Eleven
Recommendations for Improving Medical Waste Management

Provided to the Technical Working Group of the Basel Convention
by the **Basel Action Network (BAN)**
April 12-14, 1999

These basic recommendations are meant simply as guidelines to stimulate better and more specific planning and action programs at the municipal government level and then at the level of individual health care facilities. They are based on observations made by Hollie Shaner, R.N. and Glenn McRae of CGH Environmental Strategies, Inc. of Burlington, Vermont, USA in their work both in the U.S. and their experiences in applying that work in other countries including India, New Zealand and Caribbean Island nations.

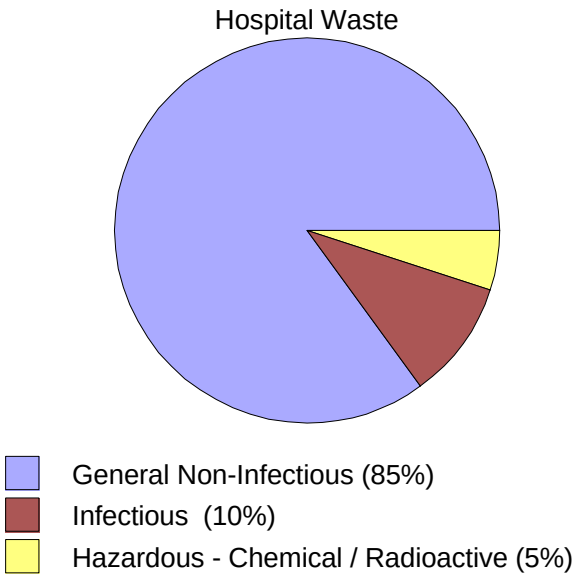
(1) CLEARLY DEFINE THE PROBLEM

Before any clear improvement can be made in medical waste management, consistent and scientifically based definitions must be established as to what is meant by medical waste and its components, and what the goals are for how it is managed. If the primary goal of "managing" waste from medical facilities is to prevent the accidental spread of disease, then it must first be acknowledged that there is only a small percentage of the waste stream that is contaminated in a manner that renders it capable of transmitting disease, and that the only documented transmission of disease from medical waste has been from contaminated sharps (syringes, etc.). In the United States we differentiate the waste stream from medical facilities in three major categories:

(A) Hospital Waste - all waste generated from a facility (including cafeteria, office, and construction wastes)

(B) Medical Waste (A subset of hospital waste) - waste generated as a result of patient diagnosis, treatment, or immunization of human beings or animals

(C) Potentially Infectious Waste (A subset of medical waste) - that portion of medical waste that has the potential to transmit an infectious disease.



It is category "C" that a medical waste management scheme must address first. The American Hospital Association (Robert Fenwick, 5/91) indicates that this category of waste should not be any more than 15% of the total hospital waste stream, and a number of U.S. hospitals who have implemented good segregation programs have reduced this portion of their waste stream to less than 8%.

Based on observations at a number of health care facilities in non-US countries we believe that the average hospital waste stream contains less than 10% of materials that could be considered "potentially infectious waste" if properly segregated.

We support the efforts of the governments and professional associations around the world to create clear definitions and standards in this area, and recommend the following resources as a base line in this effort:

- World Health Organization publication "*Managing Medical Wastes in Developing Countries*" (WHO/PEP/RUD/94.1), edited by Dr. Adrian Coad.

- Society for Hospital Epidemiology of America Position Paper on "*Medical Waste*" by Drs. William A. Rutala (Division of Infectious Diseases, University of North Carolina Hospitals, Chapel Hill) and C. Glen Mayhall (Division of Infectious Diseases, University of Tennessee Medical Center, Memphis), published in "The Journal of Infection Control and Hospital Epidemiology, 1992: 13:38-48.

- Center for Disease Control, standards for management of infectious wastes, Atlanta, GA.

Establishing a clear definition of the type of waste that is seen to be a problem will allow for the development of a sound solution. If we utilize the definition proposed and documented above then the volume of waste that is identified as a problem is only 10% of the wastes being generated at Indian hospitals and health care facilities. The solutions to look for must address the 10% first, and not treat all waste generated at hospitals as the same.

(2) FOCUS ON SEGREGATION FIRST

The current waste management practice observed at many hospitals is that all wastes, potentially infectious, office, general, food, construction debris, and hazardous chemical materials are all mixed together as they are generated, collected, transported and finally disposed of. As a result of this failure to establish and follow segregation protocols and infrastructure, the waste leaving hospitals, as a whole is both potentially infectious and potentially hazardous (chemical). At greatest risk are the workers who handle the wastes (hospital workers, municipal workers and rag pickers). The risk to the general public is secondary and occurs in three ways: (1) accidental exposure from contact with wastes at municipal disposal bins; (2) exposure to chemical or biological contaminants in water; (3) exposure to chemical pollutants (e.g., mercury, dioxin) from incineration of the wastes.

