CHAPTER - 4

HEALTH IMPACTS AND RECOMENDATION FOR MEDICAL WASTE MANAGEMENT

4.1. Health Impacts

The aim of Health-care activities are protecting health, curing patients and saving lives. But that also generate large amount of waste, 20 percent of which entail risks either of infection, of trauma or of chemical or radiation exposure. Disposal of bio-medical wastes has considered as a major problem in India and other country. The public is increasingly concerned over improper disposal of bio-medical waste are thus creating a great health risk to both the public and the environment.

The medical waste management in Mysuru city some hospital is poorly practiced and below the standards required. The study revealed that; the health workers patients and community who live nearby the hospital environment are in great risk of acquiring communicable diseases such as hepatitis due to injury caused by used syringes. The most striking observation during the time of study was the scattered used syringe in open spaces of the hospital premises where the patient can come in contact with them.

The present study has indicated needle injury, disease transmission such as HIV and hepatitis are great risk posed by medical waste at the study area as used syringe and needle are scattered in open spaces around the hospital premises. (Lakbala, 2012) observed that improper treatment of waste generated in health care facilities can severely affect the health of patients and other members of the community.

Furthermore, (WHO, 1999) reported that improper management of medical waste exposes the medical staffs, waste handlers, environment and the
surrounding communities to infection, toxic effects and injuries. The finding shows that medical waste is not given a priority at few hospitals. The risk factors associated with medical waste must be cared in order to prevent harm that might occur to health care workers, patients and the nearby hospital community.

The current study found that the extent of environment contamination in the study area is high as medical waste and other hospital waste are scattered around the hospital area. Study observed used sharps discarded open space of disposal premises, this situation also explained by hospital staff during focus group discussion.

According to (Mathur et al., 2012) stated that; inadequate biomedical care cause environment pollution, unpleasant smell, growth and multiplication of vector like insect, rodents and worm that may lead to transmission of disease like typhoid, cholera, hepatitis and AIDs through injuries of syringe and needles contaminated with human body products.

The findings approve the hypothesis of the study that; the extent of environment contaminated with sharp waste is high in the study area. Hence the hospital management should develop strategies of improving medical waste management by adhering with standards and policy developed by WHO in caring medical waste management at a desirable standards.

This study has revealed that barriers that hinder safe handling and disposal of sharp waste are lack of planning, monitoring of health care wastes and lack of budget for smooth running of hospital activity. Furthermore lack of training, lack of material and equipment, negligence, inadequate number of staffs and lack of motivation of worker in doing their daily routine work are barrier. (Geronnimo and Sarez 2005) insisted the importance of developing information material for the employee and patient in form of poster. Handout and hospital waste manual is a constant remainder for all health personnel involved in medical waste
management. On the other hand, (Hagstrom, 2006) observed that inadequate horizontal and vertical communication among medical staffs, resistance to change and time constrain are barrier to proper management of medical waste.

The findings of the study approve the hypothesis of the study that; financial constrain and shortage of staffs limit safe handling of sharp waste at the hospital. Building modern incinerator within the hospital premises is the best solution for proper management of sharp waste produced at hospital as current practice. This process of sometimes takes longtime due to lack of transport and improper working of the hospital incinerator as explained by all health workers during focus group discussion.

The study finding has shown that, almost all health care workers have general knowledge/ understanding on health and environmental effect of medical waste if it is not handled properly. However there are still about 56% of waste handlers who are not knowledgeable on health and environmental effect of sharp waste as they lack training on how to take care and they do not know any injection safety policy, guideline and disposal policy. The survey also shows that, lack of knowledge among health workers and a lack of coordination among different ministries in handling care waste hinder safe handling of hospital waste. Furthermore high level of knowledge of hospital staff on sharps waste as ingredients of medical waste was, due to the familiarity of health workers with syringes and needles accidents that happen as a result of sharps injury. Knowledge of exposure to occupational hazard reported was lower for 75.0% in hospital. Hence it is the duty bound by the hospital management to make sure that it provides a sufficient knowledge on proper medical waste management. This will improve individual performance which will lead to the hospital performance and hence the maximization of quality healthcare provision.

