CURRENT PRACTICES OF BIO-MEDICAL WASTE MANAGEMENT IN GOVERNMENT MEDICAL COLLEGE ASSOCIATED S.M.H.S.HOSPITAL, SRINAGAR, J&K, INDIA

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ABSTRACT
To assess current practices of Bio-Medical waste management including production, collection, transportation, storage, treatment and disposal technologies, and planning of Bio-Medical Waste Management and infection control in S.M.H.S. Hospital Srinagar; and to assess health and safety practices for healthcare personnel in Government Medical College Associated S.M.H.S. Hospital, Srinagar an observational study using interview method was conducted in S.M.H.S. Hospital, an associated hospital of Government Medical College, Srinagar. Around 750 bedded, S.M.H.S. Hospital, an associated hospital of Government Medical College, Srinagar is the second biggest hospital in the valley with annual OPD influx of more than 12 lac patients and about 4,200 inpatients admitted annually. Each in-patient patient generates about 2 kg of waste generated per annum is approximately 650 tonnes. Every day the BMW is collected by in-service sanitation staff-collecting, carrying in plastic in waste-dumper of Municipality. The BMW generated is not segregated and is either burnt in incinerator or lifted by SMC for open dumping (or land filling), thus not fulfilling the requirements envisaged in Bio-Medical Wastes (management and Handling) Rules 1998.

INTRODUCTION
During last few decades, the need for better health-care has been felt globally and Kashmir is no exception to it. To cater to the needs and demands of the increasing population, a rapid mushrooming of hospitals, both in government and private sector has been felt. Consequently there has been a proportionate increase in the quantum of waste generated by these health-care centres. Ironically the hospitals hoped to bring relief to the sick are themselves creating health hazards to the community due to improper management of the waste generated in the course of health-care activities. Such waste has been termed as 'Bio-Medical Waste', which according to Bio-Medical Waste (Management & Handling) Rules, 1998 of India means "any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biological, and including categories mentioned in Schedule I"

Though between 75-90% of the waste produced by the health care institutions is non-risk being generated from administrative and house-keeping/maintenance of health care establishment, the remaining 10-25% waste is regarded as 'hazardous' and may create a variety of health risks.

Methodology: The study was carried out in Government Medical College Associated SMHS Hospital, Srinagar, J&K.
The data collection was carried out by way of:
a) Observational studies of Bio-Medical Waste in each ward of the hospital, starting from source, handling, collection, transportation, and final disposal.
b) The information/data regarding Bio-Medical Waste Management planning and policies, man-power— their training and safe practices, was collected from the Head of the hospital (Medical Superintendent) of S.M.H.S.Hospital, Srinagar by way of a semi structured interview, proforma being the one used by the WHO Regional Office for South-East Asia, with minor editorial changes.

OBSERVATIONS:
S.M.H.S. Hospital, Srinagar was

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established in 1940 in Kak Sarai area of Srinagar city and was inaugrated by His Excellency The Marquess of Linlithgow, Viceroy of India on 15th October, 1940 as a general hospital with specialties of General Medicine, General Surgery, Gynaecology and Obstetrics, Orthopaedics, E.N.T. and Ophthalmology.

Government Medical College, Srinagar was established on 15th August, 1961 and S.M.H.S. Hospital was made its associated hospital. Some specialty branches including Orthopaedics, Gynaecology and Obstetrics were shifted to new hospitals. Sub branches like Casualty, Dermatology, Cardiology (I.C.C.U.), Burns ward, Isolation ward and post operative ward (S.I.C.U.) were established subsequently.

A) Observation of on-site Production, Collection, Transport, and Storage of BMW:

1) Production of BMW:

Bio-medical waste generation in S.M.H.S.Hospital depends on different sites, which include:

i) Soiled dressings, swabs and cotton, Blood and other body fluids. Dissected body organs and tissues,

ii) Disposable plastics, including used syringes, drippers, used I/V fluid bottles, Ryles tubes, catheters, drains.

iii) Glass including used injection vials and ampoule, broken glass syringes. Other sharps including needles, blades, scalpels. Blood and other infective body fluids/ tissues,

iv) Lab. Reagents, Glass slides, etc.

v) Radiographic dyes and reagents Discarded films etc.

vi) Paper boxes and cartons, Broken bottles, Discarded medicine (if any), Paper wastes,

As per J&K State Pollution Control Board, the waste generated in S.M.H.S.Hospital, Srinagar is about 2 Kg. per Bed per Day. So, the total Bio-Medical Waste generated in S.M.H.S. Hospital, Srinagar having 120% bed occupancy is approximately 1,800 Kgs per day or approximately 650 tonnes per year.

