Waste Management System, Actions to be Taken for a Better System

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Hospital Waste Management is such a burning and alarming issue in this country that an emergent and practical plan is needed. Mayo Hospital, a premier institution was established in 1870 in this area of the city which has become congested and thickly populated. This hospital is facing a number of environment problems, some of which are about disposal of hospital waste. It has been tried to analyse present situation and give measures which have been taken and are in practice in this hospital. An action plan for the disposal of hospital waste has been outlined. It has been tried to emphasize that waste management system, like other managerial practices, is a co-ordinated effort. A co-operation and liaison with authorities like Metropolitan, Police, Health and District Administration is required to achieve the set objectives. It is our duty to provide facilities for medical care as well as a healthy environment to the patients. it is hoped this work will help in understanding hospital waste problems and education of the staff in this hospital. The hospital waste management system will be a step towards a better system.

Mayo Hospital which is more than 125 years old is situated in the most thickly populated area of Lahore city. The hospital which was built for a population of one lakh is serving not only Lahore city but is also receiving patients from all over the Punjab, as it does not have any well-defined catchment area.

The hospital is producing a number of wastes including solid, chemical, radioactive and Infectious wastes. A number of measures in disposing of waste have been practised during the last two years. The consultants of World Bank were given detailed situational analysis about the disposal of waste material and the problems encountered during its management during a recent visit to Mayo Hospital.They agreed to help in the management of waste disposal.

Situational Analysis:

This 2000 beded hospital isbound to present a major challenge of dealing with waste disposal. Furthermore, its location in a thickly populated area makes the situation more complex.The variety of waste materials generated by this organization need appropriate planning of the situation and training of the staff.

What has been done:

1. Staff has been educated to collect waste and garbage from different units of the hospital. This waste is either carried manually or on man-driven wheel-barrows to the specified sites where containers of Metropolitan Corporation of Lahore (MCL) are put. There are two filth depots of Mayo Hospital provided by the Metropolitan Corporation.
2. These containers/ depots are emptied by the MCL twice a week.
3. The hospital incinerator is more than 100 years old and not working for the last 12 years. It is an out-dated equipment and it cannot be repaired. A project for the replacement of the same along with staff, equipment and accessories has been forwarded to government for approval.
4. The hospital has a policy for sterilization and disinfection. According to this policy the hospital has its Infection control officers who are microbiologist, anaesthetist and biochemist. They have collected environmental samples from different areas of the hospital. They are working in the hospital and submit reports about the existing pathogenic and non-pathogenic organisms. Their reports about the contamination of water have provided guide line for the administration and a scheme for the safe water supply has been approved by the Planning and Development department of the Government of Punjab.
5. A number of trees have been planted in the hospital to help in controlling the pollution and cleaning the environment.
6. A trial of segregation of waste according to solid, sharp-edge and chemical was made. The hospital

sanitary staff was educated and large size plastic bags were provided for the transportation of waste.

7. As far as disposal of amputated human parts is concerned, these are handed over to the relatives of the concerned patient as per their desire. They bury these in the grave-yard of their locality.
8. Mayo Hospital is registered with Directorate of Nuclear Safety & Radiation Protection Pakistan Atomic Energy Commission,. Arrangements for the disposal of liquid radioactive waste have been made according to the directions of Pakistan Atomic Energy Commission.

Action Planning :

1. Policy and Procedure
   Formulation and Implementation of policy for appropriate disposal of hospital waste.
2. Waste Management system (WMS.)
   The entire WMS will comprise:
   i) Collection, segregation, transportation, and treatment (incineration); infectious waste will be segregated from the non infectious one.
   ii) All infectious waste except sharps and needles will be discarded into red double bags which are leak-resistant, impervious and of sufficient strength to prevent tearing and eventually will go to incinerators.
   iii) Sharps and needles will be put into impervious, rigid, puncture-resistant containers. Needles will not be recapped, bent, broken, clipped before incineration.
   iv) All containers will be securely closed or sealed prior to collection and transportation to incinerators. All containers will be properly labelled and marked. All infectious waste containers from the place of origin will be transported to a centralized storage area properly marked and locked all the time and kept free of spillage before transporting it to the incinerators.

