygmomanometers. At the end of this factsheet, health care professionals will find a list of non-mercury blood pressure devices that are suitable for clinical practice and have been evaluated by the British Hypertension Society, an independent authority that sets standards for accurate measurement of blood pressure.

"In practice, many healthcare professionals are already phasing out mercury sphygmomanometers."

Reasons to phase out mercury sphygmomanometers

› Difficulties managing mercury in hospitals

The EU authorities have recently stated that restricting mercury sphygmomanometers in professional settings is unnecessary as healthcare facilities generally conduct proper mercury waste management[2]. However, this is not always the case. A survey in the Czech Republic showed that mercury waste from hospitals (estimated to 1000 kg/year) was generally not recycled but incinerated or landfilled as hazardous waste, thus contributing to potential contamination of the environment[3].

› Higher costs of mercury devices

Mercury devices represent a significant financial burden for hospitals. Mercury devices must be collected separately and treated as hazardous waste. It can also be quite costly to clean a contaminated healthcare facility if a sphygmomanometer breaks. While non-mercury devices are sometimes more expensive to purchase than mercury devices, total life-cycle costs of mercury devices are often higher than the mercury-free alternatives. Reasons for the higher cost of mercury devices include: compliance with regulations around mercury handling; cleaning up after spills; need to train staff how to safely dispose of broken equipment; and hazardous waste management.

The increasing demand for mercury free devices is driving down prices for alternatives. The EU Commission now predicts that substitution will not bring with it significant cost increase. Market expansion is also increasing the number of competitively-priced options for healthcare facilities[4]. Thus substituting mercury devices with safer mercury-free alternatives can be considered cost efficient.

› Safest solution – substituting mercury for safer alternatives

Substitution is generally regarded as the most powerful measure for preventing mercury pollution, because it reduces the amount of mercury in society, thereby preventing mercury entering the waste stream and being released into the environment from incinerator emissions and landfills[5]. In practice, many healthcare professionals are already phasing out mercury sphygmomanometers and moving to automated oscillometric devices or digital devices for the measurement of blood pressure. This phase out does involve changes of practice in reading blood pressure, but research has shown that this can be accomplished without any impairment of diagnostic accuracy[6].

Since 1991, Sweden has gradually banned the use of almost all mercury instruments including blood pressure devices. A recent survey by the Swedish National Chemicals Inspectorate (KEMI) found that "there were only positive experiences reported from the phase out of mercury in the most wide spread equipment called sphygmomanometers, which today is complete. No negative medical, practical or economic experiences were found from the phase out of mercury containing sphygmomanometers."[7]

Addressing concerns around Alternative Sphygmomanometers:

I. Accuracy of mercury-free blood pressure devices for clinical use

There are 3 types of non-mercury blood pressure devices: aneroid, semi-automated and automated devices. Both mercury and non-mercury sphygmomanometers will give accurate results when properly calibrated and used for the purpose for which they were designed. However, there is a large number of different types of automated blood pressure devices on the market, some intended for personal use, and others for various kinds of clinical use. Not all of these are accurate in all clinical applications.

It is therefore very important to purchase devices that meet the accuracy standards of a respected authority on blood pressure measurement, such as British Hypertension Society or the European Society for Hypertension and to ensure that the devices are used in their intended context. Purchasing officers in healthcare facilities should be aware that protocols exist for validating blood pressure devices, and that evidence of independent validation of a device should always be demanded from manufacturers.

In practice health care facilities in Austria, Denmark, the Netherlands and Sweden have reported only positive experiences in the use of mercury-free devices. In Sweden, KEMI has found that mercury-free blood sphygmomanometers are causing no problems in clinical diagnosis and monitoring, including in the presence of arrhythmias, preeclampsia and in accelerated (malign) hypertension[8].

II. Calibration

One of the main concerns healthcare practitioners have about digital and other non- mercury devices is that of accuracy. Examples of both inaccurate mercury and mercury-free sphygmomanometers can be found in the medical literature, though this inaccuracy is typically related to poor maintenance and calibration[9, 10].

Wellch Allyn, the manufacturer of both mercury and alternative sphygmomanometers states, "Any device – mercury, aneroid or digital – requires routine calibration checks to insure accuracy as part of a regular preventative maintenance program. To imply otherwise gives false expectations for the reliability of mercury manometers and raises unnecessary concerns over the accuracy of aneroid and digital devices[11]."

The British Hypertension Society (BHS) recommends that mercury blood pressure devices should be calibrated at least once a year and that aneroid devices should be calibrated twice a year. Mercury-free sphygmomanometers, when properly calibrated, are as accurate as the older mercury models. For automated devices, the BHS recommends to undertake the calibration according to manufacturers' instructions.

It is also not advisable to use a mercury device for calibration as there is a higher probability of error. Instead, it is preferable to use a digital device whose accuracy is 0.1 +/- of mercury. It is also good practice to delegate the task of ensuring regular calibration checks and maintenance to a designated individual.

III. Availability of Alternatives

Many healthcare practitioners are concerned about the availability of alternatives at competitive pricing. In fact, there are many mercury-free sphygmomanometers on the European market from major medical equipment suppliers. Many of these devices satisfy the criteria of professional organisations such as the British Hypertension Society, the European Hypertension Society and the Association for the Advancement of Medical Instrumentation. Some of these brands include: Omron, Rudolf Riester, Heine Optotechnik, BOSH + SOHN, Braun, Terumo, Seinex, Wellch Allyn, Microlife, SunTech Medical, American Diagnostics Corporation (A&D) and Trimline Medical Products.

The British Hypertension Society (BHS) has created a list of vendors of sphygmomanometers that have met the BHS criteria and are currently available in the UK.

Clinical trial protocols:

It is important that alternatives to mercury sphygmomanometers meet standards set out in clinical trial protocols. Some examples are given below:

1. O'Brien E, Petrie J, et al. The British Hypertension Society protocol for the evaluation of blood pressure measuring devices. Journal of Hypertension 11 (Suppl 2): S43-S62. 1993

2. American National Standard for electronic or automated Sphygmomanometer. ANSI/AAMI SP10 2002. www.aami.org

3. S Mieke. Non-invasive sphygmomanometers – Clinical Investigation. Deutsches Institut Fuer Normung E.V. (German Institute for Standardisation). DIN 58130: 1996. Available from BSI www.bsonline.bsi-global.com

4. E O' Brien, T Pickering, et al. International Protocol for validation of blood pressure measuring devices in adults. Working Group on Blood Pressure Monitoring of the European Society of the Hypertension. Blood Pressure Monitoring 7:3-17. 2002

5. Non-invasive sphygmomanometers – Test procedures to determine the overall system accuracy of automated non-invasive sphygmomanometers. BS EN 1060-4. 2004 Available from BSI www.bsonline.bsi-global.com

Based on these protocols, the British Hypertension Society lists individual types and brands of sphygmomanometers that have passed the validation tests. The information is intended primarily for the UK medical audience. However the BHS is among the three most-cited and respected authorities concerned with precise blood pressure measurement. A large number of the manufacturers mentioned in the table are international companies which sell their products in EU countries.

The table has been reproduced with kind permission of the British Hypertension Society for educational purposes. HCWH does not endorse any of these brands, has not tested them for safety or efficiency and does not take responsibility for accuracy of the information and product performance.

TABLE 1: Automatic Digital Blood Pressure Devices for Clinical Use and also suitable for Home/Self Assessment

DEVICE	GRADE	COST (INCL VAT)	CUFF SIZES (CM)
A+D-767	BHS A/A	£69.99 (Feb 2006)	Small adult (18-22), Standard adult (22-32) Large adult (32-45)
A+D-779	International Protocol	£71.36 (Feb 2006)	Small adult (18-22), Standard adult (22-32, included) Large adult (32-45)
A+D-787	International Protocol	£79.99 (Feb 2006)	Small adult (18-22), Standard adult (easy cuff, 26-36, included) Large adult (32-45)
A&D UA-774	BHS A/A	£89.99 (Feb 2006)	Small adult (18-22), Standard adult (22-32, included) Large adult (32-45)
A&D UA-767 Plus	BHS A/A	£79.99 (Feb 2006)	Small adult (18-22), Standard adult (22-32, included) Large adult (32-45)
A&D UA-767PC With capacity to store up to 126 readings & optional software for use with a PC	BHS A/A	£120.00 (Feb 2006)	Small adult (18-22), Standard adult (22-32, included) Large adult (32-45)
A&D UA-767V With voice to speak reading	BHS A/A	£149.99 (Feb 2006)	Small adult (18-22), Standard adult (easy cuff, 26-36, included) Large adult (32-45)
A&D UA-767 Plus Memory With memory capacity to store up to 30 readings	BHS A/A	£84.99 (Feb 2006)	Small adult (18-22), Standard adult (22-32, included) Large adult (32-45)
A&D UA-767P- BT With Bluetooth output only available to telemedicine service providers	BHS A/A	£176.25 (Feb 2006)	Small adult (18-22), Standard adult (22-32, included) Large adult (32-45)
A&D UA-704	BHS A/A	£39.99 (Feb 2006)	Standard adult (22-32, included) Large adult (32-45)
Boots Upper Arm (Omron HEM-742-UK)	International Protocol	£49.95	Small adult (17-22), Standard adult (22-32) Large adult (32-42)
Boots Upper Arm Intellisense (Omron HEM-757-UK)	International Protocol	£79.95	Small adult (17-22), Standard adult (22-32) Large adult (32-42)
Microlife 3AG1 Last reading memory	BHS A/A	£39.95 (Aug 2006)	Standard adult (22-32, included) Large adult (32-42)
Microlife As easy as 123 Single button operation. Last reading memory	BHS A/A	£44.98 (Aug 2006)	Standard adult (22-32, included) Large adult (32-42, available from Microlife)
Microlife 3BT0-A	BHS A/A	£49.95 (Aug 2006)	Standard adult (22-32, included) Large adult (32-42)
Microlife BP A100 Derivative of 3BTO-A Pulse arrhythmia detection. Last reading memory	BHS A/A	£59.95 (Aug 2006)	Standard adult (22-32, included) Large adult (32-42)
Microlife 3BTO-A(2) Also validated for use in pregnancy see 'BP Devices for use in Special Cases'	BHS A/A	£69.95 (Aug 2006)	Medium adult (22-32) and large adult (32-42) cuffs both included to ensure accurate BP measurements in pregnancy as weight and arm circumference increase.
Microlife BP 3AC1-1 60 reading memory capacity.	International Protocol	£69.95 (Aug 2006)	Standard adult (22-32, included) Large adult (32-42)
Microlife BP A100 Plus Derivative of 3BTO-A. Automatic averaging of 3 readings, arrhythmia detection, 200 reading memory capacity.	BHS A/A	£79.95 (Aug 2006)	Standard adult (22-32, included) Large adult (32-42)
Microlife BP 3AC1-1PC Derivative of BP 3AC1-1 Automatic averaging of 3 readings, arrhythmia detection, 99 reading memory capacity. PC Link included	International Protocol	£89.95 (Aug 2006)	Standard adult (22-32, included) Large adult (32-42)
Omron 637-IT (R7 HEM-637-E2 [EU])Wrist Monitor Also validated for use in obese adults and the elderly see 'BP Devices for use in special cases	International Protocol	£149.95	Fits 13.5-21.5

