INTERNATIONAL SOCIETY FOR INFECTIOUS DISEASES

GUIDE TO INFECTION CONTROL IN THE HEALTHCARE SETTING

Waste Management

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Topic Outline

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KEY ISSUES

Waste materials are generated in the healthcare setting. They require special procedures for collection, storage, transport, and disposal in efforts to prevent complications related to direct exposure of these waste products. The key step in waste management is to distinguish between infectious and noninfectious waste. Infectious waste has the potential to transmit disease and should be collected, transferred, and disposed of in a manner that decreases the risk of injury to healthcare workers, waste management workers, patients, and the community.

KNOWN FACTS

- There are many materials/equipment used in hospitals for the diagnosis and treatment of patients. These materials have come in contact with blood, bodily fluids, and tissue of patients and these substances may contain infectious microorganisms. These materials have the potential to transmit disease and thus require proper management and disposal following use. Prior to disposal, these materials need to be classified into infectious and noninfectious waste.
- The definition of infectious waste is not concrete or universal; however, the general idea is that infectious waste is medical waste that may contain microorganisms that have the potential to cause disease. There are many factors which facilitate the progression of an infectious exposure to an infectious disease. These factors include the size of the inoculum, the virulence of the microorganism, and the susceptibility of the person in contact with the infectious waste. Currently, there is no method to determine the risk of disease, as these factors are usually unknown prior to exposure. This limitation and the ambiguous definition of infectious waste, highlight the need to correctly identify infectious

waste from noninfectious waste to decrease the risk of disease transmission. Strict protocols should be in place to ensure compliance with optimal waste handling.

- Exposure to infectious wastes can occur in many settings, including outpatient/clinic settings; however, the majority of accidents and exposures to infectious waste occur in the hospital setting. The waste products from sharps (e.g. needles, vials, surgical equipment) and cultures concentrated with microorganisms have the highest potential for disease transmission; however, disease transmission has also resulted from exposure to blood, bodily fluids, tissue from infected patients or laboratory animals, and material from microbiology and pathology laboratories.

Controversial Issues

There are no set protocols or strict criteria to determine which type of medical waste has the potential to cause disease in susceptible hosts. However, there are categories of medical waste that have a greater potential for transmitting disease. Three questions should be considered when deciding if medical waste has the potential to contain microorganisms capable of transmitting disease. An infection control practitioner should be consulted for questions and guidance.

1. *Does the medical waste contain blood, body fluids, or tissue with pathogenic microorganisms in sufficient quantity to produce disease?*
    - Patients with known infections are likely to generate waste containing a large amount of microorganisms. The supersaturated gauze covering a draining wound, the sputum of a patient with known TB, the syringe used on a patient with known HIV or viral hepatitis, a diaper with the stool of a baby admitted with diarrhea, are all examples of infectious waste with

the potential to transmit disease. All blood and body fluids, body organs, and microbiology laboratory specimens should be considered infectious waste regardless of the patient's diagnosis.

2. *Does the waste contain viable and pathogenic microorganisms?*
    - Clinical microbiology laboratories handle a large number of microorganisms daily. These organisms are cultured from blood, sputum, stool, and other body fluids and should therefore be treated as infectious while in the laboratory and once disposed of. Infectious waste in the clinical microbiologic laboratory also includes material used for isolation and identification of the microorganisms (e.g. slides, pipettes, and tubes).
    - Consideration should also be made outside of the microbiology laboratory pertaining to blood and body fluid samples sent for general evaluation such as the clinical chemistry laboratory. These samples should also be considered infectious waste given their potential to contain pathogenic organisms.
3. *Can the waste create a portal of entry for pathogenic organisms into a susceptible host?*
    - Sharps are the single most frequent cause of occupationally acquired bloodborne disease in healthcare workers and should always be considered infectious waste. Sharps include needles, scalpel blades or other sharp instruments, IV catheters, broken glass (vials), and razor blades (no longer used for trimming hair given significant risk for infection). The health status of a patient is not always readily available; therefore, sharps containing blood should be classified as infectious because they provide a portal of entry for microorganisms.
    - Sharps that do not contain blood (e.g., broken glass) are still dangerous because they may cause puncture injuries to

healthcare workers and waste management workers, which can produce a portal of entry for pathogenic microorganisms.

