For Discussion
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Legislative Council Panel on Health Services
Legislative Council Panel on Environmental Affairs

Management, Regulation and Disposal of Clinical Waste

INTRODUCTION

Clinical wastes are potentially hazardous and infectious. They should be handled carefully to protect the public, healthcare workers and waste management operators. This paper outlines the Administration's proposals to regulate the handling and disposal of clinical wastes.

BACKGROUND

Clinical Waste

2. Clinical wastes refer to substances generated in clinics, hospitals, laboratories and other medical sources in connection with dental, medical, nursing, veterinary or other practices involving medical treatment, or pathological or pharmaceutical research. Clinical wastes are mainly in the form of:-

(a) used or contaminated sharp items such as syringes, needles, scalpels or other sharp instruments;

(b) laboratory waste such as unsterilised laboratory stocks and cultures of infectious agents;

(c) human and animal tissues such as organs and body parts of human or dead animals;

(d) infectious materials which contain a specified group of lethal pathogens;

(e) surgical dressings, swabs and all other waste dripping or caked with blood, or containing free-flowing blood; and

(f) other wastes which are contaminated with the above clinical waste, or other infectious materials which may pose a significant health risk.

Disposal and handling practice

3. In 1998, about 2,600 tonnes of clinical waste were generated. Of these, about 1,900 tonnes were disposed of in landfills and about 700 tonnes were burnt in pathological waste incinerators in 10 hospitals prior to landfilling. A small amount of human body parts was incinerated in two crematoria managed by the Urban Services Department (USD). To improve air quality further, 8 hospital incinerators ceased their operations in 1999 and only human body parts or animal tissues are being incinerated by the remaining hospital incinerators.

4. The Hospital Authority hospitals, registered private hospitals and Government clinics are the major clinical waste producers. They account for about 80% of the clinical waste produced and have already introduced measures to segregate clinical waste from municipal waste. For example, the Hospital Authority has reduced the amount of clinical waste requiring disposal from about 12 tonnes per day in 1989 to 3.3 tonnes per day in 1999. Safety precautions are put in place for handling, transporting, storing and disposing of clinical waste through the Urban and Regional Services Departments or their contractors. However, practice varies amongst minor waste producers such as private medical practitioners and laboratories.

5. Current disposal and handling methods should be further improved because:

(a) disposal of clinical waste at landfills along with municipal waste may pose risks to workers during transportation and landfill operations where clinical waste, particularly sharp materials, may be exposed;

(b) existing pathological waste incinerators or autoclaves installed in hospitals cannot handle all types of clinical waste. It is not cost-effective to retrofit these pathological waste incinerators to meet current air emission standards; and

(c) there is no standardized code of practice on the management of clinical wastes and no proper legislative controls to prevent malpractice.

The Clinical Waste Control Scheme

6. The Government considers it necessary to introduce a comprehensive "cradle-to-grave" system to control clinical waste with the following objectives:

(a) clinical waste should be properly segregated to avoid mixing with municipal waste;

(b) segregated clinical waste should be properly stored, packaged and labeled;

(c) proper guidelines and precautions should be introduced to ensure safe collection and transportation. Suitable equipment and staff training should be provided; and

(d) clinical waste should be disposed of in such a way to ensure complete destruction of dangerous pathogens, remove the risks associated with sharp materials and address community concerns about proper disposal of human body parts.

7. To achieve these objectives, we have formulated a clinical waste control scheme which comprises:

(a) amendments to the Waste Disposal Ordinance to define clinical waste and to establish a statutory framework for the regulation of handling practices and licensing of clinical waste disposal facilities;

(b) introduction of the Waste Disposal (Clinical Waste) (General) Regulation to specify technical requirements for the collection and transportation of clinical waste;

(c) modifications to the Chemical Waste Treatment Centre (CWTC) to provide a proper disposal facility to treat clinical waste in a safe and environmentally acceptable manner. A funding proposal is scheduled to be submitted to the Public Works Sub-Committee in January 2000;

(d) introduction of the Waste Disposal (Charges for Disposal of Clinical Waste) Regulation to set out a charging scheme for the use of the CWTC. The scheme will be based on the chemical waste charging scheme; and

(e) publication of a Code of Practice to provide guidance for waste producers and collectors on the proper management of clinical waste from the point of production to the point of disposal.