TABLE 1: Automatic Digital Blood Pressure Devices for Clinical Use and also suitable for Home/Self Assessment

DEVICE	GRADE	COST (INCL VAT)	CUFF SIZES (CM)
Omron M5-I (HEM-757-E)	International Protocol	£89.95 (Feb 2006)	Small adult (17-22), Standard adult (22-32) Large adult (32-42)
Omron 705-IT (HEM-759-E [EU])	BHS A/A, International Protocol (Feb 2006)	£169.95	Small adult (17-22), Standard adult (22-32) Large adult (32-42)
Omron 705-CPII (HEM-750P-E2 [EU])	International Protocol	£149.95 (Feb 2006)	Small adult (17-22), Standard adult (22-32) Large adult (32-42)
Omron MX2 Basic (Same algorithm as HEM 737)	International Protocol	£52.95 (Feb 2006)	Small adult (17-22), Standard adult (22-32, included) Large adult (32-42) ***NB*** Cuff depth on Small is 11 cm, Standard is 15 cm and Large is 17.5 cm. The Standard and Large cuffs are deeper than average.
Omron MX3 Plus (HEM-742-E [EU])	International Protocol	£59.95 (Feb 2006)	Small adult (17-22), Standard adult (22-32, included) Large adult (32-42) ***NB*** Cuff depth on Small is 11cm, Standard is 15cm and Large is 17.5 cm. The Standard and Large cuffs are deeper than average.
Omron M4-I (HEM-752-E [EU]) Derivative of 705-IT	International Protocol	£79.95 (Feb 2006)	Small adult (17-22), Standard adult (22-32, supplied) Large adult (32-42)
Omron M6 (Same Algorithm as 705-IT) (HEM-7001-E [EU])	International Protocol	£79.99 (Feb 2006)	Small adult (17-22), Standard adult (22-32, supplied) Large adult (32-42)
Seinex (Fore-Care) SE-9400	International Protocol	£49.99	Small adult (18-22), Standard adult (23-33) Large adult (33-45)

TABLE 2: Automatic Digital Blood Pressure Devices for Clinical Use*

*These blood pressure monitors are robust and so are most suitable in wards and clinics where they are frequently moved

DEVICE	GRADE	COST (INCL VAT)	CUFF SIZES (CM)
Accutorr Plus	BHS A/A	£1495 (April 2004)	Children (l 13.8-21.5 cm), Standard adults (l 27.5-36.5 cm) Large adult (32-45)
A&D TM-2564G	BHS A/A	Details Awaited	Details Awaited
A&D TM-2655 Validated for self assessment in pharmacies etc.	BHS A/A	Details Awaited	Automatically adjustable
BpTRU BPM 100 Includes wall/desk fixing bracket. Auto BP measurement with1st reading filtering & averaging	BHS A/A	£395	Small adult (18-26 cm), Standard adult (26-34 cm) Large adult (34-43 cm). All three cuffs included **Also available:** Child cuff (13-18 cm) Extra large (41-52 cm)
BpTRU BPM 200/300 Same algorithm as BpTRU BPM 100 Includes wall/desk fixing bracket & mobile trolley fixing bracket Auto BP measurement with 1st reading filtering & averaging	BHS A/A	£545	Small adult (18-26 cm), Medium adult (26-34 cm) Large adult (34-43 cm). All three cuffs included **Also available:** Child cuff (13-18 cm) Extra large (41-52 cm)
Omron 907 Same as HEM 907 See also Manual BP Devices for Clinical use	International Protocol	£350.95 (Sept 2005)	Small adult (l 17-22 cm), Standard adult (l 22-32 cm) Large adult (l 32-42 cm)
Smart signs SL 500 AC (same as BPM-100)	BHS A/A	£ 495 (April 2004)	Small adult (9 x 17 cm), Standard adults (12 x 33 cm) Large adults (15 x 33 cm)
Smart signs SL 500 BAT (same as BPM-200)	BHS A/A	£ 575 (April 2004)	Small adult (9 x 17 cm), Standard adults (12 x 33 cm) Large adults (15 x 33 cm)
Smart signs SL 510 AC (same as BPM-300)	BHS A/A	£ 750 (April 2004)	Small adult (9 x 17 cm), Standard adults (12 x 33 cm) Large adults (15 x 33 cm)

= same algorithm as the SL 500 AC. NB the Smartsigns range is marketed overseas under model names BPM-100, BPM-200 and BPM-300

TABLE 3: Aneroid Sphygmomanometers for Clinical Use

DEVICE	GRADE	COST (INCL VAT)	CUFF SIZES (CM)
Maxi Stabil 3	BHS A/A	£87.00	Details Awaited

TABLE 4: Blood Pressure Devices for Use in Special Cases

DEVICE	GRADE	COST (INCL VAT)	CUFF SIZES (CM)
Microlife 3BTO-A(2) Validated for use in pregnancy	BHS A/B	£59.95 (April 2005)	Standard adult (22-32 cm) and Large adult (32-42 cm) cuffs both included to ensure accurate BP measurement in pregnancy as weight and arm circumference increase
Omron 637-IT Wrist Monitor Validated for use in obese adults and the elderly International Protocol		Details Awaited	Details Awaited

TABLE 5: Ambulatory Blood Pressure Measuring Devices Oscillometric Mode

DEVICE	GRADE	COST (INCL VAT)	CUFF SIZES (CM)
SL90217		£1995 (Sept 2005)	Children (l 13-20 cm), Small adult (l 17-26 cm) Standard adult (l 24-32 cm), Large adult (l 32-42 cm) Extra large adult (l 38-50 cm)
SL90207		£1500 (Sept 2005)	Children (l 13-20 cm), Small adult (l 17-26 cm) Standard adult (l 24-32 cm), Large adult (l 32-42 cm) Extra large adult (l 38-50 cm)
A&D TM-2430 Data output facility to PC or printer, includes software	BHS A/A	£1468.75 (Feb 2006)	Small adult (l 15-22 cm), Standard adult (l 20-31 cm) Large adult (l 28-36 cm)
A&D TM-2421 Includes software	BHS A/A	£1,169.00	Small adult (l 15-22 cm), Standard adult (l 20-31 cm)
ABP-2000	BHS A/B	tbc	Tbc
Mobil O Graph	BHS A/B	tbc	Small adult (l 20-24 cm), Standard adult (l 24-32 cm) Large adult (l 32-42 cm)
Daypress 500 BHS A/B	tbc	Tbc	
ES-H531	BHS B/B	Details not found	Details not found
Meditech ABPM-04	BHS B/B	tbc	Small adult (l <24 cm), Standard adult (l 24-32 cm) Large adult (l 32-42 cm), Extra large adult (l 42-55 cm)
Tensioday		Details not found	Details not found
Save 33 Model 2	BHS B/B	Details not found	Details not found
Nissei DS-240	BHS B/A	Details not found	Details not found
Oscar 2	International Protocol	tbc (June 2005)	Small adult 19-27 cm, Standard adult 27-42 cm (included) Large adult 35-50 cm **Available From Sept 05:** Small adult orbit 18-27 cm, Standard adult orbit 25-35 cm (included), Adult plus orbit 33-40 cm (included), Large adult orbit 39-46 cm
Agilis Distributor & other details awaited	International Protocol	tbc	tbc

For references please refer to the British Hypertension Society website: www.bhsoc.org/blood_pressure_list.stm

UK Distributors for Table 1.

A&D Instruments Ltd
24 Blacklands Way
Abingdon Business Park
Abingdon
Oxon
OX14 1DY
Tel. Freephone 0800 616 140,
ext 121
Fax. 01235 550 485
www.aandd.net

Omron Healthcare (UK) Limited
Opal Drive
Fox Milne,
Milton Keynes
MK15 0DG
Tel. 0870 750 2771
Fax. 0870 750 2772
Email. info.omronhealthcare.uk@
eu.omron.com
www. omron-healthcare.com

KSM Healthcare Ltd
(Seinex)
78 Burnthill Road
Newtownabbey
Co. Antrim
BT36 5HF
Tel. 028 90848454

Tyrrell Healthcare Ltd
(Microlife range)
Pinewood, Greenways, Henfield
West Sussex
BN5 9TZ
Tel. 0845 2225123 (local rate call)
Tel. 01273 494401 (24hr answering
service)
Fax. 01273 493986
Email. info@tyrrellhealthcare.com
www.tyrrellhealthcare.com
(including online ordering)

UK Distributors for Table 2.

Datascope Medical Co. Ltd
(Accutorr Plus)
Lakeview Court
Ermine Business Park
Huntingdon
PE29 6XR
Tel. 01480 423600
Fax. 01480 423638
www.datascope.com

Omron Healthcare (UK) Limited
Opal Drive
Fox Milne,
Milton Keynes
MK15 0DG
Tel. 0870 750 2771
Fax. 0870 750 2772
Email. info.omronhealthcare.uk@
eu.omron.com
www.omron-healthcare.com

Huntleigh Healthcare Ltd
(Smartsigns)
35 Portmanmoor Road
Cardiff
CF24 5HN
Tel. 02920 485885
Fax. 02920 492529
www.huntleigh-healthcare.com"

Tyrrell Healthcare Ltd
(Microlife range)
Pinewood, Greenways, Henfield
West Sussex
BN5 9TZ
Tel. 0845 2225123 (local rate call)
Tel. 01273 494401 (24hr answering
service)
Fax. 01273 493986
Email. info@tyrrellhealthcare.com
www.tyrrellhealthcare.com
(including online ordering)

UK Distributors for Table 3.

