Eleven Recommendations for Improving Health Care Waste Management

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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 in the U.S. since 1990, and their experiences in applying that work in other countries including India, Thailand, The Philippines, South Africa, New Zealand, Argentina, El Salvador, Costa Rica, Cuba and Caribbean Island nations.

(1) CLEARLY DEFINE THE PROBLEM -

Before any clear improvement can be made in health care waste management, consistent and scientifically based definitions must be established for "healthcare waste," encompassing all its components, and what the goals are for how they are managed. If the primary goal of "managing" waste from health care 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 health care waste has been from contaminated sharps (syringes, etc.).[a] Additional goals (such as environmental protection and cost reduction) can be integrated and can compliment the first goal.

The wastes from healthcare facilities are differentiated into at least four major categories. There are additional sub-categories, but in general it can be viewed as:

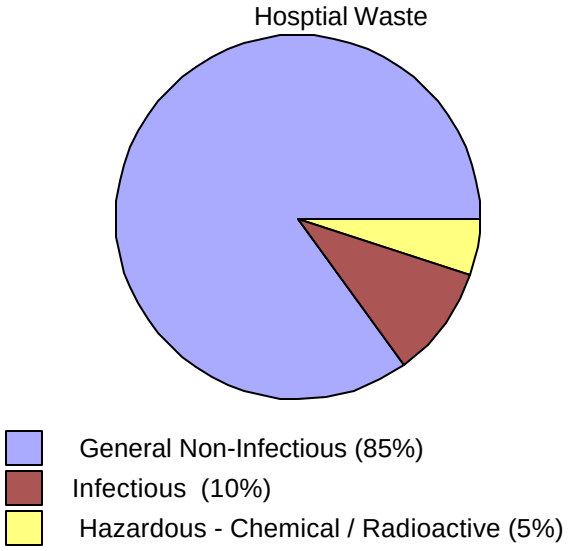
(A) General Solid Waste: This is the majority of all wastes found in health care facilities and is similar to wastes generated by other businesses and institutions (mostly paper), restaurants (organic wastes and packaging), hotels (general trash), warehouses (packaging), construction wastes and other wastes commonly found in the general municipal waste stream.

(B) Infectious Waste: The wastes generated in direct patient treatment or diagnosis that are suspected to contain pathogens (bacteria, viruses, parasites, or fungi) in sufficient concentration, quantity and virulence that they could cause disease in a susceptible host. This includes cultures and stocks from labs, blood, sharps, and pathological waste.

[a] NOTE: There has been one recorded case at an infectious waste treatment facility in the U.S.A. where a worker contracted airborne TB under poor working conditions.

(C) Hazardous Chemical Waste: Large numbers of hazardous chemicals are used in hospitals to disinfect, clean, operate equipment, treat and diagnosis disease. These range from genotoxic chemicals used in cancer treatment to oils and solvents used to operate boilers.

(D) Radioactive Waste: Used in treatment and diagnosis.



Healthcare waste management schemes usually first address infectious wastes (Category 'B' – displayed as red in chart). 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 have implemented good segregation programs that reduced this portion of the waste stream to less than 6%.

Based on observations at a number of health care facilities in non-US countries it is evident that the average hospital waste stream may contain less than 10% of materials that could be considered "potentially infectious waste" if properly segregated. Depending on local conditions and definitions, this could vary between 5-25%. We support the efforts of government agencies and professional associations, active in many countries, to create clear definitions and standards in this area, and recommend the following resources as a base line in this effort:

X World Health Organization publication *Safe management of wastes from health care* (Geneva, 1999),

X 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.

X 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. WHO suggests that this waste be limited to:

Infectious waste is suspected to contain pathogens (bacteria, viruses, parasites, or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. This category includes:
• Cultures and stocks of infectious agents from laboratory work;
• Sharps - items that could cause cuts or puncture wounds, including needles, hypodermic needles, scalpel and other blades, knives, infusion sets, saws, broken glass, and nails. Whether or not they are infected, such items are usually considered as highly hazardous health-care waste.
• Waste from surgery and autopsies on patients with infectious diseases (e.g. tissues, and materials or equipment that have been in contact with blood or other body fluids);
• Pathological waste consists of tissues, organs, body parts, human fetuses and animal carcasses, blood, and body fluids. Within this category, recognizable human or animal body parts are also called **anatomical waste**. This category should be considered as a subcategory of infectious waste, even though it may also include healthy body parts; • waste from infected patients in isolation wards (e.g. excreta, dressings from infected or surgical wounds, clothes heavily soiled with human blood or other body fluids);
• Waste that has been in contact with infected patients undergoing haemodialysis (e.g. dialysis equipment such as tubing and filters, disposable towels, gowns, aprons, gloves, and laboratory coats);
• Infected animals from laboratories;
• Any other instruments or materials that have been in contact with infected persons or animals.