II) Collection:

The waste generated in each ward is collected by in-service sanitation staff (sweepers), about 3-4 sweepers in each ward.

The safety practices adopted by the sanitation staff for collection of Bio-Medical Wastes are rudimentary. The protective gears used by the sweepers include thin latex gloves and facemasks (worn occasionally). No other specific protective clothing is used.

The BMW is collected with hands and temporarily stored in plastic buckets of various sizes and colours. No segregation and colour coding of Bio-Medical Waste is carried out, except that used I/V fluid plastic bottles and used plastic syringes are allegedly kept separate in a big bag and sold to rag-pickers by the sanitation staff of their own. This needs further confirmation.

III) Transportation:

The Bio-Medical waste generated band collected in buckets in each ward is carried out, rather dragged by the respective sanitation staff from their wards through the corridors of hospital to the dumping site established near incinerator. Usually two persons hold the bucket and carry it to the dumping site, using minimal precautions. During transport some of the waste spills out. This activity is carried out on daily basis, usually in the mornings. IV) Storage:

The Bio-Medical Waste collected each day is stored at a single dumping site near incinerator in a open space, where from it is taken to pyrolytic incinerator after minimal segregation and rest in kept in Municipal dumper of Srinagar Municipal Corporation.

B) Assessment of treatment and disposal technologies of Bio-Medical Waste Management in S.M.H.S. Hospital, Srinagar:

1) Treatment:

The bio-Medical Waste generated is not subjected to any treatment from the site of production to the site of storage, near incinerator. Occasionally, lime is sprinkled at the dumping site.

2) Disposal:

The Bio-Medical Waste stored at the dumping site is un-segregated. Some segregation is carried out. The non hazardous waste segregated by unscientific techniques is put in Municipal dumper which is taken by Dumper placer of Srinagar Municipal Corporation, though irregularly. See Photo 6,7 & 8.

The major portion of the waste is fed in pyrolytic incinerator that is run irregularly. The exhaust from the incinerator pollutes the atmosphere.

C) Assessment of Health and safety practices for health-care personnel:-

The health-care personnel including the sanitation staff were assessed on following components:

WORKERS’ PROTECTION:

The production, collection ( & segregation), transportation, (treatment), and disposal of Bio-Medical Waste involves the handling of potentially hazardous material. The workers need:

Protective Clothing: No worker was observed wearing protective clothing except facemasks and latex gloves occasionally.

Personal hygiene: Workers were observed utilizing hand wash facilities.

Immunization: The workers have not been fully immunized against Hepatitis B and Tetanus.

Cytotoxic toxicity:

No written procedures that specify safe working methods for handling and processing cytotoxic drugs have been made;

Procedures for emergency response in case of spillage or other occupational accident has not been established;

No education or training has been given to personnel involved in handling cytotoxic drugs.

D) Assessment of Bio-Medical Waste Management planning and infection control in S.M.H.S. Hospital, Srinagar.

To assess Bio-Medical Waste Management planning and policy, and infection control a survey questionnaire drafted by WHO Regional Office for South-East Asia was used.

1) The person responsible for Organization and management of BMW at the hospital level is Medical Superintendent (Dr. Waseem Qureshi)
II) The number of persons involved in the collection, handling, and storage of hospital waste, their designation, their training in solid waste handling and management, and the number of years of experience of this type of work.

<table>
<thead>
<tr>
<th>Number</th>
<th>Designation</th>
<th>Training</th>
<th>Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td>Sweepers</td>
<td>Nil(non-formal)</td>
<td>Varies, upto 35 years</td>
</tr>
<tr>
<td></td>
<td>(Sanitary Attendants)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

No instruction / training is given to newly hired waste management staff.

No infection control committee / team exists in S.M.H.S. Hospital, Srinagar

Recommendations for management of Bio-Medical Wastes:

I) Collection:
In plastic bags with rigid ring with the top fold over the rim of dustbin having a lid/ cover. The reusable container should be smooth, well rounded having maximum size of 100 litres for dry waste and 50 litres of wastewater. It should be cleaned and dis-infected regularly should be handled by one person. Containers/ bags for sharps: Sharps should be collected in separate containers. This special bag should be strong, puncture proof, firmly closed to prevent spillage, falling or leaking out. The container should be provided with a handle. Garbage collection centre: Covered and protected garbage collection centres should be used for collection of 'general waste'.