Welch Allyn UK Ltd
Cubington Rd
Aston Abbotts
Buckinghamshire
HP22 4ND
Tel. 0207 3656780
Fax. 0207 3659694
Email.
welchallyn@mail.welchallyn.com
www.datascope.com

UK Distributors for Table 4.

Microlife Health Management Ltd
6 & 7 Henfield Business Park
Shoreham Rd
Henfield
West Sussex
BN5 9SL
Email. info@microlife.uk.com
www.microlife.uk.com

UK Distributors for Table 5.

R L Dolby & Co Ltd
(SL range)
Monitor House
Kerse Rd
Stirling
FK7 7RZ
Tel. 01786 446640
www.dolby-ltd.co.uk
Email. sales@dolby-ltd.co.uk"

A&D Instruments Ltd
(TM range)
24 Blacklands Way,
Abingdon Business Park,
Abingdon,
Oxon,
OX14 1DY
Tel. Freephone 0800 616 140,
ext 121
Fax. 01235 550 485
www.aandd.net

Biotrac, Inc
(ABP-2000)
7215 NW 46th Street
Miami
FL 33166
U.S.A.
Tel. (305) 594-7474
Fax. (509) 267-2283
www.biotracmed.com

I.E.M. GmbH
(Mobil O Graph)
Cockerillstraße 69,
D-52222 Stolberg/Germany
Tel. +49 (2402) 95 00-0,
Fax. +49 (2402) 95 00-11
www.iem.de

Meditech Ltd
(Medictech).
200 Ulloi ut, Budapest
H–1191 Hungary
Tel. +36 1 280 8232;
+36 1 280 82 33
Fax. +36 1 282 9388
Email. meditech@meditech.hu

SunTech Medical Ltd Europe
(Oscar 2)
Oakfield Industrial Estate
Stanton Harcourt Rd
Eynsham
Oxford
OX29 4TS
Tel. (01865) 884234
Fax. (01865) 884235
www.suntechmed.com

Resources

Health Care Without Harm: www.noharm.org/europe/mercury/sphygmos
"A New Era: The Elimination of Mercury Sphygmomanometers", factsheet, June 2002.

Professional Associations

British Hypertension Society: www.bhsoc.org/blood_pressure_list.stm
European Society of Hypertension: www.eshonline.org/
Association for the Advancement of Medical Instrumentation: www.aami.org

Other Resources

KEMI – Swedish Chemical Inspectorate:
Mercury-free blood pressure measurement equipment – Experiences in the Swedish healthcare sector.
www.noharm.org/details.cfm?type=document&id=1167

UK Medical Devices Agency:
Blood Pressure Measurement Devices – Mercury and Non-mercury
www.mhra.gov.uk/home/idcplg?IdcService=GET_FILE&dDocName=CON007351&RevisionSelectionMethod=LatestReleased

DABL Educational Trust:
Manufacturers site on validation and classification of blood pressure devices
www.dableducational.org/sphygmomanometers.html

Sustainable Hospitals Project:
Database of manufacturers and brand types (mainly for the US)
www.sustainablehospitals.org

Wellch Allyn:
Clarification on the Efficacy of Aneroid and Digital Blood Pressure Devices
www.noharm.org/library/docs/Welch_Allyn_Clarification_on_the_Efficacy_of_A.pdf

References

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2. *EU Commission. 2006. Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Council Directive 76/769/EEC relating to restrictions on the marketing of certain measuring devices containing Mercury (presented by the Commission) Brussels, 21.2.2006. COM(2006) 69 final. 2006/0018 (COD), p. 3*
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5. *UNEP Chemicals. 2002. Global Mercury Assessment. Excerpts from the full report. Geneva, December 2002, p. 16,18*
6. *MHRA UK. 2005. Report of the Independent Advisory Group on Blood Pressure Measurement in Clinical Practice. June 2005.*
7. *KEMI – Swedish Chemical Inspectorate (2005) Mercury-free blood pressure measurement equipment – Experiences in the Swedish healthcare sector. Sundbyberg. November 2005, p. 4.*
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9. *Mion D, Pierrin AMG. How accurate are sphygmomanometers? Journal of Hypertension, 12: 245- 248. 1998.*
10. *Markandu NK, Whitcher F, Arnold A, Carney C. The Mercury sphygmomanometer should be abandoned before it is proscribed. Journal of Human Hypertension 14(1): 31-6. 2000.*
11. *Wellch Allyn: Clarification on the Efficacy of Aneroid and Digital Blood Pressure Devices. See www.noharm.org/library/docs/Welch_Allyn_Clarification_on_the_Efficacy_of_A.pdf*

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Chlumova 17, 130 00 Praha 3, Czech Republic
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28 Bld Charlemagne, B1000 Brussels, Belgium
Phone: +32 2 234 3640 Fax: +32 2 234 3649
E-mail: info@env-health.org
www.env-health.org

* *Formerly known as EPHA Environment Network (EEN)*

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"Stay Healthy, Stop Mercury" campaign
Health and Environment Alliance (HEAL) 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.

DENR ADMINISTRATIVE ORDER NO. 38
Series of 1997

Subject: CHEMICAL CONTROL ORDER FOR MERCURY AND MERCURY COMPOUNDS

Section 1. Legal Authority

This Chemical Control Order (CCO) is being issued on the basis of authorities given to the Department of Environment and Natural Resources under Republic Act 6969 of 1990 and DENR Administrative Order (DAO) No. 29, Series of 1992.

The requirements and procedures presented in this CCO are in addition to all the other requirements of Title II and Title III of DAO 29 as they pertain to the importation, manufacture, distribution and use of mercury and mercury compounds and the storage, transport, and disposal of their wastes.

Section 2. Policy

It is the policy of DENR to minimize hazards to human health and the environment from the improper use, management, disposal, and subsequent release and exposure to harmful substances.

Section 3. Definition & Rationale

In this CCO, unless inconsistent with the context or subject matter, the following definitions apply:

(1) **"Act"** means Republic Act 6969 otherwise known as the Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990.

(2) **"Department"** means the Department of Environment and Natural Resources.

(3) **"Authorized Officer"** means a person appointed under the Act as an authorized officer for the purpose of the Act.

(4) **"Mercury"** means any substance containing the element mercury, either in its pure form, as metallic salts or organometallic compounds.

Mercury and mercury compounds are toxic to aquatic life even at low concentrations, especially the methylated forms of mercury. It is also known to bioconcentrate greatly in the food chain causing risks to humans who become ecological receptors through fish ingestion. It is used in a variety of applications, for example, in the preparation of chlorine, in the production of electrical apparatus, industrial controls and switches, anti-fouling coatings and fungicides and in metallurgy and mining. In man, it has been shown to cause neurological disorders through the inhalation of mercury vapors and ingestion of methylated forms of mercury.

This CCO, therefore, is meant to control their use and dispersion into the environment to avoid these adverse consequences.

Section 4. Application and Coverage

This CCO applies to the importation, manufacture, processing, use and distribution of mercury and mercury compounds. It also addresses the treatment, storage and disposal of mercury-bearing or mercury-contaminated wastes in the Philippines. This order will cover the following:

(1) Importers and distributors

(2) Manufacturers, processors and industrial users
(3) Transporters
(4) Treaters and disposers

Section 5. Objectives

This CCO has the following objectives:

(1) Reduce hazards to health and the environment from the use, handling, management, transport and disposal, and subsequent release and exposure to mercury.

(2) Establish requirements and procedures for importation (for use in commerce), transport, manufacturing, labeling, re-labeling, spill handling, emergency procedures, and proper treatment, storage, and disposal of mercury and mercury compounds as well as mercury-contaminated containers and mercury-bearing or mercury-contaminated wastes.

(3) Establish limitation of use of certain mercury and mercury containing substances.

(4) Control and regulate the disposal of mercury contaminated wastes and establish requirements so that access to, use and disposal of any mercury and mercury-containing materials will be limited to persons who have the expertise and facilities to handle these substances with minimum discharge to the environment.

(5) Establish a registration, monitoring and compliance program to enforce the tenets and covenants of this Order.

Section 6. Exemptions

The following are exempt from this CCO:

(1) All premises and entities which handle substances and mixtures exempt under Title II of DAO 29, Series of 1992.

(2) Industries and other users whose exemption claims have been approved by the Department of the time period identified in the Department's approval. Industries must complete the Department's exemption claim form and get approval from the Department.

Section 7. General Requirements and Procedures

In addition to the general requirements under Title II of DAO 29, the following requirements and procedures have been established for importers and industrial users of mercury and mercury compounds, and treaters and disposers of mercury-bearing or mercury-contaminated wastes. These are:

(1) ***Required Permits***

(a) Any person or entity importing, manufacturing, distributing or using mercury or mercury-containing products in the Philippines must register with and secure a license to use and to purchase from the Environmental Management Bureau of the Department.

(b) Any person or premise that imports mercury or mercury-containing compounds must get an importation clearance from the Environmental Management Bureau of the Department.

(c) Any person or entity, or premise treating, transporting, storing or disposing of mercury, mercury compounds or mercury-bearing or mercury-contaminated wastes must register and secure a license for such purposes with the Environmental Management Bureau of the Department.

(d) As part of the registration process, each premise must submit a Mercury Management Plan, described in item 5 Section XIII of this CCO, to the Environmental Management Bureau of the Department.

(2) ***Reports and Records***

(a) Any importer, manufacturer, distributor or user of mercury and mercury compounds or transporters, treaters and disposers of mercury-bearing or mercury-contaminated wastes must submit quarterly reports to the Environmental Management Bureau of the Department, as well as retain records of their activities and transactions.

