

INFECTIOUS WASTE DISPOSAL IN DEVELOPING COUNTRIES: RECOMMENDED MINIMAL PRACTICES FROM A HOSPITAL SURVEY IN SOUTHEAST ASIA

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ABSTRACT

When managed ineffectively, infectious hospital wastes in developing countries can compromise the quality of patient care and create significant occupational, public, and environmental health risks. Three types of hospital facilities in a developing country were studied to assess waste separation, transport, treatment, and disposal practices. The staff of a municipal General Hospital (1,650 beds) did not appropriately separate wastes and disposed of untreated solid wastes by surface dumping near the hospital grounds, pending municipal collection and disposal in an unsecured landfill. While personnel of a rural Divisional Hospital (150 beds) did not effectively separate sharps from other forms of medical waste, they disposed of all solid wastes on hospital grounds in a secured ground pit, followed by burning and soil cover. Workers at a rural Township Hospital (25 beds) separated wastes and disposed of them by; (i) burning general and most medical wastes in a ground pit, (ii) using a separate pit with metal cover and delivery tube to burn needle and other sharps, and (iii) incinerating all forms of paper wastes.

While no hospital had a written waste management policy or provided waste management training to employees, the smaller, rural hospitals accomplished effective waste disposal using no- to low-cost minimal practices. Furthermore, their procedures prevented scavenging and reduced risks for environmental pollution, as well as the transmission of common and emerging infectious disease agents. In addition to promoting effective minimal treatment and disposal practices, as in ground pits, when no other options are available, recommendations for developing countries include; (i) a written waste management policy, (ii) separation of sharps from other forms of medical waste, (iii) development of safe storage and transport procedures, and (iv) providing training and protective equipment to those who work directly with hospital waste.

HOSPITAL FIELD SURVEY

In response to a request from a national government in southeast Asia, the World Health Organization (WHO), South-East Asia Regional Office, New Delhi, funded a two week field survey to identify inadequacies of the country's current systems of infectious and other hazardous hospital waste disposal and provide recommendations for effective no- to low-cost management practices. The survey team first discussed hospital waste management issues with WHO representatives and key national government officials, and then visited three types of hospitals, i.e., a city General Hospital (1,650 beds), a rural Divisional Hospital (150 beds), and a rural Township Hospital (25 beds). Waste practices were observed at each facility with the assistance of its management personnel. All waste procedures from generation through separation, storage, transport, treatment, and disposal were evaluated. Written policies, worker training and protection, as well as the overall waste management needs of each facility were discussed with hospital management.

There were important differences in waste segregation, treatment, and disposal practices among the hospitals inspected. Both the on-site visits and meetings with officials demonstrated that more effective hospital waste management was desired, and that waste management practices could be improved within all types of hospitals.

FINDINGS

General Hospital

The General Hospital (1,650 beds) located in the nation's capital city, had poor waste separation practices which, when combined with its procedure of surface dumping of all infectious wastes, created significant occupational, public, and environmental health risks. In particular, needles and other sharps were not separated from the waste stream, chemicals were discharged into a drain line on hospital grounds, and transport of wastes throughout the hospital was done manually. Waste

disposal consisted of surface dumping of untreated wastes adjacent to hospital grounds, followed by municipal collection and landfill deposition. This created a substantial public health risk from scavenging, as well as a major occupational health risk for city workers responsible for collecting the loose, scattered, and potentially hazardous wastes.

Divisional Hospital

This 150-bed rural hospital used minimal treatment and disposal practices consisting of:

- A secured, fenced area to prevent scavenging; and
- A ground pit for burning all general and infectious wastes (Figure 1).

There was, however, no plan for proper treatment and disposal of infectious wastes during the rainy season when the pits are flooded. As with the General Hospital, chemical wastes were discharged into a surface drain line onto the hospital grounds.

Township Hospital

This 25-bed rural hospital utilized an impressive system of minimal treatment and disposal practices consisting of:

- A ground pit for burning all infectious and most general wastes;
- A separate ground pit with metal cover and delivery tube for sharps disposal (Figure 2);
- A small, single-chamber incinerator for paper wastes (Figure 3); and
- A secured, fenced area to prevent scavenging.

As with the 150-bed hospital, this hospital also had problems with its waste treatment and disposal during the rainy season.

SUMMARY

None of the hospitals had a written waste management policy or plan, or provided waste management training for employees. In general, some personal protective equipment, such as gloves, were provided to workers who directly handled the wastes, but typically the employees were not immunized with the hepatitis B vaccine. Furthermore, none of the hospitals had a coding system for waste receptacles to permit staff to easily identify and separate hazardous hospital wastes.

The rural hospitals did, however, implement acceptable, low-cost, minimal practices for infectious waste treatment and/or disposal. Administrators were eager to receive guidance on how

to more effectively manage hazardous hospital wastes, particularly during the problematic rainy season.

