Investigation of hospital solid waste management in Iran

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Abstract: In Iran, little information is available regarding generation, composition, handling and disposal of hospital waste. The aim of this study was to investigate of the hospital waste management in 44 public hospitals and 15 specialised hospitals in 13 provinces of Iran. This study was an observational-cross-sectional interview and data collected method field. The results showed that a per capita rate of hospital wastes in Iran is 3.16 kg per bed per day in public hospitals and 3.7 kg per bed per day in specialised hospitals. The solid waste from the public hospitals consists of general waste 56%, medical 42%, sharp 2% and in specialised hospitals general waste 63%, medical 36%, sharp 1%. The paper shows that for the most part of hospitals under study, some of the general waste was mixed with infectious waste, which was collected, transported and disposed of in a similar manner as infectious waste.

Keywords: medical waste; waste management; hospital waste; infectious waste; Iran.


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1 Introduction

The rate of generation of waste in the developing countries is increasing with an increase of population (Esfandyari et al., 2014; Jaafari et al., 2014). Contaminants from this waste have polluted water, air, and soil (Kamani et al., 2014; Ghozikali et al., 2014). Healthcare activities can cause the generation of various types of solid wastes that may have adverse impacts on human health and plant. Hospital waste, because the nature of infectious, can be one of the most dangerous sources of pollution (WHO, 2001; Alam et al., 2008). Hospitals and medical centres have a special responsibility in regard to waste production. They should ensure that the waste generated does not cause a negative impact on the environment and public health (Askarian et al., 2004). According to the definition of World Health Organization (WHO, 2001, 1997), any solid waste that is produced in diagnosis, treatment or immunisation of human being or animals, in research pertaining thereto, or testing of biological, including but not limited to: soiled or blood soaked bandages, the culture dishes and other glassware, it also includes surgical gloves and discarded tools, needles, the culture, stock and swabs used to inoculate, cultures and removal of organs. Environmental hazards caused by improper waste management are considered as one the most important problems in developing countries. As the volume and complexity of healthcare waste is increased risk of disease transmission during transport and disposal is also increasing (Abduli, 1995; Dehghani et al., 2008; Ali and Kuroiwa, 2009). Today identified the specific categories of medical waste among waste containing hazardous potential. From all waste produced in healthcare centres 75 to 90% of waste is non-risk or general waste and 10 to 25% of remaining is infectious and dangerous, and may cause numerous health risks. Although the portion of infectious and hazardous waste is relatively small, but improper management of this waste can lead to contamination of greater volume of general waste (Chaerul et al., 2008). In several studies were shown that the highest risk of disease transmission in the labourers, carrying the hazardous waste associated with AIDS, hepatitis B and C, and tuberculosis (Johnson et al., 2000; Braden et al., 2001; Almuneef and Memish, 2003). In developing countries, the importance of hospital waste is inadequate (Tudor et al., 2005). And in many countries still transport and disposal of hazardous waste and medical waste has been associated with domestic waste (Da Silva et al., 2005). Most of Iranian cities domestic wastes and health-care wastes have been collected together for disposal in municipal dumpsites or poorly designed landfills or incinerators, which creates maintenance and operation, problems. Planning of healthcare waste management is essential to prevent harmful effects on human health and environment. For the successful implementation of any medical waste management plan, availability of sufficient and accurate information about the quantity and composition of waste produced is critical (Almuneef and Memish, 2003; Da Silva et al., 2005; Geng et al., 2013). Over the years, various waste management systems, procedures and different methods have been reported for the proper and safe handling and disposal of hospital waste, some of this practice includes landfill (Liu and Yu, 2003), incineration (Tzanakos et al., 2014), autoclaving (Palenik and Curnberlander, 1993), and recycling (Lee et al., 2002). Generally, there is no single approach as a solution to the problems of managing hospital waste. So in most of cases, a
number of approaches are used in combination that each practice has its strengths and weaknesses (Nemathaga et al., 2008). Also, WHO has provided comprehensive guidelines on safe, efficient and environmentally sound methods for handling and disposal of medical wastes (WHO, 2001, 1997; Prüss et al., 1999).