Implementation

Amendment to the Waste Disposal Ordinance

8. At the meeting of the Panel on Environmental Affairs on 5 March 1999, Members were informed of the legislative framework for introducing the clinical waste control scheme. The amendment Bill seeks to

(a) define clinical waste;

(b) provide for licensing control on the operation of clinical waste disposal facilities;

(c) empower the Chief Executive in Council to make subsidiary regulations relating to the clinical waste control scheme; and

(d) empower the Director of Environmental Protection (DEP) to apply the

legislative requirements by phases.

We expect to introduce the Bill to the Legislative Council in January 2000.

Waste Disposal (Clinical Waste) (General) Regulation and the code of practice

Responsibilities of Clinical Waste Producers

9. Under the proposed control scheme, clinical waste producers will be required to

(a) comply with the good practices recommended in the Code of Practice for the management of their clinical waste (e.g. proper packaging, labeling and storage);

(b) dispose of the clinical waste at a licensed clinical waste disposal facility, or consign them to a clinical waste collector for such disposal; and

(c) fill in the details on the trip ticket forms.

The key areas to be covered by the Code of Practice are listed in Annex. EPD is developing the Code in consultation with the medical profession and the waste collectors. Whilst the Code of Practice would not be legally binding, demonstration of compliance or non-compliance with its requirements could be used as evidence in the course of legal proceedings.

10. Upon commencement of the regulation, waste producers will be required to either consign their waste to a clinical waste collector or dispose of their clinical waste in a licensed disposal facility, such as the CWTC. However, in the first phase the legal responsibility for proper management of clinical waste and for maintenance of the trip-ticket records will only apply to major waste producers. Major waste producers will include

(a) all public hospitals and all hospitals managed by the Hospital Authority (HA) as listed in the Hospital Authority Ordinance (Cap. 113);

(b) private hospitals and maternity homes defined under the Hospitals, Nursing Homes and Maternity Homes Registration Ordinance (Cap. 165);

(c) the Prince Philip Dental Hospital; and

(d) all government clinics (whether they are managed by the Department of Health or other government department)

11. Minor clinical waste producers (such as private medical practitioners or clinical laboratories) will be expected to exercise professional self-regulation and abide by the Code of Practice on a voluntary basis. We have been assured by the Hong Kong Medical Association (HKMA) and the Estate Doctors Association (EDA) that their members will follow the professional guidelines issued by the HKMA. If these minor waste producers are able to abide by self regulation, there would be no need to extend control to them. However, if there is evidence that minor waste producers' performance is unsatisfactory to the extent that the environmental and public health are compromised, the Government will consider extending regulatory control to the minor clinical waste producers.

Responsibilities of Clinical Waste Collectors

12. Rather than setting up a costly and complicated licensing system for waste collection, the regulation will lay down detailed and objective technical requirements covering packaging, labeling and collection of clinical waste. The regulation will also prescribe storage and equipment requirements. Waste collectors would need to provide sufficient training, safety instructions, protective gears and equipment to operating staff. Like waste producers, clinical waste collectors are required to keep trip tickets which should be produced to DEP on demand to demonstrate that clinical wastes consignments have been duly delivered to a licensed facility for disposal.

13. To allow flexibility for the minor clinical waste producers, registered doctors, nurses, dentists, and veterinary surgeons are not considered as a "waste collector" under the regulation if they transport less than 5 kg of clinical waste to a clinical waste disposal facility on any single occasion.

Responsibilities of Clinical Waste Disposal Facility Operators

14. Provisions will be included in the Waste Disposal (Amendment) Bill which enable DEP to grant licences for the operation of disposal facilities for clinical waste. Initially, the CWTC would be the only licensed facility provided by Government. However, the Government encourages the introduction and use of new treatment and disposal technologies. DEP will grant a licence to a disposal facility if he is satisfied that environmental and public health concerns are fully and properly addressed and that proper operational controls are in place.

15. The regulations are being prepared and will be formally introduced once the Waste Disposal (Amendment) Bill is enacted. The draft regulations will be submitted for Members' reference to facilitate Members' consideration of all the legislation as a package.

Disposal of clinical waste and provision of proper facility

Disposal method

16. The Government considers that clinical wastes should generally be incinerated. This is also the practice in many advanced countries such as Canada, Germany, Singapore, Japan and the UK. Incineration can completely destroy infectious pathogens, sharps and deal with body parts, as well as reduce the waste residues that require final disposal at landfills. Proper segregation of wastes prior to incineration, together with high temperature combustion and filtering facilities in modern incinerators can effectively minimize the emission into the atmosphere of harmful substances.