(b) All reports submitted to the Environmental Management Bureau of the Department and records retained at the premises must include, among others, the names and the addresses of the importer, manufacturer, distributor and purchaser, the end-use category of mercury or mercury-containing products, quantity of products supplied, and the quantity of wastes produced as a result of manufacturing and industrial uses according to the reporting format(s) issued by the Department under this CCO.

(c) Records retained by the premises must be available for inspection at any time by any authorized government officer upon request or in times where the health, safety and environmental conditions are compromised or during times of emergency.

(d) Reports must be submitted to the Department, through the Environmental Management Bureau at frequencies and formats specified later in a Department Circular.

(e) Material Safety Data Sheets of the chemical should be made available to all relevant personnel and displayed conspicuously in the premises at all times.

(3) ***Limitations/Restriction of Use and Disposal***

(a) The use of mercury and mercury compounds shall be strictly limited to the following end-users and those exempted under Section VI of this CCO:

Chlor-alkali plants
Mining and metallurgical industries
Electrical apparatus (lamps, arc rectifiers, battery cells and others)
Industrial and control instruments
Pharmaceutical
Paint manufacturing
Pulp and paper manufacturing
Dental amalgam
Industrial catalyst
Pesticides (fungicide) production or formulation

(b) No mercury-bearing wastes shall be discharged to the environment without prior approval from the Department.

(c) Premises using, storing or treating mercury and mercury compounds or mercury-bearing or mercury-contaminated wastes should comply with prescribed emission or effluent criteria or standards contained in DAO 34, 35, 14 and 14A. In the absence of applicable local criteria or standards, recognized international criteria or standards such as those prescribed by the World Health Organization (WHO) shall apply.

(4) ***Handling Requirements***

(a) Containers of mercury or mercury compounds and mercury-bearing or mercury-contaminated wastes should be corrosion-resistant, and strong enough to withstand breakage during normal handling, transport and storage.

1) All manufacturing processes and industrial premises manufacturing or using products containing mercury or mercury compounds must report to the Environmental Management Bureau of the Department and retain records of all mercury-containing wastes or mercury-contaminated containers that are: (i) stored and disposed on-site; (ii) transported off-site; (iii) treated, stored, and disposed off-site; (iv) exported and (v) recycled.

2) The Department's clearance and permit will require the importer, manufacturer, and industrial users to state in detail the quantity and methods of storage, recycling and disposal of wastes, containers, and discarded materials generated as a result of handling mercury and mercury compounds.

3) The importer, wholesaler and distributor, manufacturer and user must comply with proper storage, labeling, packaging, pre-transport and transport (e.g. shipping) of mercury and mercury-containing materials as required by this CCO, other requirements under Titles II and III of DAO 29, and the standards adopted by the Department of Transportation and Communication including proper storage, labeling, packaging, pre-transport, and shipping.

(b) Any container or vessel containing mercury must be properly labeled. It should indicate the mercury and mercury compound content, precautions required in its handling and emergency response measures to be taken in case of spillage or any untoward incident (e.g. fire).

(c) Transfer of mercury or mercury-containing materials should not be undertaken where appropriate facilities for such are not available.

(d) Mercury and mercury compounds should be stored in secure places, with provisions for appropriate emergency response in case of accidents.

Section 8. Disclosure of Information

Relevant information should be disclosed immediately in cases of emergency to the Department through the Environmental Management Bureau and the concerned Department's Regional Offices.

Section 9. Revision of Requirements

The Department may review, revise, modify, update and supplement the requirements and standards applicable to this CCO from time to time.

Section 10. Information, Education a nd Communication and Training Requirements

(1) The Department in collaboration with other government agencies, industry associations, non-governmental organizations, professional organizations, and the academe shall promote public awareness on the beneficial use of mercury and mercury compounds and the accompanying hazards and risks involved in their usage. It shall likewise strive to increase awareness on the environmental and health risks of mercury containing wastes, as well as, their proper and safe disposal.

(2) It is the responsibility of the importer(s) to inform and train transporter(s) and user(s) on the precautions and measures in the handling of said chemicals.

(3) It is the responsibility of the management of the premises using or storing mercury and mercury compounds or treating or disposing or mercury-bearing or mercury-contaminated wastes to develop a training and contingency program for all workers handling these materials. Such training should focus on the risks associated with the chemicals and wastes, measures to avoid

exposure, and requirements for the proper management of the chemicals and wastes in an emergency, among others.

(4) The said premises or entities should inform the local government units, as well as, the nearby communities on the hazards and precautionary measures for mercury and mercury-containing compounds including emergency preparedness programs.

Section 11. Compliance Monitoring Procedure

Compliance with the requirements established in this CCO will be monitored regularly by the Department through review of reports and on-site inspection by authorized personnel of the Department.

Section 12. Penalty Provision

Any violators of the requirements specified in this CCO will be subject to administrative and criminal penalties and liabilities as specified under Title V, Chapter XI, Sections 43 and 44 of DAO 29 series of 1992, pursuant to Section 13, 14 and 15 of RA 6969.

Section 13. Specific Requirements and Standards

All persons, entities and premises covered by this CCO shall comply with the following specific requirements and standards for implementation of the general requirements outlined in Section VII of this CCO:

(1) ***Reports***

Importers and users must submit quarterly reports in accordance with the Importer's Report Form and the User's Report Form respectively. Quarterly reports must be submitted to the Department, through the Environmental Management Bureau and copy furnished the Regional Office concerned, on or before the 15th day after the end of each quarter (January to March, etc.). The reporting format will be specified in a Department Circular 30 days after the effective date of this Order.

Importers will be responsible for securing information for the report pertaining to the transport and distribution of the mercury and mercury compounds. Users will be responsible for submitting information on the treatment, storage and transport and disposal of wastes arising from their use of mercury and mercury compounds.

(2) ***Manifest***

All importers and users of mercury and mercury compounds, and treaters and disposers of mercury-bearing or mercury-contaminated wastes must comply with the manifest requirements specified under the relevant sections of DAO 29 and those to be prescribed by the Environmental Management Bureau of the Department.

(3) ***Labeling or Re-labeling Requirements***

The labels and marks for all containers of mercury and mercury containing products or mercury-bearing or mercury-contaminated wastes must clearly indicate that the material contains mercury and that the same is regulated under this CCO. The labels, at a minimum, should contain the following information:

Chemical Name of the Material
Chemical Composition/Formula
Warning: Contains a Toxic Material
First Aid Measures
Accidental release/spillage measures
Handling and Storage
Exposure Controls

Toxicological Information
Disposal Consideration
Expiry or Best Use Before information

Visible labels and marks shall be strictly required for all such containers sixty (60) days after the effective date of this Order.

(4) ***Storage Requirements***

Storage areas for mercury and mercury compounds or mercury-bearing or mercury-contaminated waste items must meet the following conditions:

(a) The storage area should be marked or delineated clearly by fencing, posts, or walls in order to limit access to it.

(b) A recording system on the condition of the storage area should be established, details of which shall include the observations, name of inspector, date inspected, etc.

(c) The dates when mercury and mercury-containing materials were placed in the storage area should be indicated on the container and duly recorded.

(d) The storage area should have adequate roof and walls to prevent rain water from reaching the mercury and mercury-containing material.

(e) There should be no cracks or openings of any kind in the containment floor or walls that could allow the flow of mercury outside the area.

(f) Floors of the storage area must be constructed of impervious material such as concrete or steel, and if the mercury is in liquid form, should be surrounded by a bund wall to contain spills.

(g) Visible warning signs and notices must be placed in conspicuous areas in the premises.

(h) Drainage facilities should be installed in premises where mercury and related compounds are used and handled to contain possibl e spillage or releases.

(i) Emergency showers and eyewash units with adequate water supply should be made available in premises where mercury and related compounds are used or handled.

(j) Fire-fighting facilities should be in place for use in case of fire(s).

(k) Access to mercury and its compounds should be restricted to those with adequate training for such purpose.

(l) A copy of the material Safety Data Sheet should always be available in the area.

(m) Segregation, adequate ventilation and ideal condition for storage of the chemical should be maintained in the area.

(n) Adequate security siting and access to the area should be ensured.

(o) Proper loading or unloading of containers should be observed.

(p) A workable emergency plan must be in place and implemented immediately in case of accidental spillage and other emergencies.

(q) Only trained personnel should be handling containers in storage as well as in the transport of such substances or mixtures.

(5) ***Management Requirements***

A Mercury Management Plan must be submitted with the registration form to the Environmental Management Bureau of the Department. The objective of the management plan is to ensure that mercury is being managed in a manner that will eliminate or minimize its risks to people and the environment. Through the management plan, a premise will show that it has the necessary mechanisms to manage the raw materials or products so that they are used for their intended purposes and are not released to the environment. It will describe any manufacturing process that involve mercury and show a mass balance for the chemical. The plan will also contain information on the waste management practices and provide a description of all releases to all environmental media. An important aspect of the plan will be a description of the premises' waste minimization programs or pollution prevention programs. These programs should look for ways to minimize or eliminate the use of mercury in processes used at the premises. The details of the management plan will vary depending on the type of premise and the type of activity being conducted, which may include importing, packaging or manufacturing or whether the operator or owner is the end-user. Below is a general outline for the management plan.

General Description

(a) Location, owner, operator
(b) Industrial activities at the premises
(c) Number of employees
(d) Other relevant information

Uses of Mercury at the Premises

(a) Description of the processes that use mercury
(b) Listing of raw materials used containing mercury
(c) Listing of wastes generated containing mercury
    wastewater
    air
    solid wastes
(f) Mass balance of mercury
(g) Description of pollution control devices in use
(h) Description of compliance with the Department's rules and regulations
(i) Description of emergency procedures and contingency plans in case of accidents

Wastes Minimization Program and Pollution Prevention Program

Training Program

(a) Workers in contact with the chemical
(b) Workers managing wastes

Section 14. Liability

The Secretary or his duly authorized representative may cause the impoundment or confiscation of any chemical substance and its conveyance and container if there is reasonable ground to believe that the sale, storage, possession, use, manufacture, transport, import or export for the chemical substance does not comply with this CCO.

Any importer or distributor selling to non-authorized persons or end-users shall be held liable under R.A. 6969. Chemicals may be confiscated and storage fees of confiscated chemicals shall be charged jointly and solidarity to the importer and/or distributor and end-user.