The aim of this study was to assess the solid waste management practices in Iran by looking at 59 hospitals, which determines quantity, composition and per capita healthcare waste in general and specialised hospitals to proper management of healthcare waste in hospitals and reduce the risks of hazardous waste.

2 Materials and methods

This study was an observational-cross-sectional interview and data collected method field. Time of the study in December 2010 to December 2011 has lasted for a year. In this study, Sampling each month at the beginning and end of month in first and end week of every month and sampling over seven days a week was done.

2.1 Background to the case study hospitals

Iran is located in the Middle East, between Turkey and Iraq on the west and Afghanistan and Pakistan on the east. Its area 1.648 million sq km (636,296 sq miles) and population equivalent 75.1 million (2010 estimate) and Tehran is capital city. This study field was 59 hospitals (44 public hospitals and 15 specialised hospitals) at 13 provinces of Iran, Including provinces Tehran, Kerman, South Khorasan, Khorasan Razavi, North Khorasan, Sistan va Baluchestan, Golesthan, Gilan, Semnan, Fars, Kermanshah, Alborz and Markazi (Figure 1).

2.2 Data collection

Study method consists of two stages, including:

- Data collected through the use of methods and questions. Checklist for recommended WHO for developing countries was used and in this checklist general information of hospitals, state personnel associated with the healthcare waste, and waste management procedures, including waste generation, quantity, separation, collection and final disposal of waste was considered (WHO, 2001, 1997).

- Weighing of waste according to type of container that the characterised in Table 1, twice one at 8 AM and the second shift at 6 PM collected and in the temporarily stored was done.
Figure 1  Location of studied area (see online version for colours)

Table 1  Types of containers used to collect different types of hospital solid waste (this study)

<table>
<thead>
<tr>
<th>Types of waste</th>
<th>Container</th>
<th>Colour used by hospitals</th>
<th>Recommended colours</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Plastic bag in bin container</td>
<td>Black/red plastic bag</td>
<td>Black plastic bag</td>
</tr>
<tr>
<td>Solid chemicals and</td>
<td>Plastic bag in bin container</td>
<td>Red plastic bag</td>
<td>Yellow-plastic bags/container</td>
</tr>
<tr>
<td>pharmaceutical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical and infectious</td>
<td>Plastic bag in bin container</td>
<td>Red plastic bag</td>
<td>Yellow plastic bags/container</td>
</tr>
<tr>
<td>Sharp</td>
<td>Safety box</td>
<td>Yellow bin beez</td>
<td>Yellow bin beez</td>
</tr>
</tbody>
</table>

2.3  Categories of generated waste

According to WHO’s (1997) classification, waste is classified as general, medical and sharps. Also provided for different categories of hospital waste has been that form:
• **General or semi household waste:** the kitchen waste, office areas, green space and landscaping.

• **Pathological wastes:** body tissues and parts of the biopsy, autopsy and surgical occur.

• **Infectious waste:** Laboratory wastes, such as culture, surgical and autopsy cases of waste, waste isolation wards that infected patients are hospitalised. Wastes that are produced from parts of infectious patient’s hemodialysis, such as pipes and filters, disposable towels, gowns, bands and gloves and waste that are in contact with animals inoculated with infectious agents.

• **Pharmaceutical and chemical waste:** These wastes include pharmaceutical products, drugs and chemicals are the wards that are returned or discarded also contain: drugs that last history their consumption or have been infected, solid waste, liquid and gas are mainly the result of laboratory activities, cleaning, cleanliness and disinfection are produced.

• **Sharp waste:** These devices include needles, surgical scalpel, saws, and broken blades, pins or any other device that can be cut and holes in the body.

Wastes were segregated according to WHO classification. The place and situation of present solid waste management was investigated and viewed. First, bags and special containers for waste separation shown in Table 2 were distributed. Then separation of samples based on scientific principles and international standards were weighed. Then using a standard checklist data was collected at all stages of waste management.