3. This waste material will be sent for treatment and disposal within one week of collection.

4. Solid waste generated from administrative area (being paper in one or the other form mostly non-toxic in nature) will be disposed of to collection area marked or sent to some paper mill for recycling.
5. All waste material will be recorded on the safety data sheets.
6. All radioactive waste will be placed in special containers for treatment and disposal in properly marked containers with recommendation symbol.

Provision of Material and Equipment

For an effective waste management system (WMS) various facilities will be required, a few of which are enlisted as under;

i) A completely modern incinerator with blow down system, analytical laboratory, technicians and other type of laboratory required to collect (at site), transport, incinerate and disposal of the ashes is needed.
ii) Ambient air monitoring equipment to be used on-site of the incinerators.
iii) Protective gears will be provided to the staff engaged in hospital waste management (Protective uniform with fluid apron and gowns, flood proof shoes and shoe covers, disposable gloves, surgical caps or hoods, masks, eye protectors, face shields).
iv) Steel containers with lids of different sizes for packing and temporarily segregating wastes. Biohazards containers for blood bags.
v) Complete transport set-up (covered trucks, automobile workshop, loading and unloading facilities). for the transport of waste from the hospital to incinerator site.
vi) Disinfectants, germicides, chemicals.
vii) Equipment like glass apparatus, steam apparatus, etc.

Incinerator

To bury or to burn? This is a continuing controversy, and the answer to this burning question is not single or simple, although it is believed that incineration must be the preferred alternative whenever that is possible, however, in some circumstances burying the waste may still be the preferred alternative, if it can be buried deep enough. But how deep is deep enough?

The incineration of waste would appear to be a very convenient and safe means of disposal. The incineration has been on the increase in the United States. Table 1 sets out the cost- benefit of this type of operation. It will be seen that incineration is steadily increasing in use, whilst its cost is becoming ever more competitive.

Three basic but essential requirements for proper combustion during incineration process are:-

1. The residence time of the waste material in contact with air.
2. The degree of mixing between the air and the waste material.
3. The temperature of incineration.

These are essential but they are interdependent.

Incinerator Design

It seems that there is really a future for incineration. Integrated systems are becoming available with more advanced technologies and sophisticated computer controlled systems. Various types of incinerators in current use can be broadly classified in accordance with their basic design features, as follows;

Static grate---- for solids and small quantity.

Multi hearth---- for filter cakes and sludges

Rotary----- for small quantity waste, can use hazardous waste as fuel, thus fully recovering the energy value.

Fluid bed---- for the incineration of organic waste.

Electro-medical destruction of organic waste---- It works by generating oxide form of silver which breaks down organic material to CO2 and H2O.

Site of Incinerator in Mayo Hospital

Since Mayo Hospital is situated in a thickly populated area

with added disadvantage of availability of land for incinerator and other basic infrastucture to be created.

Table 1 Increase in proportion of waste incinerated & cost 1986-87 (USA)

	increase in quantity %	increase in cost%
Incineration	36	5
Resource recovery	25	16-97
Landfilling	5	10-48
Deep well injection	1	-

The on site incinerator will be a health hazard for the local area, Population around. Accordingly, a suitable site to be selected, a little distance away from the city population.

Recommendations

1. Staff education and training in this particular field.
2. provision of high technology incinerators, analytical lab. and other relevant device for the treatment of waste.
3. A well defined policy and legislation for disposal and treatment of waste.
4. Coordination and liaison with Metropolitan Authority, Police, health and district administration, so that their services readily be available when and where required,
5. Help from international agencies working under W.H.O., World bank etc.

Conclusion

Mayo Hospital is a national heritage and a central focus for medical facilities in this thickly populated part of our country. It is our duty to provide facilities for medical care as well as clean environment to the patients. The recommendations evolved, if implemented, will help to improve the environment of the hospital.

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