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## Hospital waste in Hanoi

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HANOI'S 36 NATIONAL hospitals and specialized clinics are the largest hospitals and which have the best equipment in the country. Seriously ill patients from all provinces in the North are transferred to those hospitals for treatment. Nearly all beds are occupied. In most of those hospitals, costs are shared by the government and patients. The government supply facilities and the base salaries for medical staff. Due to insufficient budgets, the physical infrastructure of most of hospitals is poor and backward according to international standards. Under those conditions, the waste collection and processing of clinical and non-clinical hospital also lacks of both physical infrastructure and knowledge for management hazardous waste. This paper will review and compare the classification, processing, reuse, and recycling of waste in 24 of 36 Hanoi hospitals and specialized clinics, and also about the plan, and the role of private waste collectors and recyclers.

### Method of investigation

Twenty-four units, which are 7 central hospitals, 3 city hospitals, 2 district hospitals, 2 branch hospitals, and 2 army hospitals, 1 specialized clinic (the TB centre), 5 district health centres, 1 midwifery, and 1 subdistrict infirmary were investigated. The hospitals covered in this study represented a wide range of types and sizes, with under 450 beds and also geographically distributed even over the city, its suburban areas. The investigation methods are interviewing heads of units, departments, nurses, nurses' aides, junk buyers, URENCO staff, scavengers and studying waste bins of these hospital, tempo-

rary of URENCO dumpsites, and the municipal landfill at Me Tri.

### Results and discussion

#### Health care system and regulation regarding hospital refuse in Hanoi

Formerly, health care in Hanoi followed a strictly regimented system (Figure 1). In fact it is medical services for uninsured clients. Now it has changed somewhat due to the introduction of health insurance programs. People can go to the hospital where they are registered through their health insurance without applying successively through the lowest to highest levels of the system. In addition, people can enter any hospital which they can afford since most hospitals also provide health care services for fee.

#### General characteristics and collection, classification, and processing hospital waste

Hospitals in Hanoi are mostly located in densely populated urban areas. They are generally small, covering only a few hectares, with the exception of Bach Mai hospital, which covers 8 hectares and Army hospital 108 - 12 ha. District health centres and ward level infirmaries occupy a few hundred to one thousand square meters. According to this staffing chart, the number of nurses' aides per patient bed varies from 4 to 20. 18 hospitals produced an estimated 8.8 tons of waste (19 m<sup>3</sup>) at an average rate per bed of 1.8 kgs. Waste per bed ranged from 0.6 kgs to 4.6 kgs per day. In 24 investigative units

Figure 1. Health care system in Hanoi

**Table 1. Waste generation and collection of staff**

only 16 central and city hospitals (66.7 per cent) have contracts with URENCO, 6 clinical centres (25 per cent) have use public waste bin and 2 district hospitals (8,3 per cent) are self processing. In most cases, clinical and non-clinical hospital waste are mixed in common storage containers and buried with domestic waste at the municipal landfill. Eight of the 24 hospitals and clinics surveys have incinerators, however, only 4 are working. The most common fuel used in these furnaces are fuel wood, kerosene and rubber tires.

Those hospitals, over 60 percent classified and separated clinical and non-clinical waste (Table 3). and rather. But most of them mixed again their wastes in the final waste bins. Only 3 (12,5 per cent) of the 24 hospitals and clinics studied separated waste at waste bins then

ALL of THEM mixed with common waste in containers when URENCO transported to municipal landfill. In brief, efforts to classify and separate waste within the hospital are largely in vain.

**Method of processing medical waste, chemical and toxic materials containers, placenta and body tissues.**

90 percent of 24 hospitals studied dispose dressings and other absorbent materials in the municipal landfill and 50 per cent of those hospitals dispose chemical and toxic waste in common waste bin. Placenta and expulsion matters are mostly used for fish and pig. With regard to body tissue, 6 processing measures are employed. Three of the 24 hospitals and clinics surveyed dispose body

**Table 2. Waste separation by hospital units or sites**

**Table 3. The treatment of body tissue in 17 hospitals having operating theatres**

tissues and small body parts in public waste bins. The disposal of human body parts and tissue is a serious problem and difficult to resolve. At present, the most common response is burial (Table 3).

**Processing medical waste made of plastic**

Medical plastic is high quality plastic because it is white and easily recycled. Processing measure fore plastic syringes are very casual (Table 4). Fourteen of the 24 investigated units do not treat syringes but throw them directly into common waste bins. Among those 11 treatment measures, only burning prevents re-use. The 9 remaining measures allow reuse or recycling plastic material. Almost all medical units use transfusion bottles made of disposable plastic. Some of them are reused to store body fluids, such as wound liquids (12/24). The remaining are sold to junk buyers (16/24). Two of 24 units collect transfusion tubes for treatment by URENCO (8.33 per cent). Most transfusion tubes are thrown into common waste bins (41.66 per cent), then they are collected by pickers at the hospitals or at municipal landfill. There is only one hospital separates transfusion

bottles, tubes and plastic syringes fore URENCO collection, and only the anti-tuberculosis centre burns transfusion bottles as well as other medical waste. This situation is particularly hazardous for those who may come in contact with human blood - URENCO workers, 200 scavengers working at the municipal landfill, and recyclers. None of these recyclers have reported to the interviewers any incidence of injury due to hospital waste

**Other waste in the hospital use fore recycle**

Beside these typical medical wastes, there are also some other clinical and non-clinical hospital wastes that can be recycled. This includes X ray films, medicine bottles, cardboard boxes, bottles and aluminium cans.