If we utilize the definition proposed and documented above, and truly limit this category to those wastes that are really hazardous, then the volume of waste that is identified as a problem (potentially infectious) is only 10% of the wastes being generated at 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 practices 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 that 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 (usually less than 15% of the waste stream) will result in a clean solid waste stream (85%) 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 that exists in many health care systems. Excellent examples of hospital waste management systems focused on segregation exist in India, Costa Rica and Cuba, documenting that clear segregation efforts can be effective under many different sets of conditions.

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, 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 that 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 health care 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 Middle and Lower-Income countries generate significantly less volume of waste than U.S. hospitals. The excessive waste in U.S. hospitals comes mostly from the very heavy reliance on disposable instruments and materials, and increased packaging of all products used. These differences have not necessarily resulted in lower infection rates or better patient care and outcomes. In other countries economics has dictated the maintenance of 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.

A new and increased emphasis also needs to be put on waste reduction of hazardous materials. For example, hospital waste management would benefit from a policy to eliminate the use of mercury-containing 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 (including the USA) 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 a reduction strategy that 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, chemical hazardous wastes and materials, and radioactive wastes and materials. 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 incinerator emission rules 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 health care facilities is well established in many countries outside of the U.S.A. and Europe, 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 HEALTH CARE WASTE TREATMENT AND DISPOSAL TECHNOLOGIES -

The rush to incinerate health care 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 health care 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). It will actually create a greater threat to the general public as mercury and other heavy metals are spewed out into the general air of cities whose air quality is already compromised, or when dioxins and furans are created from the combustion of plastics such as PVC that is growing in use in medical packaging. Additionally the ash generated from incineration of health care 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 that 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.

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 health care 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.

KEY RESOURCES

-World Health Organization*: Healthcare Waste Management* – <*www.heathcarewaste.org* >

WHO has established an electronic reference library and database to house information on safe practices in managing wastes from healthcare. This includes guides to establishing a national action plan on healthcare waste management, and a note on wastes from immunization campaigns. There is a link to all WHO regional offices and the person who is in charge of healthcare waste management. The Electronic version of the WHO guide, ***Safe Management of Wastes from Healthcare Activities****, is also accessible here.*

This resource is in development, but will house a database of good practices and guidelines. It is also a central link to other institutions and programs working on this issue.

-World Bank - *Strategic Planning Guide for Municipal Solid Waste Management*

(A product of the Collaborative Working Group on Municipal Solid Waste Management by Environmental Resources Management (ERM)) This resource is in the form of a CDRom available from the InfoShop <www.worldbank.org>. It provides a decision-maker's guide and a series of linked files and publications. It is an essential resource for understanding the interface between healthcare facility waste management systems and municipal waste management systems.

- Health Care Without Harm - Treatment Technology: *Non-Incineration Medical Waste Treatment Technologies*

A Resource for Hospital Administrators, Facility Managers, Health Care Professionals, Environmental Advocates, and Community Members August 2001
http://www.noharm.org/library/docs/Non-Incineration_Medical_Waste_Treatment_Te_2.pdf

-Sustainable Hospitals Project - *Procurement: Environmentally Preferable Purchasing*

The Sustainable Hospitals Project at the University of Massachusetts -Lowell provides a web-based resource on "green" procurement of supplies and equipment for health care. It also offers a research service to respond to specific questions. www.sustainablehospitals.org

CleanMed is an international conference on green procurement and practices in healthcare (currently US based but after 2002 should have joint conferences in Europe and other countries). At the website, conference proceedings, information on exhibitors and other events can be accessed. www.cleanmed.org.

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, The Philippines, Thailand, Southern Africa, Central and South America and India.

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