3 Results

The preliminary results of sampling and analysis was performed including quantity and type of hospital waste and its management as follows:

3.1 Quantities of generated waste

Table 2 shows the components of waste generated as a general, medical, sharp is the Iran hospitals that medical waste their three pathological waste, chemicals and pharmaceutical waste and infectious waste is divided.

Also, the percentage of hospital waste components as general, medical, sharp in public hospitals in Figure 2(a) and specialised hospitals in Figure 2(b) is shown. As can be observed in Figure 2(a) general waste is 56% (9,289.5 kg), medical is 42% (6,942 kg), sharp is 2% (265.4 kg) of the total hospital waste (16,496 kg) in public hospitals and that total number of active bed in these hospitals were 5,206. Also, according to Figure 2(b), in specialised hospitals, general waste 63% (3,967.5 kg), medical 36% (2,223 kg), and sharp 1% (81 kg) of the total hospital waste (6,271.8 kg) that total number of active was 1,694.
### Table 2: Average daily generation of hospital wastes for each province and percent of total (%)

<table>
<thead>
<tr>
<th>Province</th>
<th>Type of hospital</th>
<th>Number of hospital</th>
<th>Number of active beds</th>
<th>General</th>
<th>Infectious</th>
<th>Pathological</th>
<th>Pharmaceutical and chemical</th>
<th>Sharp</th>
<th>Total</th>
<th>Weight ratio general to infectious</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(kg/day)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>(%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tehran</td>
<td>Specialised</td>
<td>5</td>
<td>844</td>
<td>1,718.5</td>
<td>1,100</td>
<td>9.7</td>
<td>9</td>
<td>27</td>
<td>2,864</td>
<td>1.56</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>(60)</td>
<td>(38.4)</td>
<td>(0.34)</td>
<td>(0.32)</td>
<td>(0.94)</td>
<td>(100)</td>
<td></td>
</tr>
<tr>
<td>Tehran</td>
<td>Public</td>
<td>8</td>
<td>1,211</td>
<td>2,820.5</td>
<td>1,425</td>
<td>13.8</td>
<td>12</td>
<td>42</td>
<td>4,313</td>
<td>1.97</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(65.3)</td>
<td>(53)</td>
<td>(0.32)</td>
<td>(0.28)</td>
<td>(0.97)</td>
<td>(100)</td>
<td></td>
</tr>
<tr>
<td>Kerman</td>
<td>Public</td>
<td>7</td>
<td>596</td>
<td>918.5</td>
<td>706</td>
<td>5</td>
<td>5</td>
<td>43</td>
<td>1,722</td>
<td>1.3</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>(53.3)</td>
<td>(40.9)</td>
<td>(0.3)</td>
<td>(0.3)</td>
<td>(2.5)</td>
<td>(100)</td>
<td></td>
</tr>
<tr>
<td>South Khorasan</td>
<td>Public</td>
<td>5</td>
<td>569</td>
<td>488.5</td>
<td>965.5</td>
<td>3.1</td>
<td>5</td>
<td>77</td>
<td>1,638</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(30)</td>
<td>(59.3)</td>
<td>(0.19)</td>
<td>(0.31)</td>
<td>(4.7)</td>
<td>(100)</td>
<td></td>
</tr>
<tr>
<td>Khorasan Razavi</td>
<td>Specialised</td>
<td>2</td>
<td>220</td>
<td>230</td>
<td>207</td>
<td>1</td>
<td>0.9</td>
<td>4.6</td>