17. Other disposal methods have been suggested and considered, but they cannot provide a complete solution.

(a) Landfills: At present, most of our clinical wastes are disposed of at landfills. In landfills, the potentially harmful materials are covered but not immediately destroyed. Particular care on the part of landfill operators is required to ensure occupational safety and necessitates more demanding leachate treatment. The disposal of body parts at landfills is unacceptable.

(b) Autoclaves: An autoclave is a strong, pressurized, steam-heated vessel used for sterilization purposes. Autoclaves are used in disinfecting medical instruments, and laboratory cultures. Some hospitals are already using autoclaves to sterilize medical equipment for the purpose of reuse or to treat small quantities of clinical waste generated by the clinical laboratories. However, autoclaving does not adequately deal with other clinical wastes including body parts, or sharps. When autoclaving large quantities of clinical waste, cold spots may exist within the waste mass and incomplete destruction of pathogens can occur. To counter this it is a common practice to shred the waste before starting the autoclaving process. However, the shredding machine itself can cause problems if the machine is not disinfected or operated properly. There is also the risk of releasing vapourised medicines as volatile organic compounds (VOC) into the atmosphere as autoclaves do not normally incorporate air emission controls. Autoclaving will not achieve volume reduction.

(c) Microwave systems: Microwave systems are also effective in killing most bacteria but not for bacteria in spore form. They are not suitable for disposal of all types of clinical waste. For example, body parts, and metallic instruments cannot be treated in microwave facilities. Microwaves share the same disadvantages as autoclaves in respect of cold spots, air emissions and lack of volume reduction.

18. Autoclaves and microwave systems may be used as pre-treatment methods prior to incineration or to reduce the volume of material needing incineration. They can complement, but not replace incineration or landfill.

Disposal facility

19. In 1995, the Government proposed to build a Centralised Incineration Facility (CIF) in Tuen Mun to handle clinical waste, animal carcasses and security waste. The CIF proposal was discussed in this Council on various occasions, but was eventually withdrawn because of the reservations expressed by the then Legislative Council Members on the cost effectiveness of the CIF proposal and the possibility of achieving savings by utilizing existing facilities.

20. As an alternative, the Government proposes to modify the Chemical Waste Treatment Centre (CWTC) for safe incineration of clinical waste. The reasons are:

(a) The CWTC is equipped and designed to meet the most stringent air emission standards adopted by developed countries. It has sufficient capacity to handle all the clinical waste projected to arise over the next ten years.

(b) By modifying the CWTC, rather than building a new facility, significant resources and development time can be saved.

(c) Land can be saved as there is no need to find another site for the incineration facility.

21. The Administration is considering constructing waste-to-energy incineration facilities (WEIF) by 2007 capable of disposing 6,000 tonnes of municipal solid waste each day. However, the WEIFs will be designed for mass burning of solid waste. The technical processes and control(e.g. temperature and gas emission standards) would be different from the CWTC, so that they cannot destroy certain clinical wastes as completely as the CWTC. We do not intend to deliver clinical waste to the WEIFs in future. There would not be duplication of disposal facilities.

22. When the CWTC is modified and available for disposal of clinical waste, additional alternative facilities such as autoclaves or microwave systems would not be necessary. However, the Government does not preclude the private sector from building other disposal facilities subject to them meeting licensing requirements under the Waste Disposal Ordinance and the Air Pollution Control Ordinance.

<u>Modifications required</u>

23. To enable the CWTC to treat clinical waste, the following steps are needed -

(a) design and modification of the existing facilities for the reception, handling,

storage and incineration of clinical waste;

(b) provision of transit skips for the containment and delivery of clinical waste to the CWTC;

(c) provision and upgrading of equipment for environmental control and monitoring; and

(d) provision of computerized weighing, waste recording and billing systems associated with clinical waste disposal.

24. A supplementary environmental impact assessment study completed in May this year has confirmed that the CWTC, with the proposed modifications and additional mitigation measures, will be able to handle clinical wastes to the required environmental standards.

25. The modification works are estimated to cost about $64 million at December 1998 prices. The average recurrent cost from 2001/02 to 2011/12 will be about $22 million per annum. The Government intends to submit the funding proposal to the Public Works Sub-Committee in January 2000. Subject to availability of funds following approval by the Finance Committee, we expect that the CWTC will be ready to incinerate clinical waste by mid 2001. Part of the operating cost would be recovered through charging.

