To the Editors:

Management of health care waste in Sri Lanka

In many countries improper management of waste generated in health care facilities causes direct health harm to the community, to people working in health care facilities, and to the environment. In addition, pollution from inadequate treatment of waste can cause indirect health harm to the community. The disposal of certain types of devices should follow specific safety rules. For example, a syringe is a common item that requires safe disposal. It is a usual sight in the vicinity of practically every hospital to find unsterile needles, syringes and containers for sample collection for sale by unscrupulous vendors. The health authorities are aware of this perilous situation, but are unable to act in a meaningful manner due to the absence of a clinical waste management infrastructure. Sri Lanka urgently needs a proper clinical waste management system.

Waste management options need to be efficient, safe and environment friendly to protect people from voluntary and accidental exposure to waste when collecting, handling, storing, transporting, treating or disposing of waste. Furthermore, in the Sri Lankan context such options need to be cost effective, taking into account the local logistical needs. Though clinical waste management should be an integral part of the health care delivery system the principal reason for absence of such infrastructure is economic. Health personnel are still to distinguish health care waste from ordinary garbage.

In a discussion of health care waste management it is important to have clear definitions of various categories of health care waste. For the purpose of this article I have chosen the WHO classification of health care waste.

Health care waste

This includes all the waste generated by health care establishments, research facilities and laboratories. In addition, it includes the waste originating from "minor" or "scattered" sources such as that produced in the course of health care undertaken in the home (dialysis, insulin injections, etc.) [1]. Between 75% and 90% of the waste produced by health care providers is non-risk or "general" health care waste, comparable to domestic waste. It comes mostly from the administrative and housekeeping functions of health care establishments. The remaining 10% to 25% of health care waste is regarded as hazardous and may create a variety of health risks [1].

General health care wastes should be dealt with by the municipal waste disposal mechanisms [1]. This article is confined to the analysis of the current and future aspects of "hazardous" health care waste management, principally by government health institutions in Sri Lanka, with comments on the private sector where relevant.

Hazardous waste

The WHO classifies hazardous waste into the following categories [1].

1. Infectious waste, suspected to contain pathogens (bacteria, viruses, parasites, or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts.
2. Pathological waste, consisting of tissues, organs, body parts, human foetuses and animal carcasses, blood, and body fluids.
3. 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 hazardous health care waste.
4. Pharmaceutical waste, includes expired, unused, spilt, and contaminated pharmaceutical products, drugs, vaccines, and sera that are no longer required and need to be disposed off appropriately. It also includes discarded items used in the handling of pharmaceuticals, such as bottles or boxes with residues, gloves, masks, connecting tubing, and drug vials.
5. Genotoxic waste, includes certain cytotoxic drugs, vomit, urine, or faeces from patients treated with cytotoxic drugs, chemicals, and radioactive material. Cytotoxic or antineoplastic drugs are the principal substance in this category. These drugs are used in highly specialized units.
6. Chemical waste, consists of discarded solid, liquid, and gaseous chemicals, used for diagnostic and experimental work and for cleaning, housekeeping, and disinfecting procedures. These are considered hazardous if at least one of following properties is present; toxic, corrosive (pH<2 or pH>12), flammable, reactive (explosive, water-reactive, shock-sensitive) or genotoxic.
7. Waste with high content of heavy metals.
8. Pressurized containers. Many types of gases used in health care are often stored in pressurized cylinders, cartridges, and aerosol cans. Many of these, once empty or of no further use (although they may still contain residues), must be disposed off.
9. Radioactive waste.

Background data

Although Sri Lanka has impressive health indicators, the health system has certain shortcomings. They include poor macro- and micro-health planning, unequal distribution of resources, lack of funds and no long term political and bureaucratic commitment towards health issues.

A major drawback in planning has been the non-inclusion of a clinical waste management system, which is an integral part of any national health system.

Tables 1 and 2 show generation of health care waste from international sources. This data can be used as a comparative scale for Sri Lanka. Using data from Table 2, I have calculated the estimated daily waste generation in a few categories of hospitals in Sri Lanka (Table 3).

Table 1. **Total health care waste generation by region [2]**

Region	*Daily waste generation (kg/bed)*
North America	7–10
Western Europe	3–6
Latin America	3
Eastern Asia	
• High income countries	2.5–4
• Middle income countries	1.8–2.2
Eastern Europe	1.4–2
Eastern Mediterranean	1.3–3

Table 2. **Health care waste generation according to type of hospital [3]**

Source	*Daily waste generation (kg/bed)*
University hospital	4.1–8.7
General hospital	2.1–4.2
District hospital	0.5–1.8
Primary health care centre	0.05–0.2

Data from high income countries.