MINIMAL PRACTICES RECOMMENDATIONS

1. All hospitals in developing countries should work to minimize waste-related transmission of infectious disease agents through implementation of no- to low-cost minimal effective practices for infectious waste treatment and disposal.
2. All hospitals should have a written policy on the management of infectious wastes and provide training for workers responsible for waste handling.
3. Needles and other sharps must be separated from other types of waste. This would enhance the protection of those who collect, transport, treat, and dispose of wastes. Needles should not be re-capped, but deposited directly into dedicated, puncture-proof containers. Used and empty plastic or glass bottles can provide low-cost solutions. A color-coding or similar system to assist workers in separating and identifying wastes is strongly encouraged.
4. The transport of infectious waste containers throughout a hospital should never be done manually, but only by means of covered carts or similar conveyances. This minimizes direct contact with a worker's body and prevents any leaking wastes from spreading contamination.
5. Chemical wastes should not be discharged onto hospital grounds but stored in leak-proof containers that are returned to the supplier for disposal or to a private contractor for reprocessing/recovery or otherwise dealt with as per acceptable disposal practices, in accordance with environmental regulations.
6. Hospitals should strive to ensure that infectious solid wastes receive treatment to reduce the threat to public health and safety. Such wastes should not be permitted to be deposited untreated in a landfill or other surface-dumping site. A steam autoclave, if available, may be used to effectively treat non-chemical types of infectious wastes prior to final disposal. Hospitals should work to procure an autoclave or alternative treatment system.
7. In the absence of infectious waste treatment by steam autoclaving or alternative technology, facilities are encouraged to use single-chamber incinerators, drum incinerators (Figure 4), or pit burning with burial of the resulting ash, as minimal treatment and disposal practices.
8. Wastes awaiting treatment should be stored in

FIGURE 1
Ground pit for burning infectious and general hospital wastes.

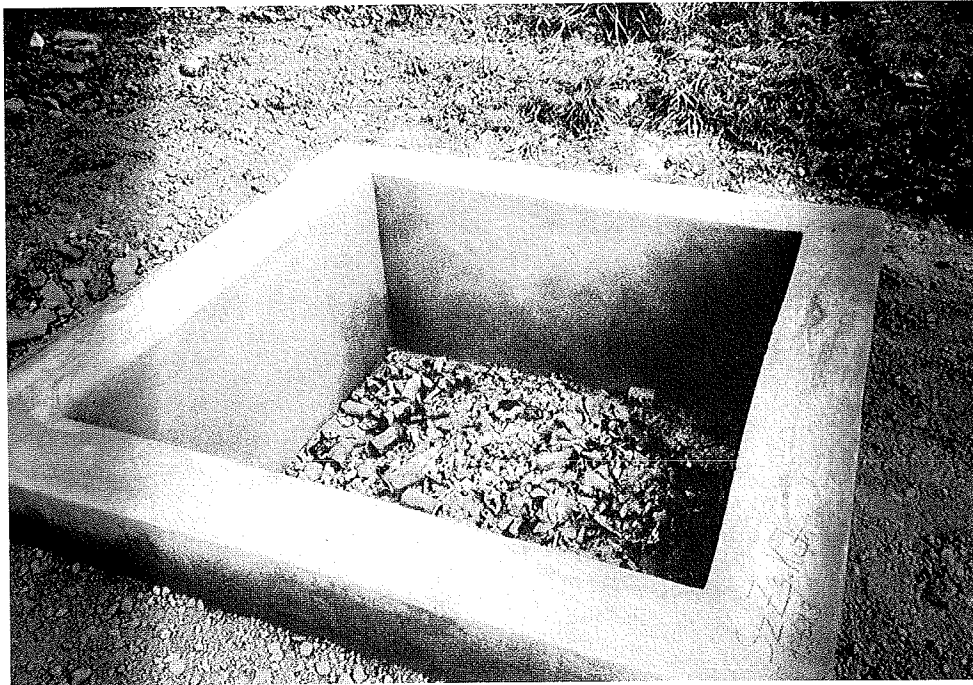
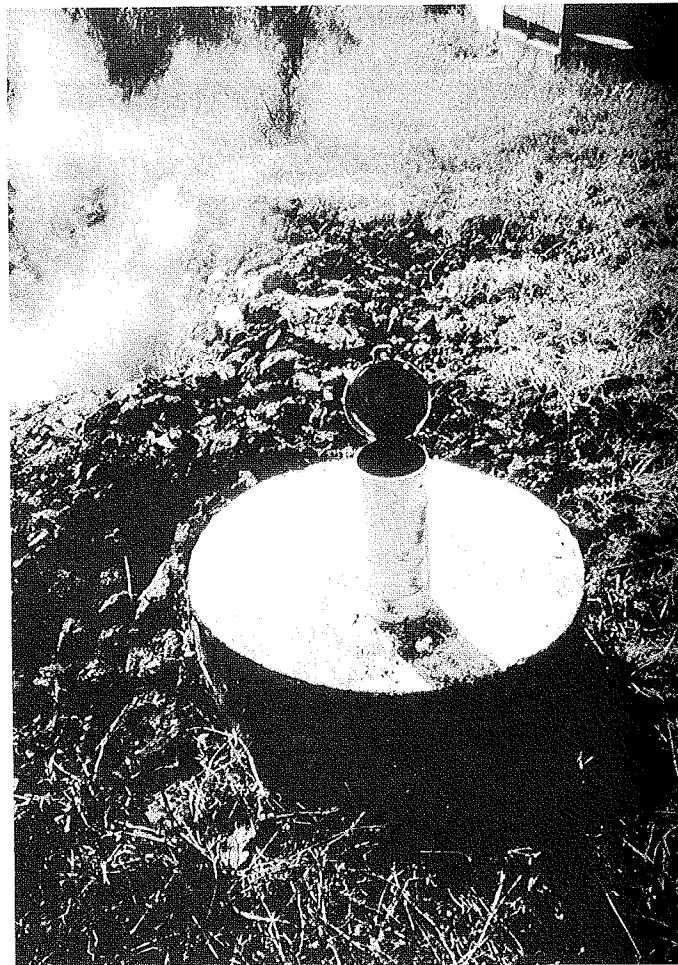