Charges for Disposal at CWTC

26. Under the "polluter pays" principle, users of the CWTC should pay for the cost of handling and disposing of the clinical waste. The disposal charges will also help create an economic incentive for waste reduction and proper segregation by the waste producers. We propose to introduce a Waste Disposal (Charges for Disposal of Clinical Waste) Regulation to provide the legal basis for charging.

27. The charging mechanism will follow the same approach as the land-based chemical waste charging scheme already in place at the CWTC. We do not intend to recover the capital expenditure. Only the variable operating cost (VOC) will be recovered

from the waste producers other than government departments. The Clinical Waste Charging Scheme is totally separated from the Chemical Waste Charging Scheme and there will be no cross subsidy between these two charging schemes. In addition, private waste producers will only be charged on the amount of clinical waste they deliver to the CWTC, and they will not be responsible for the share of the disposal cost incurred by government departments.

28. All clinical wastes will be charged at a single rate and the estimated charge rate for incinerating clinical waste at the CWTC is about $7 to $8 per kg and each waste producer will only be charged according to the quantity of waste delivered to the CWTC. The actual amount charged will be adjusted with reference to inflation. A minimum charge of about $150 will also be levied on those who deliver small quantities of clinical waste to the CWTC for disposal. During the consultation with the medical profession, we were informed that the quantities of clinical waste generated by a typical private practitioner are small (about 1 to 2 kg per week). Disposal would be infrequent, perhaps twice per month.

29. At present, disposal of chemical waste is charged at a rate of 31% of VOC. This will gradually be increased to 100% VOC by 2005/06 by annual increment. When the CWTC is ready to accept clinical waste in 2001/02, charges are expected to be set at 46% of VOC, and increase to 100% VOC in 2005/06. The projected revenue is estimated to increase from about $6 million in 2001/02 to about $16 million in 2005/06.

Public Consultation

30. The relevant medical professions and trades including the Hospital Authority (HA), all private hospitals, the Hong Kong Medical Association (HKMA), the Estate Doctors Association (EDA) and the Environmental Contractors Management Association have been consulted. Representatives generally supported the Clinical Waste Control Scheme. The HKMA and EDA advised Government that private medical practitioners would exercise self-regulation and would follow the HKMA's guidelines (their Code of Practice) on clinical waste management, so that the regulatory requirements need not apply to them.

31. The medical profession and the collectors supported the "polluter pays" principle, and agreed that only variable operating costs should be recovered. The HA and private hospitals proposed that a ramp-up mode of charging similar to the chemical waste

charging scheme should be adopted.

32. The Kwai Tsing District Board (KTDB) was consulted on the proposed modification of the CWTC in early 1997. Members objected to the proposal which they worried would pose adverse environmental impacts and increase pollution to the district. The KTDB moved a motion against the project. Members' concerns were addressed in the subsequent supplementary environmental impact assessment study, which confirmed that the CWTC is capable of treating both chemical and clinical wastes in an environmentally acceptable manner.

33. The Advisory Council on the Environment (ACE) was consulted on the supplementary EIA study on 3 May 1999. The ACE endorsed the findings and recommendations subject to some minor requirements on the monitoring regime. We are confident that the CWTC can fulfill all ACE's requirements in implementing the proposed project. We briefed the KTDB again on 13 May 1999 on the findings of the study. However, KTDB remained opposed to the proposed project and moved another motion expressing their objection to incineration of clinical waste in the CWTC. We will provide detailed environmental data on CWTC emission, etc., to Kwai Tsing District Council in future on a regular basis.

Advice sought

34. Members are invited to comment on the contents of this paper.

Planning, Environment and Lands Bureau
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Annex

Good Management Practices Recommended in the Code of Practice

- To segregate clinical waste from other waste types (e.g. municipal waste) to minimise posing potential health risk to municipal waste collectors and landfill workers.

- To place clinical waste in appropriately designed sharp boxes, bags or containers.

- To label and mark clinical waste for easy identification by workers and the public.

- To use properly designed transport skips for transporting clinical waste within the premises.

- To provide safe and secure temporary storage facility within the premises.

- To use properly designed vehicles and instruments for transporting clinical waste to disposal facilities.

- To provide appropriate training to staff and ensure that they will take all necessary safety measures while handling clinical waste under normal and emergency conditions.

- To keep records of the quantities of clinical waste collected by waste collectors and produce such records for inspection by the Authority.

- To prepare a Clinical Waste Management Plan for setting out proper management responsibilities.