No matter what final strategy for treatment and disposal of wastes is selected, it is critical that wastes are segregated (preferably at the point of generation) prior to treatment and disposal. This most important step must be taken to safeguard the occupational health of health care workers. Hospitals are currently burning wastes or dumping wastes in municipal bins which are transported to unsecured dumps. The wastes contain mercury and other heavy metals, chemical solvents and preservatives (e.g., formaldehyde) which are know carcinogens, and plastics (e.g., PVC) which when combusted produce dioxins and other pollutants which pose serious human health risks not only to workers but to the general public through food supplies.

Imposing segregation practices within hospitals to separate biological and chemical hazardous wastes (less than 10% of the waste stream) will result in a clean solid waste stream (90%) which can be easily, safely and cost-effectively managed through recycling, composting and landfilling the residues. This resulting waste stream has a high proportion of organic wastes (food) and recyclable wastes (paper, plastic, metal) and actually very little that is truly disposable, especially given the high percentage of reprocessing and reuse of materials which exists in many non-US

health care systems. Several hospitals in India have already set up segregation programs providing local examples of what is possible. If proper segregation is achieved through training, clear standards, and tough enforcement, then resources can be turned to the management of the small portion of the waste stream needing special treatment. This is not to minimize the need for resources to be allocated to assisting with segregation. Training, proper containers, signs, and protective gear for workers are all necessary components of this process to assure that segregation takes place and is maintained.

(3) INSTITUTE A SHARPS MANAGEMENT SYSTEM

Of the 10 percent or less portion of the waste stream that is potentially infectious or hazardous, the most immediate threat to human health (patients, workers, public) is the indiscriminate disposal of sharps (needles, syringes, lancets, and other invasive tools). Proper segregation of these materials in rigid, puncture proof containers which are then monitored for safe treatment and disposal is the highest priority for any health care institution. If proper sharps management were instituted in all health care facilities most of the risk of disease transmission from medical waste would be solved. This would include proper equipment and containers distributed everywhere that sharps are generated (needle cutters and needle boxes), a secure accounting and collection system for transporting the contaminated sharps for treatment and final disposal, and proper training of all hospital personnel on handling and management of sharps and personal protection.

(4) KEEP FOCUSED ON REDUCTION

Hospitals in the Third World generate significantly less volumes of waste than U.S. hospitals. In part this is a result of a decision to maintain a system that relies on reprocessing and reuse of materials. Establishing clear guidelines for product purchasing that emphasized waste reduction will keep waste management problems in focus. New emphasis needs to be put on waste reduction of hazardous materials. For example, hospital waste management would benefit from a policy of a phase out of mercury-based products and technologies. Digital and electronic technology is available to replace mercury-based diagnostic tools. This is a purchasing and investment decision. Since there is no capacity in most countries to safely manage mercury wastes, this reduction policy will make a serious contribution to cleaning up the hospital waste

stream. This is one example of reduction strategies which could be identified and implemented in all countries. Practicing pollution prevention is the most cost effective way of securing public health.

(5) ENSURE WORKER SAFETY THROUGH EDUCATION, TRAINING AND PROPER PERSONAL PROTECTIVE EQUIPMENT

Workers who handle hospital wastes are at greatest risk from exposure to the potentially infectious wastes and chemical hazardous wastes. This process starts with the clinical workers who generate the wastes without proper knowledge of the exposure risks or access to necessary protective gear, and includes the workers who collect and transport the wastes through the hospital, the staff who operates a hospital incinerator or who take the waste to municipal bins, the municipal workers who collect wastes at the municipal bins and transport it to city dumping sites, and the rag pickers, who represent the informal waste management sector, but play an important role in reducing the amount of waste destined for ultimate disposal. Whether rag pickers are considered as part of the formal system or not, they are integrally involved in waste management and their unique role and personal safety and health needs must be considered.

Proper education and training must be offered to all workers from doctors to ward boys, to laborers and rag pickers to ensure an understanding of the risks that wastes pose, how to protect themselves, and how to manage wastes (especially how to properly segregate). Education and training programs must be developed which speak to each population in a way that will best meet the needs and build understanding and change behavior in that population. There is no “one” way to educate all workers.

(6) PROVIDE SECURE COLLECTION AND TRANSPORTATION

If the benefits of segregation are to be realized then there must be secure internal and external collection and transportation systems for waste. If waste is segregated at the point of generation only to be mixed together by laborers as they collect it, or if a hospital has segregated its waste and secured it in separate containers for ultimate disposal only to have municipal workers mix it together upon a single collection, then the ultimate value is lost. While worker safety may have been enhanced, the ultimate cost to the environment and the general public is still the same.