**The garbage processing at Me Tri ground**

The landfill is the last place where the value can be extracted from the waste stream. It is also the place where recyclable materials are concentrated. Most of the clinical hospital waste that can be reused or recycled are collected by pickers who work there by day and night.

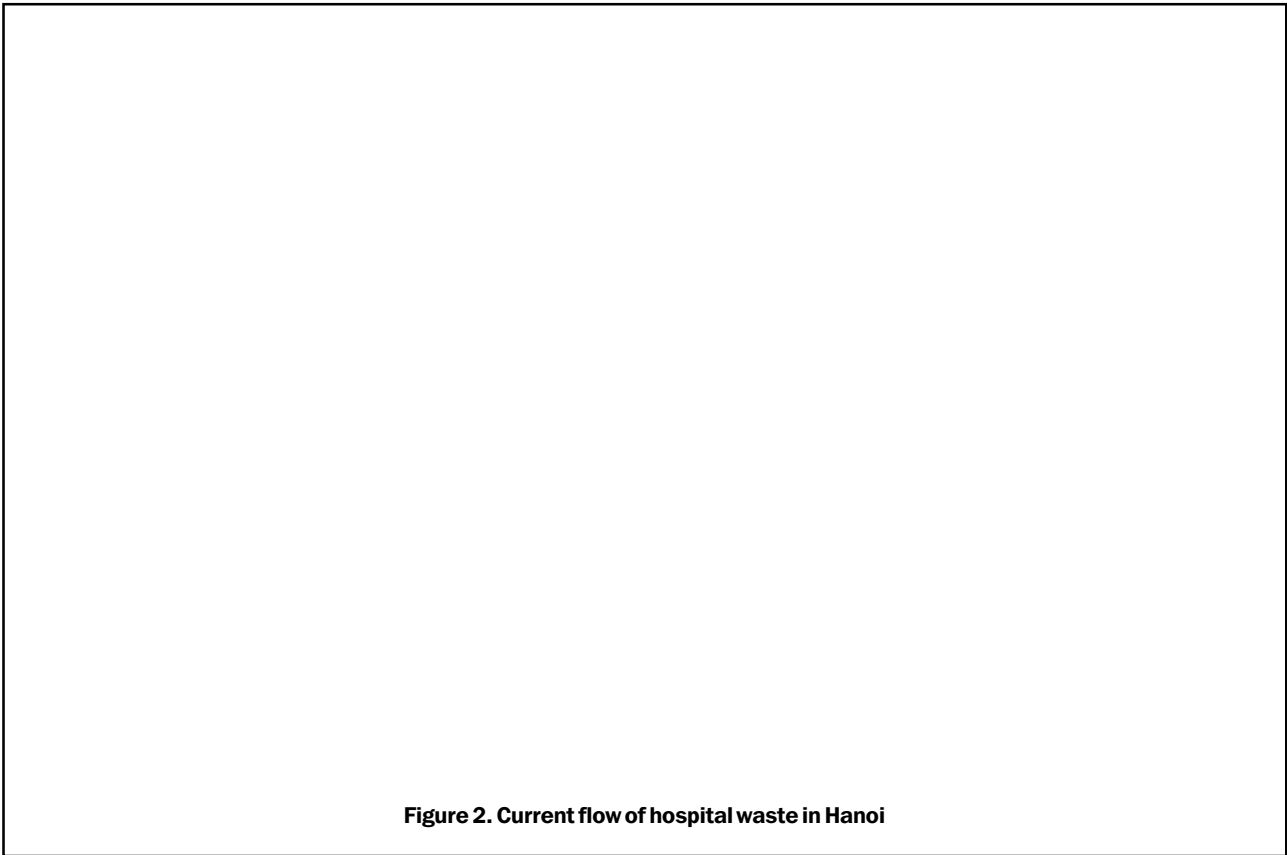
**Conclusion**

The problem of hospital waste, as outlined in this paper, must be viewed from three directions:

- Most of hospitals currently practice some form of classification and separation, this is not standardized and needs to be improved.

**Table 4. Measures for treating plastic syringes in 24 investigated units**

**Table 5. Measures treating medical plastic**



- Reuse and recycling must be segregated from hospital hazardous waste by efforts
- Treating hospital waste separate from domestic waste currently exists. Thus transport and disposal must be appear in constraint binding

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Below we present a trial model to separate hazardous hospital waste from nonhazardous hospital waste and domestic waste in collection and transportation.