The importer and distributor shall likewise be held liable together with the end-user in cases of injury or damage to public health and the environment and shall properly compensate the affected parties and restore the damaged area or areas resulting from any incident or accident involving the use, sale, manufacture, distribution, storage, transport, treatment and disposal of mercury and mercury compounds.

Section 15. Effectivity

These Rules and Regulations shall take effect thirty (30) days after completion of publication in the Official Gazette or in a newspaper of general circulation:

(Sgd.) **VICTOR O. RAMOS**
Secretary

23 December 1997

Chapter 1

Classification of Hazardous Wastes

Wastes are considered hazardous if they are listed under the Classification of Prescribed Hazardous Wastes (HW) under this Procedural Manual or they exhibit any of the four characteristics, namely: ignitable, corrosive, reactive or toxic based on TCLP.

(1) The classification of wastes listed in Table 1-1 shall be as hazardous wastes.
(2) The analysis of extracts shall follow the Toxicity Characteristic Leaching Procedure (TCLP).

Table 1-1 Classification of Hazardous Wastes

Class	Description	Waste Number
A: Wastes with cyanide		
Wastes with cyanide	Waste containing cyanide with a concentration >200 ppm in liquid waste	A101
B: Acid wastes		
Sulfuric acid	Sulfuric acid with pH =< 2.0	B201
Hydrochloric acid	Hydrochloric acid with pH =< 2.0	B202
Nitric acid	Nitric acid with pH =< 2.0	B203
Phosphoric acid	Phosphoric acid with pH =< 2.0	B204
Hydrofluoric acid	Hydrofluoric acid with pH =< 2.0	B205
Mixture of sulfuric and hydrochloric acid	Mixture of sulfuric and hydrochloric acid with pH =< 2.0	B206
Other inorganic acid	Other inorganic acid with pH =< 2.0	B207
Organic acid	Organic acid with pH =< 2.0	B208
Other acid wastes	Acid wastes other than B201 to B208 with pH =< 2.0	B299
C: Alkali wastes		
Caustic soda	Caustic soda with pH >= 12.5	C301
Potash	Potash with pH >= 12.5	C302
Alkaline cleaners	Alkaline cleaners with pH >= 12.5	C303
Ammonium hydroxide	Ammonium hydroxide with pH >= 12.5	C304
Lime slurries	Lime slurries with pH >= 12.5	C305
Other alkali wastes	Alkali wastes other than C301 to C306 pH >=12.5	C399
D: Wastes with inorganic chemicals		
Selenium and its compounds	Includes all wastes with a total Se concentration > 1.0 mg/L based on analysis of an extract	D401
Arsenic and its compounds	Includes all wastes with a total As concentration > 5 mg/L based on analysis of an extract	D402
Barium and its compounds	Includes all wastes with a total Ba concentration > 100 mg/L based on analysis of an extract	D403
Cadmium and its	Includes all wastes with a total Cd concentration > 5	D404

compounds	mg/l based on analysis of an extract	
Chromium compounds	Includes all wastes with a total Cr concentration > 5 mg/l based on analysis of an extract	D405
Lead compounds	Includes all wastes with a total Pb concentration > 5 mg/l based on analysis of an extract	D406
Mercury and mercury compounds	Includes all wastes with a total Hg concentration > 0.2 mg/l based on analysis of an extract. These also includes organomercury compounds. Refer to CCO.	D407
Other wastes with inorganic chemicals	Wastes containing the following chemicals: - antimony and its compounds; - beryllium and its compounds; - metal carbonyls ; - copper compounds; - zinc compounds ; - tellurium and its compounds; - thallium and its compounds; - inorganic fluorine compounds excluding calcium fluoride	D499
E: Reactive chemical wastes		
Oxidizing agents	Includes all wastes that are known to contain oxidizing agents in concentration that cause the waste to exhibit any of the following properties : 1. It is normally unstable and readily undergoes violent change without detonating; 2. It reacts violently with water; 3. It forms potentially explosive mixtures with water; 4. When mixed with water, it generates toxic gases, vapor or fumes in a quantity sufficient to present a danger to human health; It is a cyanide (CN) or sulfide (S) bearing wastes, which when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors and fumes in a quantity that poses a danger to human health	E501
Reducing agents	Includes all wastes that are known to contain reducing agents in concentration that cause the waste to exhibit any of the following properties : 1. It is normally unstable and readily undergoes violent change without detonating; 2. It reacts violently with water; 3. It forms potentially explosive mixtures with water; 4. When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health; It is a cyanide (CN) or sulfide (S) bearing wastes, which when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors and fumes in a quantity that poses a danger to human health	E502
Explosive and unstable chemicals	Includes all wastes that are 1) capable of detonation or explosive reaction when subject to a strong initiating	E503

Annex E: List of Recognized Transporters and Treaters of Hazardous Waste (Based on the the Environment Management Bureau's March 2007 list)

Company	Address	Contact	Type of Waste	Expiry of Registration
Region: Cagayan Valley				
Province: Bataan				
AMDJ Trading	89 Purok 1, Brgy. Ipag, Mariveles, Bataan	(047) 9356805 Mobile 09214668583 09185763231	misc. wastes [pharmaceutical and drugs] (M503), waste with inorganic chemicals (D401-D499)	07-Jun-07
Province: Bulacan				
Wastech Junk Shop	Sta. Rosa I, Marilao, Bulacan	Mobile 09159248783	Waste with inorganic compounds (D401-D499)	23-May-07
Province: Pampanga				
Safewaste, Inc.	3 Pallosapis St, San Fernando, Pampanga	Telefax (045) 9632219	Pathogenic or infectious wastes (M501)	12-Jan-08
Semirecycling Co., Inc.	Bldg. 7268, Jose Topacio St., Industrial Estate I Clark Special Economic Zone, Clark Field, Pampanga	(045) 8934063 Fax (045) 8934064	Busted fluorescent lamps (D407), contaminated containers (J201 contaminated with D407)	06-Oct-07
Province: Zambales				
Enviro Care Trucking Services	1488B Morning Glory Alley, Tabacuhan, Sta. Rita, Olongapo City, Zambales	Telefax (047) 2244931	Waste with inorganic chemicals (D401-D499), misc. waste [pathogenic or infectious waste/pharmaceutical waste and drugs (M501-M503)]	28-Jun-07
GBPL Enterprises	Gate 3 SBMA Free Port Zone, Subic, Zambales	Telefax (632) 9153970	Waste with inorganic chemicals (D401-D499)	22-Dec-07
Region: Southern Tagalog				
Province: Batangas				
Aldeoper Trucking Services	Sitio Sto. Nino, Brgy Galamay-amo, San Jose, Batangas	(043) 7230045; Fax (043) 3000804	Waste with inorganic chemicals (D401-D499)	26-Feb-08
BNJ Trading and Gen. Services	Perez Compound, Ayala St., Pob, San Pascual, Batangas	Telefax (043) 72739 Mobile 09175041975	Waste with inorganic chemicals (D401-D499), misc. waste [pathogenic or infectious waste/pharmaceutical waste and drugs (M501-M503)]	31-Oct-07
Sani Kleen Laundry Corp.	Pingkawitan, Lipa City	(043) 7565541 Fax (043) 7570461	Health Care Wastes (M501)	16-Mar-07

Company	Address	Contact	Type of Waste	Expiry of Registration
Region: Southern Tagalog				
Province: Batangas				
Wastegarde Phils, Inc.	Soro-Soro Kalsada, Batangas City	Telefax (043) 7220922	Waste with inorganic chemicals (D401-D499), misc. waste [pathogenic or infectious waste/pharmaceutical waste and drugs (M501-M503)]	05-Apr-07
Province: Cavite				
Asia Metal Trading Corp.	Lot 28 New Cavite Industrial City (NCIC) Stateland, Manggahan, Gen. Trias, Cavite	046) 4021440 Fax (046) 4021384	Busted fluorescent lamps (D407)	22-Dec-07
Gaselco Trading	JM St, Brgy Mabuhay, Carmona, Cavite	(02) 2599784; 9976374	Busted fluorescent lamps (D407)	23-Nov-07
JORM Trading Corp.	Gen. Trias Drive, Brgy. Tejero, Gen. Trias, Cavite	(046) 4378623 Fax (046) 4378632	Waste with inorganic chemicals (D401-D499)	15-Dec-07
MP Armonia Mini Trading	Brgy Bagtas, Tanza, Cavite	Mobile 09164706119	Waste with inorganic chemicals (D401-D499)	08-Sep-07
Norton Trading	10 B San Jose St., Poblacion I, Tanza, Cavite	Mobile 09172469005	Waste with inorganic chemicals (D401-D499)	19-Jan-08
PAE Environmental (Phils.), Inc.	Gen. Emilio Aguinaldo Memorial Hospital Compound, Trece-Indang Rd, Brgy Luciano, Trece Martirez, Cavite	(632) 8427087; 8427177	Misc. waste [Pathogenic or infectious(M501)]	09-Apr-07
RD Environmental Solutions, Inc.	Blk 18 Lot 13, Rd E, Phase 4, CEPZ, Brgy Bacao, Gen. Trias, Cavite	Telefax (046) 4371711	Waste with inorganic chemicals (D401-D499)	23-May-07
RMM Trading and Waste Management Services	Lalaan 1st, Silang, Cavite	(046) 4148071	Waste with inorganic chemicals (D401-D499), misc waste [pharmaceutical waste (M503)]	08-Feb-08
RN3K Trading	Brgy Sta. Clara, Gen Trias, Cavite	Mobile 09175779574	Busted fluorescent lamps (D407)	07-Feb-08
Sardido Industries, Inc.	Remulla Blvd, Sahud Ulan, Tanza, Cavite	(02) 8207562 Fax (02)8207594	Waste with inorganic chemicals (D402-D499), misc wastes (M501 and M503)	26-Feb-08
Solvtech Consultancy Resources	Blk 11 Lot 6A, Phase I, Sterling Technopark, Maguyam Rd, Silang, Cavite	(046) 8653173 Fax (02) 5298342	Waste with inorganic chemicals (D401-D499), misc wastes (M501, M503-M505)	18-Aug-07
Southcoast Metal Ent., Inc.	Panorama Bldg 2, Phase IV, Cavite Export Processing Zone, Rosario, Cavite	(046) 4379788 Fax (046) 4379789	Busted fluorescent lamps (D407)	27-Feb-08