The study also found that; 47% of community member who live nearby the hospital have high awareness on environment effect of sharp waste. This
finding has great implication when it comes to introducing intervention measures through health education. Community member learn more quickly on the matter related with their health. Emphasis should be given to all community because there is some community member who has low understanding of health matter including environmental effect of medical waste.

Medical waste management is a long process, many step involved in this process that are collection, segregation, storage, transportation, treatment and disposal.

Environmental and health risk caused by biomedical waste

4.2. Classification of medical waste:

Medical wastes are mainly classified in to two types, that Classification are health risk waste and non-health risk waste. Figure 4.1.1 shows waste Classification.

4.2.1. Non-health risk waste

Maximum waste generated in health care centre is non-hazardous, that waste comprises 75-90% of the waste total waste. This includes waste of food remnants, paper, cartons fruits peels, packaging materials ex..

4.2.2. Health risk waste

Only 10-25% of waste from the health care centre is hazardous and can be injurious to humans or animals and detritus to Environment. Mixing of a small quantity of health risk waste with any other waste converts the entire waste in to hazardous or infectious waste.
Figure 4.1: Types of the medical waste

4.3. Types of health risk waste generation in health care center

The world health organization Classification of medical waste into:

- Pharmaceuticals
- Infection
- Sharps
- Pathological
- Others sanitary waste

Consequently, hospital waste comprises of sharps, fluid solid and laboratory waste that are possibly deadly or toxic and are regarded a hazard to the society and the environment. However, the term medical waste may include the following

- Cultures and stocks of inferiors agent and associated biologics
- Blood, blood products and body fluids
- Pathological waste consisting of tissues organs and body parts
- Sharps including needles, syringe.
The below figure 4.2 shows Classification of risk waste.

![Classification of risk waste diagram]

**Figure 4.3:** types of the risk waste

### 4.4. Environmental and health risk caused by biomedical waste

The improper management in bio-medical waste causes stern environmental problems that causes to air, water and land pollution. The pollutants that causes damage can be classified into biological chemical and radio active. There are several legislation and guidelines Concerning environmental problems, which can be addressed. The classification of radio active waste generated as part of Bio-medical waste is covered some of the effects of pollution on air, radio activities, land, health and risk are discussed, (Sadhu and singh, 2003)
4.5. **Persons exposed to risk:**

Persons who are working near or within the health-care establishments they are exposed to hazardous waste are potentially at risk. The main groups at risk are the following.

- Doctors, nurses and hospital maintenance personnel
- Patients in health care centre or receiving home care.
- Visitors to health-care centre
- Laundries workers, waste handlers and waste transporter
- Workers in waste disposal facilities including scavengers.

Likewise, the workers involved in the gathering and treatment of the biomedical waste are presented to a certain risks associated with waste disposal. Although treatment and disposal of health-care waste reduces risk indirect health risk may occur through. The release of poisonous pollutants into the environment through treatment or disposal.

4.6. **Impact from infectious waste and sharps**

Infectious waste may contains variety of pathogenic micro-organism. Infectious waste contains pathogens may enter the human body by different ways.