FIGURE 2
In-ground sharps disposal system.



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FIGURE 3
Single-chamber incinerator.

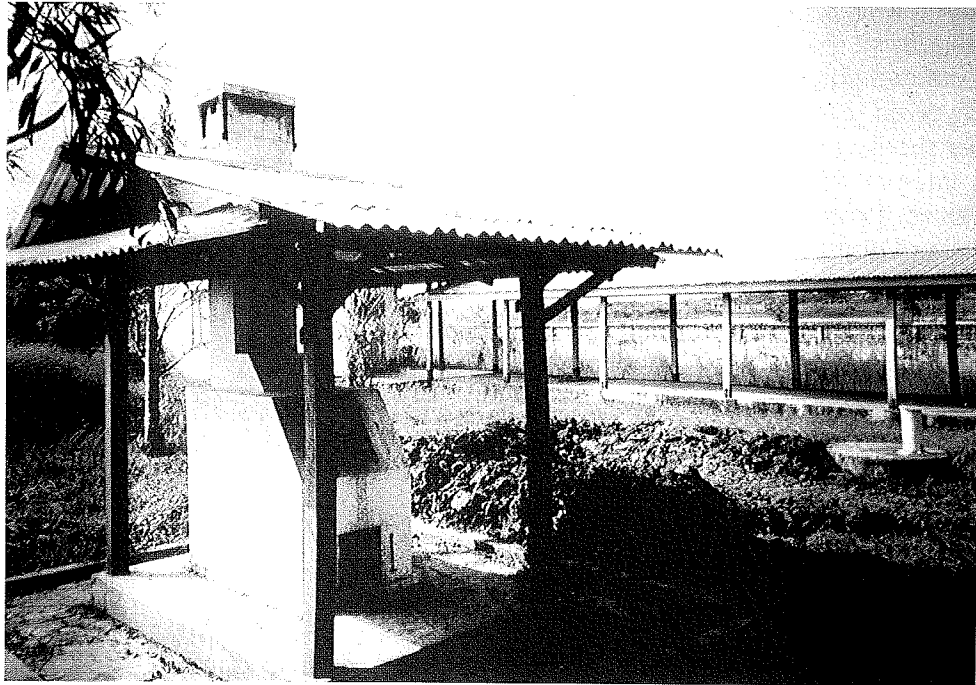
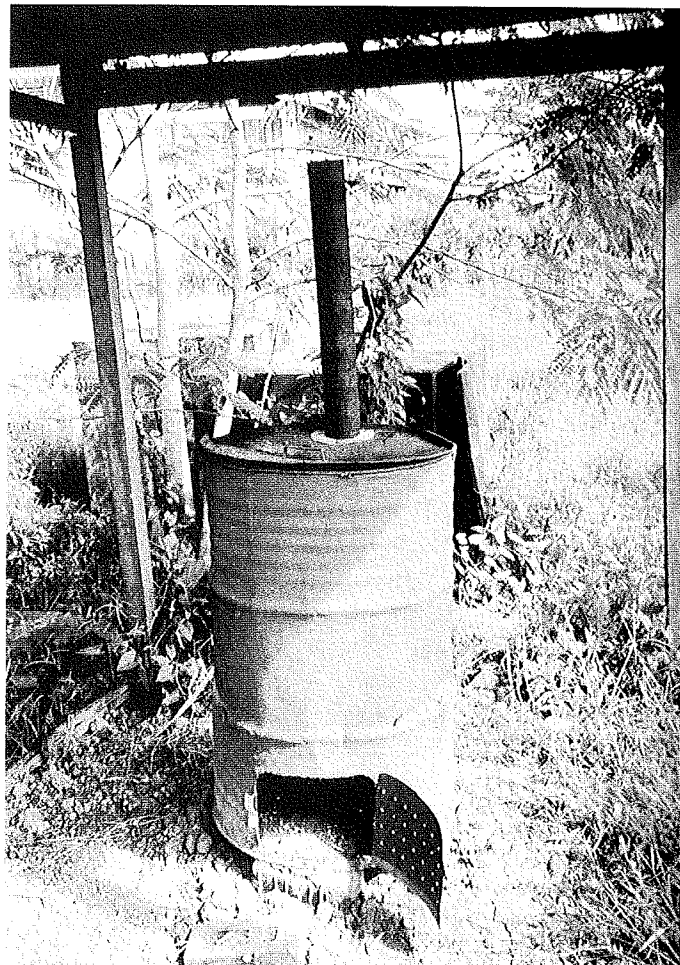