Company	Address	Contact	Type of Waste	Expiry of Registration
Region: Southern Tagalog Province: Laguna				
Aeroasia Intl. Trading Corp.	31 JAGISAI Bldg, Magsaysay Rd, San Antonio, San Pedro, Laguna	(02) 8681035 Fax (02)8681045 Mobile 09109015707	Waste with inorganic chemicals (D401-D499), misc. waste [pathogenic or infectious waste/pharmaceutical waste and drugs (M501-M503)]	10-Apr-07
ECA Ent.	494 Brgy Timbao, Biñan, Laguna	(049) 8376756 Mobile 09166166781	Waste with inorganic chemicals (D401-D499)	26-Feb-08
Ecosaver Ent.	Unit 5, La Filipina Compound, National Highway, Landayan, San Pedro, Laguna	(02) 8686561 Fax (02) 8471280	Waste with inorganic chemicals (D401-D499)	10-Apr-07
Elms Industrial (Philippines) Co., Inc.	Blk 1 Lot 6, Calamba Premier Industrial Park, Batino, Calamba City, Laguna	(049) 5456610 Fax (049) 5456645	Waste with inorganic chemicals (D401-D499), misc. waste [pharmaceutical waste and drugs (M503)]	25-Oct-07
ESPHIL, Inc.	Bldg 1 & 2, C.A. Yulo Ave, Silangan Industrial Park, Canlubang, Calamba, Laguna	(049) 5490509 to 11 Fax (049) 5490499	Waste with inorganic chemicals (D401-D499)	08-Jan-08
Sher-Kay	190 Brgy Timbao, Biñan, Laguna	(049) 5126611	Busted fluorescent lamps (D407), misc. waste [pharmaceutical and drugs (M503)]	19-Sept-07
The Rock Environmental Approach Technologies, Inc. (TREAT)	Lazaro Compound, Brgy Parian, Calamba City	(049) 5454513; 5452741 loc 106	Waste with inorganic chemicals (D401-D499)	15-Nov-07
Province: Rizal				
Hundredfold Logistic Corp.	26 Danville St, Vermont Park Subd, Mayamot, Antipolo City	(02) 6822918 Fax (02) 6822918	Waste with inorganic chemicals (D401-D499), misc. waste [pharmaceutical waste and drugs (M503)]	05-Apr-07
New Parbuilt Construction and Services Corp.	2/F Regalado Bldg, Gen Luna St, San Mateo, Rizal	(02) 2971589; 2972234; 9977220 Fax (02)2972234	Waste with inorganic chemicals (D401-D499), misc waste [pharmaceutical waste (M503)]	19-Dec-07
Region: Bicol Region Province:				
Unocal Philippines, Inc.	T. Cabiles St, Tabaco City	8458400 Fax 8458597	Busted fluorescent lamps (D407), misc. wastes [pathogenic or infectious wastes (M501)]	16-Mar-07
Region: Central Visayas Province: Cebu				
Cebu Common Treatment Facility, Inc. (CCTFI)	CTF/SSF Site, Sanitary Landfill Compound, Inawayan, Cebu	(032) 2733137; 2721631 Fax (032) 2733137	Waste with inorganic chemicals (D402-D499),	26-Oct-07

Company	Address	Contact	Type of Waste	Expiry of Registration
Region: Central Visayas				
Province: Cebu				
Dale's Carton Supply	Carajay Rd, Gun-ob, Lapu-Lapu City, Cebu	(032) 4952624	Busted fluorescent lamps (D407)	14-Jul-07
Maritrans Recycler, Inc.	Pelaez Bldgs, AS Fortuna St, Mandaue City, Cebu	(032) 3459525/26	Busted fluorescent lamps (D407)	16-Mar-07
Marviche Ent.	Pool, Bangkal, Lapu-Lapu City	(032) 3410058; 4923442	Busted fluorescent lamps (D407)	22-Aug-07
Region: Central Mindanao				
Province: South Cotabato				
Unified Engineering & Manpower Multi-Purpose Cooperative	Purok San Miguel, Polomolok, South Cotabato	(083) 3820454	Busted fluorescent lamps (D407), misc. waste [infectious waste (M501)]	18-Jan-08
Region: NCR				
Province: 1st District, Metro Manila				
Clean Leaf Industrial Sales	EK2 Garage, H. Lopez Blvd, Tondo, Manila	(632) 4482885 Fax (632) 4472265	Waste with inorganic chemicals (D401-D499)	08-Sep-07
Jademar Envirocare Management Ent.	1100 Juan Luna St, Tondo, Manila	Mobile 09192292488	Waste with inorganic chemicals (D401-D499), misc. waste [pharmaceutical and drugs (M503)]	8-Sep-07
Province: 2nd District, Metro Manila				
CleanHaul Environmental Services, Inc.	3/F H & K Fortune Bldg, Riverside Drive, Santa Lucia, Pasig City	(632) 9150537 Fax (632) 9162326	Waste with mercury compounds (D407), misc. wastes [pathogenic or infectious (M501), pharmaceutical waste and drugs (M503)]	19-Apr-07
Disposal Network, Inc.	Gil Fernando Ave, Brgy Sto. Niño, Marikina City	(632) 8894344 Fax (632) 8452938	Waste with inorganic chemicals (D401-D499), misc wastes [M501-M505]	06-Oct-07
Dolomatrix Philippines, Inc.	102 E. Rodriguez Jr. Ave, Bo. Ugong, Pasig City	(632) 6719086 Fax (632) 6715925	Waste with inorganic chemicals (D401-D499), misc. waste [pharmaceutical and drugs (M503)]	24-Jan-08
EnviroGreen Trading	Rm. B19 Lester Bldg, Km. 22, Quirin Highway, Lagro, Quezon City	(632) 4177729 Fax (632) 4175101	Busted fluorescent lamps (D407)	22-Aug-07
GlobeCare Services, Inc.	1 Sheridan St, Mandaluyong City, MM	(632 7477470; 6388698 Fax (632) 7477469	Waste with inorganic compounds (D401-D499), misc. wastes [M501-M505]	22-Dec-07
Horizon Ecology System Services and Management, Inc.	38 Guerilla St, Sto. Niño, Marikina City	(632) 9129354; 9129355; 9424769 Fax (632) 9424769	Waste with inorganic compounds (D401-D499)	17-Nov-07
IPM Construction and Development Corp.	Sandoval Ave, Brgy San Miguel, Pasig City	(632) 6334372 to 75 Fax (632) 6334143	Waste with inorganic compounds (D401-D499)	15-Dec-07

Company	Address	Contact	Type of Waste	Expiry of Registration
Region: NCR				
Province: 2nd District, Metro Manila				
Rodlea Trading	68 Saint Martin St, Payatas A, Quezon City	(632) 4302365 Fax (632) 9512729	Busted fluorescent lamps (D407)	26-Feb-08
Province: 3rd District, Metro Manila				
Ecogreen Trading	Padrigal St, Karuhatan, Valenzuela City	(632) 2920377 Fax (632) 2920377	Waste with mercury compounds (D407), misc. wastes [pharmaceutical waste and drugs (M503)]	19-Sep-07
Province: 4th District, Metro Manila				
Chevalier Enviro Services, Inc.	Km 17 West Service Rd, Cervantes St, South Super Highway, Parañaque City	(632) 8234245; 8210136 Fax (632) 7767042	Misc wastes [pathogenic or infectious wastes (M501)]	23-May-07
Hazard Waste Management Services	165 Isagani St, Rizal Village, Alabang, Muntinlupa City	(632) 8420612 Fax (632) 8001855	Busted fluorescent lamps (D407), misc. waste [pharmaceutical and drugs (M503)]	08-Sep-07
Region: Cordillera Administrative Region				
Province: Benguet				
APO Enterprises	100 Bubon, Virac, Itogon, Benguet	Mobile 09209090438	Waste with inorganic chemicals (D401-D499)	06-Dec-07

Annex F: Sample Quotation for the treatment and proper disposal of busted fluorescent lamps

Cleveland EnviroTech Solutions Inc

Treater and Transporter of prescribed hazardous wastes

DATE : **October 16, 2006** **QT. 06 001 HCH 1016 133**

TO : **HEALTH CARE w/o HARM**

TEL. NO. : **(02) 456 – 1178** FAX NO.: **(02) 926 – 2649**

SUBJECT : **Financial Proposal for Transportation; Treatment; Storage & Proper Disposal of Prescribed Hazardous Wastes.**

We would like to submit this quotation for the Transport, Treatment, Storage and Proper Disposal of Prescribed Hazardous Waste(s) from your facility, as follows:

ITEM	DESCRIPTION	UNIT PRICE	REMARKS*
1.	Busted Fluorescent Lamp	P 15.00 / Pc.	

* Container (s); Drum (s) not returnable.

TERMS OF PAYMENT : 15 days., after pull out of waste (s), VAT exclusive
SCHEDULE OF PULL – OUT : 3 – 4 days upon receipt of Purchase Order or upon signing of conformance. The conformance letter will serve as a preliminary contract.
VALIDITY : Thirty (30) days upon receipt of this quotation.

Should you find this quotation in order and acceptable, please indicate your conformity by signing at the space provided below. Kindly send a copy to us, which will serve as our preliminary contract. If there are any clarifications, please contact our office at the below – mentioned address and telephone numbers.

Respectfully yours,

Maude Ortiz
Marketing secretary

Approved by,

BERNIE S. CHUA
Marketing Director

CONFORME:			
PRINTED NAME	DESIGNATION	DATE	SIGNATURE

Km. 29, Brgy. Tungkong Mangga, City of San Jose Del Monte, Bulacan, Philippines
Telephone Nos.: (044) 691-6727 / (02) 414 - 3881 / (044) 691 8927 / (044) 691 0653
Fax Nos.: (044) 691 – 6727

Protect Environment ... Respect GOD!