II) Storage
i) Central storage area: Prior to incineration on site or prior to transportation for disposal of site, 'clinical waste' is required to be stored, treated separately from 'general waste' storage area and should be clearly identified with clear warning sign. This area should be kept locked with a key available throughout 24 hours for the staff and only authorized persons should be allowed to enter.

ii) Location: It should be constructed away from the hospital building, food preparation & storage area and public places.

iii) Construction: It should be covered, situated on wide drain with impervious hard standing, well lit, well ventilated, and protected from entry by animals and insects.

iv) Capacity: It should contain a minimal capacity of two-day storage.

v) Removal: It should be removed daily for disposal.

III) Handling & Transfer:
The transportation of 'chemical waste' off site should be carried out in specially designed vehicles, with a fully enclosed body and a bulk head separating the driver's compartment from the local compartment.

Handler's safety is responsibility of management. Employee should be provided with approved protective clothing and footwear. Training should be imparted to drivers, collectors, and other handlers on risks of the wastes, other instructions, and precautions taken in the event of spillage by accident. These handlers should be protected by vaccinations.

Vehicles / Trolleys for transportation include:

a) Wheel barrow
b) Cycle rickshaw garbage carrier with separate compartments for biodegradable and non-biodegradable wastes
c) Garbage lorry.

COLOUR CODING OF BIO-MEDICAL WASTES:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Colour Coding</th>
<th>Type of Container</th>
<th>Waste Category</th>
<th>Treatment option</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yellow</td>
<td>Plastic bags</td>
<td>Human anatomical wastes</td>
<td>Incineration/Deep burial</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Animal wastes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Microbiological &amp; biotechnology wastes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Solid wastes (items contaminated with blood and body fluids including cotton, dressings, solid plastic, casts, linens, bedding, other material contaminated with bold)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
<td>Disinfected container/plastic bag</td>
<td>Solid waste (waste generated from disposable items other than sharps wastes, such as tubing, catheters, I/V sets, Ryle's tube, urinary catheter, suction catheter, chest drain catheter, blood set, glucose bottles, plastic syringes, (Solid wastes, microbiology and biotechnology wastes)</td>
<td>Autoclaving/Microwaving/ Chemical treatment plus mutilation/shredding</td>
</tr>
<tr>
<td>3</td>
<td>Blue/White (puncture-proof containers)</td>
<td>Plastic bags</td>
<td>Waste sharps (needles, blades, glass etc. that may cause puncture and cuts. This include both used and un-used sharps) Solid wastes (disposable)</td>
<td>Autoclaving/Microwaving/ Chemical treatment plus mutilation/shredding</td>
</tr>
<tr>
<td>4</td>
<td>Black</td>
<td>Plastic bags</td>
<td>Discarded medicines and Cytotoxic drugs (waste comprising of out dated, contaminated and discarded medicine) Incineration ash Chemical waste (solid, chemical used in the production of biologicals, chemicals used in disinfection, as insecticides etc. General non-infective wastes Left-over food and peels of fruits)</td>
<td>Chemical treatment and disposal in secured landfills</td>
</tr>
</tbody>
</table>
(IV) Treatment:

Treatment is a process by which waste is modified before it is finally disposed off, so that it can no more act as source pathogens. The main reasons for treatment are to make waste free from micro-organisms, to reduce in volume for better transport and storage, to make part unrecognizable and to convert it more unusable (like syringes and needles).

(V) Disinfection:

It is a process of distribution or removal of pathogens that give rise to infection. Hospital waste in category of 'infectious waste' should be disinfected before final disposal as it contains pathological microorganisms responsible for diseases.

The most common disinfectant applicable is 1% sodium hypochlorite.

(VI) Disposal:

Final disposal is made by one of the following procedures:

a) Incineration
b) Chemical disinfection
c) Wet (Steam disinfection) and Dry (Screw feed technology) thermal technology
d) Microwave irradiation
e) Land disposal (especially sanitary landfills)
f) Inertization (mixing waste with concrete or other substances before disposal in order to minimize the risk of toxic substance contained in the waste migrating into surface water or ground water.

Formation of Hospital Bio-Medical Waste Management Committee:
The head of the health-care facility should form a Waste Management Committee consisting of following personnel:

1) Head of the hospital / Medical Superintendent (as Chairman)
2) Waste Disposal Officer (as Secretary)
3) Infection Control Officer
4) Head of the Departments
5) Chief Pharmacist
6) Dy. Medical Superintendent
7) Hospital Engineer
8) Radiation Protection Officer
9) Stores Officer
10) Additional members may be appointed whenever the need arises.

The management of bio-medical wastes require diligence & care from a chain of personnel, starting with a nurse or a doctor who use the equipment that become waste, taken by hospital sanitation staff who provide clean bags & containers and carries away the waste, and finishing with the person responsible for ensuring that the bio-medical waste is disposed off in correct way to prevent any damage or adverse effect to the environment and the life sustained in it.

FURTHER READING

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