FIGURE 4
Drum Incinerator.



a secure area to prevent human and animal scavenging. Hospitals using pit deposition and burning should establish these sites on high-ground, and seek other solutions so that effective treatment and disposal can continue during the rainy season.

9. Workers involved directly in handling infectious hospital wastes should be provided with appropriate protective equipment and supplies, such as eye protection, gloves, protective gowns, and hand-washing agents and disinfectants.

10. The central governments are encouraged to develop a national policy for hospital waste management based on the *Action Plan for the Development of a National Programme for Sound Management of Hospital Wastes* (WHO/SEARO, 1997). They could also require hospitals to establish effective waste management practices, as contained in *Suggested Guiding Principles and Practices for the Sound Management of Hazardous Hospital Wastes* (WHO/SEARO, 1997). Both documents were developed as a result of a Regional Consultation on Sound Management of Hospital Wastes, held in Chiang Mai, Thailand in 1996.

DISCUSSION

Both the Divisional and Township hospitals had effectively implemented economical, minimal practices necessary to contain, treat, and dispose of hazardous hospital wastes. In so doing, they significantly reduced the risk of transmission of common and emerging infectious disease agents. While neither had a formal waste program, they did implement a number of the most significant management techniques, including waste separation, treatment (burning), disposal (burying), and security (preventing human scavenging). Most importantly, these management principles were being practiced at little or no cost, as their implementation required primarily manpower that was readily available on each hospital's staff. These minimal practices support the philosophy that it's better to do "something" to address infectious waste treatment and disposal than "nothing at all"!

It was obvious that the minimal practices in place at both rural hospitals were in large part due to the enthusiasm of the hospital administrators, who were eager to have their waste collection and disposal systems assessed in order to learn how to make additional improvements.

It was discouraging to see the General Hospital separate the infectious from the general wastes, and then transport the infectious wastes outside the hospital to be dumped over the wall. While the

dumping area was officially a pickup point for the city refuse collectors, it provided an excellent opportunity for human and animal scavenging and as a result, increased public, occupational, and environmental health risks.

Developing countries worldwide are currently faced with the difficult challenge of containing the spread and resultant economic and social impacts of a variety of common and emerging infectious diseases. While great efforts are needed in the areas of diagnosis, treatment, nutrition, sanitation, and public health education, attempts at reducing the risks for infectious disease transmission must also include effective treatment and disposal of hospital wastes.

CONCLUSION

The results of this field survey have shown that minimal practices can contribute to the reduction of human health risks associated with inappropriate infectious hospital waste management. It is recommended that in the absence of a more sophisticated program of waste treatment and disposal, governments of all developing countries actively promote the minimal practices concept. The results of this study have contributed to the minimal practices concept for infectious and other hazardous healthcare wastes described by the World Health Organization in its recently published text (Pruss, et al, 1999).

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REFERENCES

- Pruss, A., Giroult, E., and Rushbrook, P. (eds). 1999. *Safe Management of Wastes From Health-Care Activities*. World Health Organization, Geneva, Switzerland.
- WHO/SEARO. 1997. *Action Plan for the Development of a National Programme for Sound Management of Hospital Wastes*. World Health Organization, Regional Office for South-East Asia, New Delhi, India.
- WHO/SEARO. 1997. *Suggested Guiding Principles and Practices for the Sound Management of Hazardous Hospital Wastes*. World Health Organization, Regional Office for South-East Asia, New Delhi, India.