In addition the very real concern of hospital administrators and municipal officials to prevent the reuse of medical devices, containers and equipment after disposal should be taken into account in any management scheme. One has only to walk by street vendors selling used latex gloves, or using cidex (a disinfectant regulated as a pesticide in the US) containers to hold water for making tea, to understand the risk that unsecured waste disposal systems have.
In addition, the practice of cleaning and reselling, syringes, needles, medicine vials and bottles, is not well documented but appears to have enough informal evidence to indicate that it is a serious concern. Items that could potentially be reused illegitimately must be either rendered unusable after their use (cutting needles, puncturing IV bags, etc.) or secured for legitimate recycling by a vendor or system that can be monitored for compliance.

(7) REQUIRE PLANS AND POLICIES

To ensure continuity and clarity in these management practices, health care institutions should develop clear plans and policies for the proper management and disposal of wastes. They need to be integrated into routine employee training, continuing education, and hospital management evaluation processes for systems and personnel. In the U.S. the Joint Commission for the Accreditation of Health Care Organizations has been developing a set of standards on the "Environment of Care" which includes plans and policies for the proper management of hazardous materials and workers' safety, without which a hospital cannot be accredited. The USEPA's new MACT rule now requires that hospitals develop waste management plans, a requirement that many states have had on the books for several years. Municipal governments or state governments could require waste management plans from all hospitals as a condition for operating.

(8) INVEST IN TRAINING AND EQUIPMENT FOR REPROCESSING OF SUPPLIES

The science of the reprocessing of equipment and materials for reuse in medical facilities is well established in India and should be supported. Professional health care associations should be urged to firmly support judicious reuse of materials, and should begin to set standards for reprocessing. Maintenance of this effort within hospitals will provide quality products and thwart efforts to increase reliance on disposables. Disposables are costly, increase waste generation, and

do not necessarily provide for decreases in infection rates in hospitals. A reprocessing industry must however be supported with investment in proper equipment and training so that it is carried on in a safe and efficient manner.

(9) INVEST IN ENVIRONMENTALLY SOUND & COST EFFECTIVE MEDICAL WASTE TREATMENT AND DISPOSAL TECHNOLOGIES

The rush to incinerate medical waste in countries around the world as an ultimate solution to a problem without definition is doing a great injustice to the community, the public health of its people, and the environment. Of the eleven recommendations that we are making, it is no accident in giving attention to treatment technologies as ninth. Without proper attention being paid to one through eight on this list, whatever decisions being made for treatment and disposal will be insufficient, if not counter productive. The mass incineration of hospital waste given current practices of waste disposal will not reduce risk to workers (this is where the greatest risk of disease transmission or chemical exposure exists) and will actually create a greater threat to the general public as mercury and other heavy metals are spewed out into the general air, or dioxins and furans are created from the combustion of plastics such as PVC which is growing in use in medical packaging. Additionally, the ash generated from incineration of medical waste is also tainted with heavy metals and other toxic residues. Lesser risks are associated with the treatment of unsegregated wastes through other treatment technologies such as autoclaving, hydroclaving, microwaving and chemical disinfection, which affect workers more than the general public, and contaminate water sources rather than air if improperly operated.

Choices of treatment technologies should be made in line with a clear knowledge of the waste stream to be managed and the goal to be achieved through treatment. If the technology is to be environmentally sound, the waste stream should be able to be treated (disinfected) without creating other hazardous by-products. Incineration may be an “overkill” technology. Its goal is sterilization, not disinfection. One has to ask the question as to whether sterilization is necessary, or if the goal is simply disinfection. Is achieving sterilization worth the cost of transferring the risk from a potentially “infectious” material to a clearly hazardous chemical one?

If the overall goal of waste management is to prevent disease transmission from waste products, then the emphasis should be placed on the “management” aspect of the process and not on the “technological fix” which time and again has proven to be an expensive diversion rather than an effective solution. Technology should fit the situation and work in the management system to achieve the final goal as part of the overall system, not as a replacement for the system.

Technology choices will be made to meet local needs and conditions and cannot be uniformly applied throughout a state or country. National standards for operating acceptable treatment technologies should be set, and there is no reason for any country to have standards any less stringent than those being modeled in the U.S. or Europe.

(10) DEVELOP AN INFRASTRUCTURE FOR THE SAFE DISPOSAL AND RECYCLING FOR HAZARDOUS MATERIALS

There was little or no observable capacity for the management, treatment, recycling or final disposal of hazardous wastes in most countries (e.g. chemicals, mercury, batteries). Hospitals seeking to segregate hazardous wastes are left with little or no option for safe disposal. The development of an industry which is capable of managing hazardous waste (chemicals) is essential. On-site reprocessing technology is available for hospitals for materials such as xylene or formalin, and recovery technology for silver from developing solution. These technologies may be cost prohibitive at this time. Pollution prevention and the choice of nonhazardous or less hazardous material is the only real option left to hospitals, which should be followed regardless of the existence of a hazardous waste industry.