- By ingestion.
- By inhalation
- Through the mucous membrane
- Through a puncture or cut in a skin
Figure 4.3: Mode of transmission of disease
**Table 4.1:** Infections caused by exposure to health-care wastes, causal organisms, and transmission route

<table>
<thead>
<tr>
<th>Sl NO</th>
<th>Type of infection</th>
<th>Examples of causal organisms</th>
<th>Route Of Transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gastroenteric infections</td>
<td>Enterobacteria, e.g. Salmonella, Shigella spp.; Vibrio cholerae; helminths</td>
<td>Faeces and/or vomit</td>
</tr>
<tr>
<td>2</td>
<td>Respiratory infections</td>
<td>Mycobacterium tuberculosis; measles virus; Streptococcus pneumoniae</td>
<td>Inhaled secretions; saliva</td>
</tr>
<tr>
<td>3</td>
<td>Ocular infection</td>
<td>Herpesvirus</td>
<td>Eye secretions</td>
</tr>
<tr>
<td>4</td>
<td>Genital infections</td>
<td>Neisseria gonorrhoeae; herpesvirus</td>
<td>Genital secretions</td>
</tr>
<tr>
<td>5</td>
<td>Skin infections</td>
<td>Streptococcus spp.</td>
<td>Pus</td>
</tr>
<tr>
<td>6</td>
<td>Anthrax Bacillus</td>
<td>Anthracis</td>
<td>Skin secretions</td>
</tr>
<tr>
<td>7</td>
<td>Meningitis</td>
<td>Neisseria meningitides</td>
<td>Cerebrospinal fluid</td>
</tr>
<tr>
<td>8</td>
<td>Acquired immunodeficiency syndrome (AIDS)</td>
<td>Human immunodeficiency virus (HIV)</td>
<td>Blood, sexual secretions</td>
</tr>
<tr>
<td>9</td>
<td>Haemorrhagic fevers</td>
<td>Junin, Lassa, Ebola, and Marburg viruses</td>
<td>All bloody products and secretions</td>
</tr>
<tr>
<td>10</td>
<td>Septicaemia</td>
<td>Staphylococcus spp.</td>
<td>Blood</td>
</tr>
<tr>
<td>11</td>
<td>Bacteraemia</td>
<td>Coagulase-negative Staphylococcus spp.; Staphylococcus aureus; Enterobacter, Enterococcus, Klebsiella, and Streptococcus spp.</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Candidaemia</td>
<td>Candida albicans</td>
<td>Blood</td>
</tr>
<tr>
<td>13</td>
<td>Viral hepatitis</td>
<td>A Hepatitis A virus</td>
<td>Faeces</td>
</tr>
<tr>
<td>14</td>
<td>Viral hepatitis B and C</td>
<td>Hepatitis B and C viruses</td>
<td>Blood and body fluids</td>
</tr>
</tbody>
</table>
4.7. **Risk from the chemical and pharmaceutical waste:**

Health care centers are used many pharmaceutical and chemicals are hazardous. Route of entry of chemicals and pharmaceutical waste through the skin or mucous membranes or from the ingestion or inhalation. Injuries to the skin, the eye, or mucous membrane.

4.7.1 **Risk from genotoxic waste**

Handling or disposal of genotoxic waste severely impact on health care workers. Discharge of such waste causes environmental degradation. May also causes dizziness, nausea, headache, or dermatitis.

4.7.2 **Risk from the radioactive waste**

Exposure to these radioactive waste causes to headache dizziness and vomiting to much more serious problems. Because radio -active waste as it is like some pharmaceutical waste. For serious virus infection such as HIV/AIDS and hepatitis B and C health care workers. Percentage have shown in the table.
Table 4.2: Viral hepatitis B infections caused by occupational injuries from sharps

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Professional category</th>
<th>Annual number of people injured by sharps</th>
<th>Annual number of HBV infections caused by injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nurses in hospital</td>
<td>20%</td>
<td>10-15</td>
</tr>
<tr>
<td>2</td>
<td>Nurses outside hospital</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>3</td>
<td>Hospital laboratory workers</td>
<td>10-20%</td>
<td>2–15%</td>
</tr>
<tr>
<td>4</td>
<td>Hospital housekeepers</td>
<td>20-25%</td>
<td>20%</td>
</tr>
<tr>
<td>5</td>
<td>Hospital technicians</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>6</td>
<td>Physicians and dentists in hospital</td>
<td>5-10%</td>
<td>&lt;1</td>
</tr>
<tr>
<td>7</td>
<td>Physicians outside hospital</td>
<td>5%</td>
<td>&lt;2</td>
</tr>
<tr>
<td>8</td>
<td>Dentists outside hospital</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Dental assistants outside hospital</td>
<td>10%</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Emergency medical personnel (outside hospital)</td>
<td>5-8%</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>Waste workers (outside hospital)</td>
<td>5-20%</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 4.3: Risk of infection after hypodermic needle puncture