SUGGESTED PRACTICE

- The key step in waste management is to distinguish between infectious and non-infectious waste. The definition and regulation of “infectious waste” varies by state/country. Each hospital should develop written procedures for waste management on the basis of national and regional regulations, the prevalence of infectious diseases that can potentially contaminate medical waste, and the local infrastructure for processing infectious waste. Hospital staff should receive training for correctly segregating all medical waste and regulation of the written procedure must be strictly enforced.
- In a waste management program, biologic waste should first be separated from non-biologic waste (paper, glass, plastic). Biologic waste should then be separated into infectious and non-infectious waste. Non-infectious waste can be collected in regular black bags and treated as residential waste.
- Sharp infectious waste must be placed in rigid, puncture proof, and impermeable containers that bear the universal biologic hazard symbol and should be removed from use and discarded when the container is ¾ full. Incineration is the preferred treatment method for sharps as it eliminates microorganisms and any possibility of puncture wounds. Other methods for treatment of infectious waste include steam sterilization and chemical treatment.
- Non-sharp infectious waste should be collected in leak-resistant biohazard bags and sent for incineration. Alternatively, it can be decontaminated on-site and subsequently discarded as non-infectious waste. On-site decontamination of microbiology laboratory waste is preferred, as this reduces the potential of exposure during the handling

and transportation of infectious materials. Identification of live cultures and stocks should be made in efforts to avoid aerosolization of infectious microorganisms.

- Disposal equipment, including sharps containers, garbage bags, and bins, should be readily available and easily accessible throughout all patient areas. Infectious waste should be transported within the hospital in wheeled trolleys or carts through specially designed routes and at low volume times of the day. These routes should avoid patient care areas as well as areas where food is prepared, stored, or transported, whenever possible.
- Infectious waste should be treated soon after discarding. If transport for off-site incineration is required, it should be temporarily stored in a secure and completely closed storage room.

SUGGESTED PRACTICE IN UNDER-RESOURCED SETTINGS:

- Two international agreements and four principles guide safe healthcare waste management. The agreements include the Basel Convention, which dictates “environmentally sound management” of waste, and the Stockholm Convention on Persistent Organic Pollutants that focuses on human protection against persistent organic pollutants. The four principles include duty of care principle, polluter pays principle, precautionary principle, and proximity principle. These stipulate that waste must be treated as unsafe until proven otherwise, should be managed and paid for by the generating facility, and treated and disposed of as close to the source as possible. These should form the framework for waste management programs and be incorporated into national legislation as well as guidelines at the healthcare facility level.
- An in depth analysis of healthcare facilities and waste management processes must be the first step in devising future policies. Political support is crucial and ideally, an official body empowered to enforce laws and regulations should monitor adherence to the regulatory

framework outlined above. A waste management policy must clearly outline the definitions of types of wastes; descriptions of associated risks; approved methods for waste management; warning against unsafe practices; assessment of costs; steps for minimization, separation, handling, transport, treatment, and disposal of waste; technical specifications; training requirements; and processes for recordkeeping and documentation. In the absence of a national commitment to improving healthcare waste management, these steps should be outlined by the individual facilities.

- As for healthcare waste in developed countries, it must first be divided into waste sharps, infectious and cytotoxic wastes, and organic wastes (blood and body fluids, human anatomical wastes, etc.). These may be treated on-site or off-site to reach a safe level of infectiousness followed by incineration or disposal in sanitary landfills. On-site treatment may be the only option for facilities in rural areas. Off-site treatment is preferred when centralized regional facilities exist. This requires dedicated personnel, monetary funds, and leadership commitment. For healthcare facilities in developing countries with limited access to safer healthcare waste management options, incineration may be an acceptable waste-disposal strategy if used appropriately. Incinerators must be constructed using appropriate dimensional plans, be operated by trained individuals, stationed away from populated areas, and effectively reduce and segregate waste materials. A good engineering design and periodic maintenance are key to effective operation.
- Staff members handling waste must be offered vaccination against tetanus and hepatitis B. They must be encouraged to use appropriate personal protective equipment including heavy-duty gloves for waste handling and industrial boots and aprons for handling containers.
- To be effective, a healthcare waste management policy must be applied carefully, consistently, and universally. Training staff members is crucial to successfully implement and upgrade waste management programs. This should focus on health awareness, safety, and environmental

issues and not only be directed at waste management staff but also hospital administration, medical doctors, nurses, ancillary, and housekeeping staff. Refresher courses should be offered at regular intervals to maximize the impact of management programs.

SUMMARY

Although the risk of acquiring disease from many infectious wastes is relatively low, the consequences can be significant when disease transmission does occur. As a result, all hospitals need to develop a waste management program. The program should be jointly designed and coordinated by the infection control department, the hospital engineering staff, and municipal authorities. Medical waste should be classified as infectious when it contains a sufficient quantity of pathogenic microorganisms to produce disease and there is the potential for disease transmission to a susceptible host.

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