The Hazardous Waste Stream

Specific waste streams that any hospital or health care facility must examine in its assessment and planning process include:

Hazardous Material	Point of Generation	Point of Use and Disposal	Common Disposal
Chemotherapy and antineoplastic chemicals	Prepared in central clinic or pharmacy	* Patient Care areas * Pharmacy * Special Clinics	* Incineration as RMW * Disposal as HW
Formaldehyde	*Pathology *Autopsy *Dialysis *Nursing Units	*Pathology *Autopsy *Dialysis *Nursing Units	Diluted and flushed down sanitary sewer
Photographic Chemicals	* Radiology * Satellite Clinics offering radiology services	* Radiology * Clinics offering radiology services	*Developer and Fixer is often flushed down sanitary sewer *X-ray film is disposed of as solid waste

Solvents	*Pathology *Histology *Engineering *Laboratories	*Pathology *Histology *Engineering *Laboratories	*Evaporation *Discharged to Sanitary sewer
Mercury	* Throughout all clinical areas in thermometers, blood pressure cuffs, cantor tubes, etc. *Labs	* Clinical areas * Labs	*Broken thermometers are often disposed in sharps containers *If no spill kits are available, mercury is often disposed of as RMW or SW * Often incinerated
Anesthetic Gases	* Operating Theater	* Operating Theater	*Waste gases are often direct vented by vacuum lines to the outside
Ethylene Oxide	*Central Sterile Re-processing *Respiratory Therapy	*Central Sterile Re-processing *Respiratory Therapy	*Vent exhaust gas to the outside
Radio nuclides	*Radiation Oncology	* Radiation Oncology	*Secure storage for time required for decay of nuclear elements (check with local authority for requirements)
Disinfecting Cleaning Solutions	Hospital-wide Environmental Services, Facilities Management, Operating Theater	*Diagnostic Areas * Operating Theater * Facilities Management	* Dilution, disposal in sewer
Maintenance: Waste Oil Cleaning solvents Leftover Paints Spent florescent lamps Degreasers Paint Thinner Gasoline	Maintenance	Maintenance	*Solid Waste *Sewer

As a result of a lack of waste segregation practices in most hospitals, many of these hazardous materials are flushed down a waste water drain that flows directly to an open sewer or river, are mixed into general solid waste for disposal in municipal bins or are mixed into wastes which are incinerated as potentially infectious waste. In either case they represent a serious health hazard to workers and the public. At this time even if they were segregated the lack of real alternatives to

properly dispose of them would mean that they would be stockpiled, potentially creating yet another threat.

(11) DEVELOP AN INFRASTRUCTURE FOR SAFE DISPOSAL FOR MUNICIPAL SOLID WASTE

Improper disposal of all wastes, municipal solid waste, hazardous wastes, industrial wastes, human wastes, etc. poses a major health hazard. The development of sanitary landfills, sewage treatment plants and other waste management facilities providing for the ultimate safe disposal of those wastes which cannot be otherwise recycled, composted or reused is necessary to securing public health in the country. Studies of the municipal waste stream in many countries such as Haiti or India conclude that approximately 50% of the wastes generated are organic and could be composted. Another large segment includes easily recyclable materials, leaving a relatively small portion requiring actual disposal. Just as in the discussion of medical waste management, proper segregation and pollution prevention, combined with a clear definition of the problem and the goal will provide the best, most environmentally safe and cost-effective solution to waste disposal. Also again, proposals for large mass burn incinerators for the general mixed waste stream, not only do not address the real problem but are burdened with numerous "side effects" which render their real value as a negative.

Health care facilities need to be able to tie into a municipal system of proper waste management to ensure that they are meeting their mission of providing for the public health. Until such an infrastructure exists there are numerous decisions and actions that any hospital can make (listed above) to begin the process of improving their waste management practices and ensuring public health and worker safety today.

For more information on environmentally responsible medical waste management, please contact the Health Care Without Harm(HCWH), the Multinationals Resource Center(MRC), the Basel Action Network (BAN) or Srishti at the addresses provided below. These groups are working together to help healthcare facilities, healthcare professionals and medical personnel. We can provide educational materials, refer experts, suggest speakers, and identify health care facilities willing to share their experience in becoming environmentally responsible.

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CGH Environmental Strategies, Inc. is considered the leading authority on environmentally sound waste management in health care facilities in the United States. The American Hospital Association has contracted with CGH to produce two manuals on waste management guidelines for hospitals, as well as special documents on managing mercury in health care settings, and on building integrated waste management systems when health care facilities merge. They have also authored numerous articles for journals and papers for conferences in the U.S. and abroad. CGH has provided services to hospitals and health care systems throughout the U.S., Canada, the Caribbean, New Zealand and India.

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