06.0080

DoloMatrix Philippines Inc.
102 E. Rodriguez Jr. Avenue
Ugong, Pasig City, PHILIPPINES
Tel : + 63 2 671 9086
+ 63 2 671 1975
Fax : + 63 2 671 5925
Email : noel_valdes@dolomatrix.com.ph
Web : www.dolomatrix.com

DoloMatrix
Engineering a cleaner environment

August 11, 2006

HEALTH CARE WITHOUT HARM
Unit 320 Eagle Court Condominium
26 Matalino St. Diliman, Quezon City

As per your request, we are submitting hereunder our quotation for the following:

Project : **Treatment of Busted Fluorescent Lamps (BFL)**

Volume : not specified

Scope :
- Application of **Permit to Transport** of BFL to Dolomatrix Phils. Inc. (DMPI) facility in Angeles Industrial Park, Calibutbut, Pampanga.
- **Controlled Crushing** of BFL to capture mercury vapor
- Chemical Fixation and Stabilization (CFS) of granular activated carbon filter (GAC) containing captured mercury using **Dolocrete® Technology**
- Issuance of **Certificate of Treatment** after passing **(TCLP) Tests**, done by third party DENR accredited laboratory.
- **Recycling** of crushed BFL

Unit Price : **P 15.00/bulb**

Additional Fees:

P2,500.00 – fee for laboratory TCLP test after treatment to support issuance of Treatment Certificate.

P3,000.00 – fee every pullout for transport of waste from client's facility to Dolomatrix TSD facility in Pampanga. **(METRO MANILA)**

P5,000.00 – (CALABARZONE)

Note :
- above quoted prices are exclusive of VAT
- Waste generator shall strictly adhere to the following:
  - Be responsible for proper packing in secure and leak free containers
  - Ensure proper labeling of each container in compliance with DAO 2004-36
  - Comply with load limits of HazWaste Transport vehicles prescribed by DENR/LTO/NLEX/SLEX

Engineering a cleane environmen DoloMatrix

Terms : full payment upon submission of invoice after pullout of wastes from client's facility

Quote Validity : Sixty (60) days

Should you find the above offer satisfactory, kindly indicate your conformity by signing on the space provided below and fax (02.671.5925) to us a copy for our files.

Thank you for taking time to evaluate our technology and for giving us the opportunity to be of service to you. It will certainly be a privilege to count your company among our valued clients.

We look forward to working with you in **"engineering a cleaner environment"**.

Yours truly,

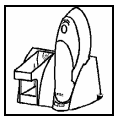
Noel N. Valdes
Marketing Director

Conforme: _____
Authorized signature over printed name

Braun Pro4000

Welch Allyn

Service Documentation



Part Number: 701627

Rev. E

This documentation provides only technical information - technical data, calibration instruction, general information and regulations for medical products.

The function of the thermometer is described in the Operating Instructions, Welch Allyn P/N 701622

Technical data:	Display:	LCD-Display.
	Display resolution:	0.1 °C / °F.
	Displayed temperature range:	20.0 °C - 42.2 °C (68.0 °F - 108.0 °F).
	Work place temperature range:	10.0 °C - 40.0 °C (50.0 °F - 104.0 °F).
	Work place humidity:	up to 95 %.
	In the range between:	35.5 °C - 42.0 °C (95.9 °F - 107.6 °F).
	the accuracy of allowable tolerance with probe cover is:	± 0.2 °C (± 0.4 °F).
	Outside the range from:	35.5 °C - 42.0 °C (95.9 °F - 107.6 °F).
	the accuracy of allowable tolerance with probe cover is:	± 0.3 °C (± 0.5 °F).
	Probe tip:	heated up to approximately 37°C.
	Power supply:	rechargeable Braun battery-pack with base-station and smart plug or 2 1.5 V type AA (LR 6) batteries.
	Smart plug:	100-240 V - input / 12 V – output.
	Base-station:	12 V - input / approx. 2.4 V – output.
	Battery-life time:	3 month (with *) / 1000 measurements.
	Rechargeable battery lifetime:	3 month / 500 measurements per charge.
	Rechargeable battery charging:	Thermometer stored in basis-station.
	Rechargeable battery charging time:	14 hours.
	Base-station function indications:	1 LED, green for power connection 1 LED, yellow for charging indication.
	Electronic anti-theft *:	for Pro 4000 appliances only and with the base-station in use.
	Automatic turn off:	If no button is pressed within 60 seconds, the appliance will turn off automatically.
	Manual turn off:	Push I/O mem - button for >3 seconds.

GEON MT-B162A

Appearance	As pictures
Measurement range	32.0 ℃ - 43.0 ℃ Temp. < 32.0 ℃ : display "Lo" for low Temp. > 43.0 ℃ : display "Hi" for high
Accuracy	±0.1 ℃ between 35.5 ℃ and 42.0 ℃ at an ambient temperature of 18 ℃ to 28 ℃
Display	Smallest unit of display: 0.1 ℃
Memory	Storing the last measured value automatically
Beeper	1. The temperature is ready to use 2. The measurement is finished
Waterproof	Optional
Operation temperature	10 ℃ to 35 ℃
Storage temperature	-25 ℃ to + 55 ℃
Battery	IEC type LR41 Alkaline
Reference to standards	93/42/EEC MDD, IEC60601-1:1990, IEC60601-1-2:2001, EN12470-3:2000, ASTM E1112 :98

2 YEARS GUARANTEE CE 0197

HuBDIC FS-100

Infrared Forehead Thermometer FS 100

***Comfortable and Easy Use**

- Comfortable way of taking temperatures with a light stroke across the forehead
- Simple one-handed operation takes temperatures easily and accurately during scanning (2~3 seconds)
- No probe filter is needed

***Accurate and Reliable**

- Measure a body temperature 40 times per second during scanning to produce more accurate reading - Continuous scanning identifies highest temperature
- Accuracy and repeatability is upgraded due to adopting higher resolution, advanced infrared sensor and complete calibration control.

***User-Friendly Functions and Design**

- Auto-off: Automatically shuts off after 1 minute of non-use
- Easy-to-read large LCD display
- Temperature can be given in either ℃ or ˚F
- Compact, lightweight, and streamlined design

***No Ready Time**

- The innovative algorithm enables re-measurement instantly

***Product Specifications**

Items	Descriptions
Measurement method	Infrared measurement
Temperature Range	20(68.4)~42.2℃(108˚F)
Accuracy	±0.2℃(±0.4℃)
Display type	LCD (Liquid Crystal Display)
Power save mode	Automatic shutdown after 1 minute
Battery	CR2032(1ea) About 6,000 readings
Dimensions	36mm(W) * 32mm(D) * 116mm(H)
Operating temperature	10(50)~40℃ (104˚F)
Standards	CE0120, ISO-9001:2000, ISO-13485:2003

Microlife IR 1DB1

11. Technical Specifications

Type:	**Digital Infrared Thermometer IR 1DB1**
Measuring Range:	0 °C to 100.0 °C (32.0 °F to 212.0 °F)
Accuracy:	Laboratory: : ±0.2 °C, 32.0 ~ 42.2 °C (±0.4 °F, 89.6 ~ 108.0 °F) ±1°C, 0 ~ 31.9°C, 42.3 ~ 100.0 °C (±2 °F, 32.0 ~ 89.5 °F, 108.1~ 212.0°F)
Display:	**L**iquid **C**ristal **D**isplay with indicating unit 0.1 °C (0.1 °F)
Accoustic:	a. The unit is turned ON and ready for the measurement: 1 short „bi" sound. b. Complete the measurement: 1 long beep sound. c. System error or malfunction: 3 short „bi" sounds.
Memory:	Auto-Display the last measured temperature
Nite Glow:	a. The display will be lighted for 4 seconds when the unit is turned ON. b. The display will be lighted again for 5 seconds when the measurement has been completed.
Operating temperature:	10°C to 40 °C (50.0 °F to 104 °F)
Storage/transport temperature:	-25 °C to +55 °C (-13 °F to 131 °F)
Automatic Switch-off:	Approx. 1 minute after last measurement has been taken.
Battery:	CR2032 BATTERY (X1) - at least 1000 measurements
Dimensions:	128mm (L) x 48mm (W) x 30 mm (H)
Weight:	52g (with battery), 48g (w/o battery)
Standards:	Complies with PrEN12470-5 and ASTM E-1965 requirements

According to the Medical Product User Act a biennial technical inspection is recommenden for professional users.
Please observe the applicable disposal regulations.

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OMRON MC 510

Switching on
Press the O/I button (4). After an acoustic signal, all symbols show on the LCD display (2) for a few seconds as a means of checking that the thermometer is functioning correctly. If available the last correctly measured temperature is displayed indicated by the (M) symbol by pushing and holding the on/off switch for more then 5 seconds. After this the device is ready for measurement indicated by a flashing "°C" symbol.

Measuring
Position the sensor tip (1) in the preferred place of measurement – mouth, armpit or rectum. The (°C) symbol lights up when measurement begins. Measurement is complete when the acoustic signal sounds and the "°C" symbol in the display (2) no longer flashes. The measured value remains visible for approximately 10 minutes. After that the device switches itself off automatically.

Important information
Oral measurement (in the mouth)
Be sure to position the sensor tip under the tongue. This measurement takes approximately 1 minute.
Rectal measurement (in the anus)
Gently insert the sensor tip 2-3 cm into the anus. This measurement takes approximately 1 minute.
Axillary measurement (under the arm)
Insert the sensor tip under the arm pit so that the sensor tip is in close contact with the skin. This measurement takes approximately 5-10 minutes.
The "L" symbol appears when the measured temperature is below 32 °C. The "H" symbol appears when the measured temperature is over 43,9 °C.

Storage
Do not leave the device in direct sunlight or near heat sources. Keep out of reach of children.

Changing the battery
The (▽) symbol in the right bottom corner shows on the display to indicate the battery needs to be changed. Open the battery compartment (3) by pulling the top firmly. Replace the used battery with a new one paying attention to the "+" symbol on the battery which must be exposed when positioned.
Dispose of the battery on a recycle point in your area. Do not swallow/eat the battery.