Table 3. **Estimated daily health care waste generation in selected hospitals in Sri Lanka. (Calculated using bed capacities for year 2000)**

Hospital category	*Number of hospitals [4]*	*Total number of beds [4]*	*Estimated daily waste production (kg)*	
			Lower estimate	*Upper estimate*
1. University and teaching hospitals	15	14 659	60 102	127 533
2. General and provincial hospital	6	4 966	10 429	20 857
3. Base hospitals	36	9 865	4 932	17 757
4. Primary health care centres (DH, PU, RH, MH and CD)	481 (156+93+ 167+65)	23 212 (13 584+ 4 382+660)	1 160	4 642
Total	**538**	**52 702**	**76 623**	**170 789**

DH–District Hospital, PU–Peripheral Unit, RH–Rural Hospital, MH and CD–Maternity Home and Central Dispensary.
N.B. Mental, Chest, Leprosy, Police, Prison, Fever, Dental and Rehabilitation hospitals not included.

Estimated total health care waste produced by listed government hospitals is between 76 623 and 170 789 kg daily (Table 3). It should be noted that no private sector hospital health care waste generation has been included. Thus it can be assumed that by using high income country data we are compensating for the loss of waste generation from the private sector hospitals to some degree. Using WHO estimates [1] the daily hazardous waste production in the listed government hospitals in Sri Lanka between 7 662 and 42 697 kg daily (Table 4).

Table 4. **Estimated hazardous waste generation in government hospitals in Sri Lanka for year 2000**

	Total heath care waste (kg/day)	*Hazardous waste (kg/day)*	
		At 10% of total health care waste	*At 25% of total health care waste*
Lower estimate	76 623	7 662	19 155
Upper estimate	170 789	17 078	42 697

Table 5 gives a breakdown of the type of material generated as waste in Indian hospitals. As India and Sri Lanka share many similarities in health issues, managerially and socio-culturally, we can gain some idea as to the waste composition in Sri Lankan hospitals. The infectious waste component in this Indian series was 15% of the total hospital waste [1]. Further studies are needed to have a more accurate description of the Sri Lankan hospital waste composition.

Table 5. **Average composition of hospital waste in India [1]**

Material	*Percentage (wet-weight basis)*
Paper	15
Plastics	10
Rags	15
Metals (sharps, etc)	01
Infectious waste	15
Glass	40
General waste (food waste, sweepings from hospital premises)	53.5

Source: National Environmental Research Institute, 1997.
The data are average values obtained from 10 large hospitals in Mumbai, Calcutta, Delhi and Nagpur during period 1993 to 1996.

Current status

The state hospital health care waste produced at present in Sri Lanka is disposed off by the following methods:

1. Collection by local municipal authority and subsequent dumping.
2. Burning in the heath care facility premises.

3. Burying in the health care facility premises.
4. Dumping at a designated site within hospital premises or at a designated dumping site of the local authority.

Sri Lanka at present is disposing general health care waste according to WHO recommendations [1]. The point at which Sri Lanka departs from these recommendations is that we dispose hazardous waste along with the general waste into a common disposal system.

Hazardous waste is not treated before releasing into the general waste disposal system to render it non-hazardous. Some major hospitals in the island are collecting waste using the internationally accepted colour coded collection system. However, as there is no separate system for final collection, storage, transport and disposal of general and hazardous waste there is re-mixing of the two categories. Consequently the initial effort and cost of segregation is lost.

Sri Lanka is beginning to see the effects of unacceptable hazardous waste disposal, particularly in the form of contaminated needles and syringes re-entering the formal health system. Further studies need to be done to document this phenomenon. Improper and unsafe recycling of needles and syringes is a major concern in Sri Lanka because it jeopardizes our highly successful childhood immunisation programme. If vaccination is perceived as unsafe by the public due to circulation of contaminated needles and syringes, it will lead to an erosion of public confidence in the immunisation programme. This could have serious consequences.

In 2001–2, a World Bank team with local collaboration did a review of the clinical waste disposal systems in Sri Lanka. The team recommended the installation of an autoclave to decontaminate clinical waste generated in the government sector before release into the general waste disposal system [Personal communication, Dr. R Fernando].

This was thought to be more cost effective than the gold standard of clinical waste disposal, which is incineration. The government is unable to find a suitable location for the autoclave for which funding is available. The reason for this is that no government hospital agrees to allocate space for the autoclave to be installed. I believe that if funding is forthcoming the country should go for the gold standard in clinical waste management, which is incineration. The possibility of having it installed at a central location for the use by both government and private sector should be explored.

Conclusion

Sri Lanka's population is projected to reach 23.35 million in 2040 [5]. With increase in the number of health care facilities and the use of sophisticated equipment, the generation of hazardous waste is sure to rise. The increase in the domiciliary treatment of certain diseases (insulin injection, home dialysis) will also add to this. As clinical waste management is a relatively new concept for Sri Lanka, which needs to be integrated into the existing health care system, all levels of health professionals should be made aware of the usefulness and need for it. I hope that this article will provoke thinking on health care waste management in Sri Lanka.

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