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Infection</th>
<th>Risk of infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HIV</td>
<td>0.6%</td>
</tr>
<tr>
<td>2</td>
<td>Viral hepatitis B</td>
<td>5%</td>
</tr>
<tr>
<td>3</td>
<td>Viral hepatitis Ca</td>
<td>5-10%</td>
</tr>
</tbody>
</table>

The recognizing the types of risk associated with medical waste treatment and disposal by describing the public and environmental health impacts than need to be controlled.
4.8. HAZARDS TO THE GENERAL PUBLIC

The general public’s health can also be adversely affected by bio-medical waste. Improper practices for example, dumping of bio-medical waste in municipal dustbins, open spaces, water bodies and so on., prompts to the spread of diseases. Outflows from incinerators and open burning also lead to exposure to harmful gases which can cause cancer and respiratory diseases. Plastic waste can gag animals, which scavenge on openly dumped waste. Injuries from sharps are common feature affecting animals. Harmful chemicals for example, dioxins and furans can cause serious health hazards to animals and birds. Certain heavy metals can affect the reproductive health of the animals.

4.9. Threats Associated with Waste Disposal

Although treatment and disposal of health-care waste reduces risks, indirect health risks may occur through the release of poisonous pollutants into the nature through treatment or disposal.

4.9.1 Landfills

Landfills can pollute drinking water if they are not properly contributed occupational. Risks exist at disposal facilities that are not well designed. Run or maintained.

4.9.2 Incineration

Incineration of waste has been widely practiced but inadequate incineration of unsuitable materials results in the release of pollutants in to the air and of ash residue. incinerated materials containing chlorine can generate dioxine and furans which are human carcinogens and have been associated with a range of adverse health effects. Incineration of heavy metals or materials with high metal (lead content cadmium) can mercury and lead to the spread of toxic metals in the environment.
Dioxine, furans and metals are persistent and bio accumulate in the environment. Materials containing chlorine or metal should therefore not incinerated

Generating bio-medical waste proper management of waste can solve the problem of occupational hazards to a large extent.

**Figure 4.4:** Treatment plant of Shree consultancy incinerator chamber of Mysuru

**Figure 4.5:** Open disposal of medical waste at treatment plant
Table 4.4: the environment impact of bio-medical waste disposal

<table>
<thead>
<tr>
<th></th>
<th>Land fill</th>
<th>Incineration</th>
<th>Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air</strong></td>
<td>Emission of CH$_4$ CO$_2$, odors</td>
<td>Incineration emission of SO$_2$,NO$_X$, dioxins, heavy metals</td>
<td>Emission of dust NO$_X$,SO$_2$ release of hazardous substance from accidental spills</td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td>Leaching of salts heavy metals, biodegradable and persistent organics to ground water</td>
<td>Deposition of hazardous of substances of surface</td>
<td>Risk of surface water and ground water contamination from accidental spills</td>
</tr>
<tr>
<td><strong>Soil</strong></td>
<td>Accumulation of hazardous substances soil</td>
<td>Land filling of slags fly ash and scape</td>
<td>Risk of exposure to hazardous substances from accidental spills,</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Land fill</th>
<th>Incineration</th>
<th>Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Landscape</strong></td>
<td>Soil occupancy restriction on other land use</td>
<td>Visual intrusion ; restriction on other land uses</td>
<td>Traffic</td>
</tr>
<tr>
<td><strong>Ecosystem</strong></td>
<td>Contamination and accumulation of toxic sub in food chain</td>
<td>Contamination and accumulation substances in the food chain</td>
<td>Risk of contamination from accidental spills</td>
</tr>
<tr>
<td><strong>Urban areas</strong></td>
<td>Exposure to hazardous substances</td>
<td>Exposure to hazardous substances</td>
<td>Risk of exposure to hazardous substances from accidental spills,</td>
</tr>
</tbody>
</table>
4.10. Roles and Responsibilities of different Levels