Technical data

Maximum thermometer Flex Temp	
Waterproof / last measurement memory	
Measuring range:	32 °C – 43,9°C
Accuracy:	± 0.1 °C (34---42° C)
Ambient temperature during use:	18 °C – 28°C
Storage temperature:	-10 °C – 60 °C
Ambient Relative Humidity during use:	30 – 85 %
During storage:	10 – 95 %
Display:	3 digit LCD
Battery:	1,55 V
Battery life:	approx. 200 hours

Internally powered equipment type BF 

Cleaning
For home use OMRON recommends to clean the device with damp cloth or wash with water or alcohol.

Cleaning substance	Manufacturer	Waterbased solution	Method
Isopropyl alcohol 70%		95,0 %	Max. 24 hours soaking
Gigasept FF	Schilke & Mayr GmbH	5,0 %	Max. 24 hours soaking
Lysoforim 3000	Rosemann GmbH	6,0 %	Max. 24 hours soaking
Aseptisol	Bode Chemie	4,0 %	Max. 24 hours soaking

Please note!
- Any solution, dilution or cleaning method other than described may cause the device to malfunction.
- Avoid bending the probe tip more than 45°
- Do not boil the thermometer
- Complies to ASTM, prEN 12470-3 (1997)
- Check a ccuracy every 2 years

Disposal of this product and used batteries must be carried out in accordance with the national regulations for the disposal of electrictonic products. 

This product is guaranteed by OMRON for 2 years after date of purchase. The guarantee does not cover battery or packaging. The guarantee also does not cover damages of any kind including physical caused accidentally or from misuse. The claimed product will be replaced only when returned together with the original invoice/cash ticket.

Manufacturer:
OMRON Healthcare Europe BV
Wegalaan 5
NL-2132 JD oofddorp
The Netherlands

This product complies to the EC Directiv (93/42/EEC) MDD.

CE 0197

A & D UA-704

Technical Specifications

Dimensions	3.9" (l) x 1.2" (w) x 2.0" (h) (100mm x 31mm x 51mm)
Weight	2.6 oz. (73g) without batteries
Display	Digital: 10mm character height. Pressure and pulse displayed alternately
Pressurization	Manual, by inflator bulb
Deflation	Hand-held push button
Type	Oscillometric
Accuracy	Pressure: ±3mmHg or 2%, whichever is greater/Pulse: ±5%
Pressure Range	20mmHg to 280mmHg/Pulse: 40 to 200 pulses/minute
Power Source	One type AA alkaline batteries (1.5 volt). Battery included.
Battery Life	Approx. 2,000 measurements
Operating Environ.	50°F to 104°F (10°C to 40°C)
Storage Environ.	14°F to 140°F (-10°C to 60°C)

Blood pressure measurements determined with this device are equivalent to those obtained by a trained observer using the cuff/stethoscope auscultation method within the limits prescribed by the American National Standards Institute (ANSI/AAMI SP10) for electronic sphygmomanometers. Manufactured by an ISO 9000 and ISO 13485 registered company. Engineered in Japan. Made in China.

A & D UA-767

Technical Specifications

Display	Digital: 16mm character height Pressure and pulse displayed simultaneously
Pressurization	Automatic, using micropump
Deflation	Automatic exhaust
Type	Oscillometric
Accuracy	Pressure: ±3mmHg or 2%, whichever is greater/Pulse: ±5%
Pressure Range	20mmHg to 280mmHg/Pulse: 40 to 200 pulses/minute
Power Source	Four type AA alkaline batteries (1.5 volt). Batteries not included.
Battery Life	Approx. four months with one daily measurement
Operating Environ.	50°F to 104°F (10°C to 40°C)
Storage Environ.	14°F to 140°F (-10°C to 60°C)

Blood pressure measurements determined with this device are equivalent to those obtained by a trained observer using the cuff/stethoscope auscultation method within the limits prescribed by the American National Standards Institute (ANSI/AAMI SP10) for electronic sphygmomanometers. Manufactured by an ISO 9000 and ISO 13485 registered company. Engineered in Japan. Made in China.

A & D UA-774

Technical Specifications

Dimensions	4.3" (l) x 5.8" (w) x 2.5" (h) (110 mm x 147 mm x 64 mm)
Weight	10.6 oz. (300 g) without batteries
Display	Digital character height: 16 mm (blood pressure), 10 mm (pulse rate) Pressure and pulse displayed simultaneously
Memory	60 readings (30 for each start button)
Pressurization	Automatic, using micropump
Deflation	Automatic exhaust
Type	Oscillometric
Accuracy	Pressure: ±3 mmHg or ±2%, whichever is greater; Pulse: ±5%
Pressure Range	20 mmHg to 280 mmHg; Pulse: 40 to 200 pulses/minute
Power Source	Four type AA alkaline batteries (1.5 volt) or AC Power Adapter (TB:181). Batteries not included.
Battery Life	Approx. six months with one daily measurement
Operating Environ.	50° to 104° F (10° to 40° C)
Storage Environ.	14° to 140° F (-10° to 60° C)

Blood pressure measurements determined with this device are equivalent to those obtained by a trained observer using the cuff/stethoscope auscultation method within the limits prescribed by the American National Standards Institute (ANSI/AAMI SP10) for electronic sphygmomanometers. Manufactured by an ISO 9000 and ISO 13485 registered company. Engineered in Japan. Made in China.

A & D UA-787AC

Technical Specifications

Dimensions	4.4" (l) x 6.4" (w) x 2.4" (h) (112 mm x 163 mm x 62 mm)
Weight	12.3 oz. (350 g) without batteries
Display	Digital: 20 mm character height Pressure and pulse displayed simultaneously
Date/Time	12 hour format (AM/PM), year (2003-2052), month, and day with automatic adjustment for leap years
Memory	30 readings
Pressurization	Automatic, using micropump
Deflation	Active exhaust valve
Type	Oscillometric
Accuracy	Pressure: ±3 mmHg or ±2%, whichever is greater; Pulse: ±5%
Pressure Range	20 mmHg to 280 mmHg; Pulse: 40 to 200 pulses/minute
Power Source	120V AC adapter (model TB:181A) or four type AA alkaline batteries (1.5 volt). Batteries not included.
Battery Life	Approx. four months with one daily measurement
Operating Environ.	50° to 104° F (10° to 40° C)
Storage Environ.	14° to 140° F (-10° to 60° C)

Blood pressure measurements determined with this device are equivalent to those obtained by a trained observer using the cuff/stethoscope auscultation method within the limits prescribed by the American National Standards Institute (ANSI/AAMI SP10) for electronic sphygmomanometers. Manufactured by an ISO 9001 and ISO 13485 registered company. Engineered in Japan. Made in China.

OMRON T5

SPECIFICATIONS

Model:	**T5**
Display:	LCD Digital Display
Measurement Range:	Pressure: 0 mmHg to 280 mmHg Pulse: 40 to 180 beats/minute
Accuracy/Calibration:	Pressure: ±4 mmHg Pulse: ±5% of reading
Inflation:	Fuzzy-logic controlled by electric pump
Deflation:	Active electronic control valve
Rapid Pressure Release:	Automatic pressure release valve
Pressure Detection:	Capacitive pressure sensor
Measurement Method:	Oscillometric method
Pulse Wave Detection:	Capacitive pressure sensor
Power Source:	4 Alkaline batteries 1.5 V (Type LR6)
Battery Life:	Approximately 300 uses
Operating Temperature/Humidity:	10°C to 40°C 30 to 85% RH maximum
Storage Temperature/Humidity:	–20°C to 60°C 10 to 95% RH maximum
Main Unit Weight:	Approximately (350g) not including batteries
Main Unit Dimensions: Cuff Dimensions:	Approximately 109 mm (l) x 170 mm (w) x 66 mm (h) Approximately 140 mm x 480 mm
Cuff Circumference:	Fit arm circumference 22 cm to 32 cm
Accessories:	Arm cuff (standard size), carrying case, instruction manual

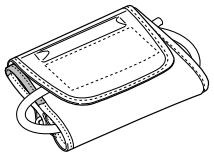
NOTE: These specifications are subject to change without notice.

Options

Standard arm cuff for adult
* For arm circumferences of 22 to 32 cm (at the center of brachium)

Arm cuff for slender arm
* For arm circumferences of 17 to 22 cm (at the center of brachium)

Arm cuff for large arm
* For arm circumferences of 32 to 38 cm (at the center of brachium)



The optional arm cuff is not equipped with an air plug. Please do not discard the air plug and retain for use with the new arm cuff.

OMRON T9

SPECIFICATIONS

MAIN UNIT:

Model:	**T9P**
Display:	LCD Digital Display
Measurement Range:	Pressure: 0 to 299 mmHg Pulse: 40 to 180/minute
Accuracy/Calibration:	Pressure: ±4 mmHg Pulse: ±5% of reading
Inflation:	Automatic by electric pump
Deflation:	Active electronic control valve
Rapid Pressure Release:	Active electronic control valve
Pressure Detection:	Capacitive pressure sensor
Measurement Method:	Oscillometric method
Pulse Wave Detection:	Capacitive pressure sensor
Power Source:	4 "AA" batteries or optional AC adapter
Battery Life:	Approximately 300 uses
Operating Temperatures/Humidity:	10°C to 40°C 30 to 85% RH maximum
Storage Temperatures/Humidity:	–20°C to 60°C 10 to 95% RH maximum
Main Unit Weight:	Approximately 380 g not including batteries
Main Unit Dimensions:	Approximately 115 mm (l) x 177 mm (w) x 71 mm (h)
Cuff Dimensions:	Approximately 140 mm x 480 mm
Cuff Circumference:	Fits arm circumference 22 ~ 32 cm
Accessories:	Arm cuff, printer-unit, paper rolls (2), instruction manual

PRINTER UNIT:

Power Source:	4 “AA” batteries
Battery Life:	Approximately 300 uses (current data)
Paper Usage:	Approximately 200 uses for 1 roll (current data)
Printer Weight:	Approximately 170 g (not including batteries)
Printer Dimensions:	Approximately 123 mm x 72 mm x 50 mm

NOTE: These specifications are subject to change without notice.
*Optional accessories: large cuff (fits arms 32 to 38 cm circumference) and small cuff (fits arms 17 to 22 cm circumference) are sold separately.

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