4.10.1 National level

Empower and bolster locale and wellbeing offices to join BMWM in the Comprehensive District Health Plans or other wellbeing offices arranges

- Incorporate BMWM Budget in the national yearly spending plan
- Request bolster from key partners and accomplices to bolster BMWM Management exercises at all levels
- Lead supervision and checking on BMWM
- Make attention to groups
- Limit working to wellbeing office staff and waste handlers
- Build up a legitimate system (Regulations) to implement safe administration of BMWM

4.10.2 Regional Level

- Translate policy guidelines and standards into actions
- Follow-up districts on BMWM monitoring issues
- Support districts to solicit adequate funds for maintaining hospital hygiene
- Ensure that the BMWM plan of each hospital is in Similarity with the national rules they shall set up regular monitoring and control procedures.
- Analyze BMWM monitoring reports from districts
- Organize annual meetings with district BMWM Committees/Officers to deliberate on monitoring reports
- Assist districts in addressing BMWM operational issues/problems identified in the monitoring process
- Provide feedback to districts on BMWM performance.
4.10.3 District Level

Build up an arrangement and spending plan for BMWM and consolidate it into the far reaching Council Health Plan (Include operation and support)

- Plan disease avoidance and control advisory group
- Incorporate BMWM in the supervision agenda. Provide details regarding BMWM
- Make Data Base for BMWM
- Dole out Responsibilities
- Stick to BMWM stream framework
- Guarantee appropriate isolation, accumulation, stockpiling, treatment and transfer
- Screen and Inspect any healing center, treatment or transfer office situated inside the range of his ward to watch that the arrangements of the National rules are being conformed to any contradiction should be accounted for.
- Make people group mindfulness on BMWM dangers.

4.10.4 Health Facility level

Guarantee that observing devices (Checklists and Questionnaires) are finished at every point in the BMWM steam (era, stockpiling, transportation and transfer)

- Keep up a BMWM development log/enlist at every purpose of BMWM stream
- Gather finished BMWM apparatuses and abridge them on a week after week premise and submit to area BMWM Committee/Officer
- Recognize holes/shortcomings in BMWM handle and prompt office administration regularly on remarkable issues
- Lead/sort out month to month gatherings with all work force keeping an eye on focuses in the BMWM stream and get ready quarterly reports.
- Hone appropriate isolation, gathering, stockpiling, treatment and transfer of Biomedical waste
- Arrange and obtain working gear's for BMWM
- Screen and oversee every day BMWM exercises.

**Figure 4.6:** Color coding bins of health care centres
4.11. Conclusion

With the couple of special cases, the current BMWM works on existing are not protected and have hurtful wellbeing and ecological impacts that should be tended to direly.

Requesting for fitting budgetary asset for the consistent execution of the National Biomedical Waste Management

Arrange at all levels will remain a key issue for its application

The maintainable usage of safe methods to oversee social insurance Waste requires an enduring duty at all levels up to the families.

Sufficient supply of hardware's at the human services offices will encourage the organization and therapeutic staff the fundamental devices to apply the institutionalized systems in their foundations and medicinal administrations:

In-administration preparing program and sufficient educational program should be set up took after by the continuous preparing of all staff

Screen execution of usage of BMWMM exercises at all levels and give specialized support

Last however one we require support of our advancement accomplices in financing the procedure and specialized help where required.