<td>443.5</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(51.8)</td>
<td>(46.7)</td>
<td>(0.22)</td>
<td>(0.2)</td>
<td>(1.03)</td>
<td>(100)</td>
<td></td>
</tr>
<tr>
<td>North Khorasan</td>
<td>Public</td>
<td>1</td>
<td>120</td>
<td>181.5</td>
<td>154</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>344</td>
<td>1.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(2.7)</td>
<td>(44.7)</td>
<td>(0.3)</td>
<td>(0.3)</td>
<td>(2)</td>
<td>(100)</td>
<td></td>
</tr>
<tr>
<td>Sistan va Baluchestan</td>
<td>Specialised</td>
<td>2</td>
<td>124</td>
<td>659</td>
<td>180</td>
<td>2.65</td>
<td>3.3</td>
<td>32.5</td>
<td>857.5</td>
<td>3.55</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(74.5)</td>
<td>(21)</td>
<td>(0.31)</td>
<td>(0.39)</td>
<td>(3.8)</td>
<td>(100)</td>
<td></td>
</tr>
<tr>
<td>Sistan va Baluchestan</td>
<td>Public</td>
<td>1</td>
<td>274</td>
<td>817</td>
<td>191.5</td>
<td>1.7</td>
<td>2.65</td>
<td>6.5</td>
<td>1,019.5</td>
<td>4.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(80.1)</td>
<td>(18.7)</td>
<td>(0.17)</td>
<td>(0.26)</td>
<td>(0.63)</td>
<td>(100)</td>
<td></td>
</tr>
<tr>
<td>Province</td>
<td>Type of hospital</td>
<td>Number of hospital</td>
<td>Number of active beds</td>
<td>Weight ratio general to infectious</td>
<td>Waste generation rates kg/day and percent of total(%)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>General</td>
<td>Medical</td>
<td>Pharmaceutical and chemical</td>
<td>Sharp</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Infections</td>
<td>Pathological</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(kg/day)</td>
<td>(kg/day)</td>
<td>(kg/day)</td>
<td>(kg/day)</td>
<td>(kg/day)</td>
<td>(kg/day)</td>
</tr>
<tr>
<td>Golestan</td>
<td>Specialised</td>
<td>2</td>
<td>44</td>
<td></td>
<td>95</td>
<td>705 (52.6)</td>
<td>0.32 (0.19)</td>
<td>0.68 (0.4)</td>
<td>4.5 (2.06)</td>
<td>170.5 (100)</td>
</tr>
<tr>
<td></td>
<td>Public</td>
<td>2</td>
<td>146</td>
<td></td>
<td>143</td>
<td>234.4 (36.4)</td>
<td>1.25 (0.28)</td>
<td>1.33 (0.36)</td>
<td>12 (2.72)</td>
<td>392 (100)</td>
</tr>
<tr>
<td>Gilan</td>
<td>Specialised</td>
<td>1</td>
<td>60</td>
<td></td>
<td>89</td>
<td>33 (60.5)</td>
<td>0.4 (0.28)</td>
<td>0.5 (0.36)</td>
<td>4 (2.72)</td>
<td>147 (100)</td>
</tr>
<tr>
<td></td>
<td>Public</td>
<td>7</td>
<td>501</td>
<td></td>
<td>642</td>
<td>555 (52.1)</td>
<td>3.93 (0.32)</td>
<td>4.9 (0.4)</td>
<td>24.9 (2.02)</td>
<td>1,231 (100)</td>
</tr>
<tr>
<td>Semnan</td>
<td>Public</td>
<td>3</td>
<td>186</td>
<td></td>
<td>283</td>
<td>196.5 (57.5)</td>
<td>2 (0.4)</td>
<td>1.6 (0.33)</td>
<td>7.5 (1.52)</td>
<td>491.5 (100)</td>
</tr>
<tr>
<td>Fars</td>
<td>Public</td>
<td>3</td>
<td>550</td>
<td></td>
<td>861</td>
<td>742 (52.9)</td>
<td>3.2 (0.4)</td>
<td>3.7 (0.23)</td>
<td>17.2 (1.05)</td>
<td>1,626.2 (100)</td>
</tr>
<tr>
<td>Kermanshah</td>
<td>Specialised</td>
<td>2</td>
<td>342</td>
<td></td>
<td>1,024</td>
<td>468.5 (67.8)</td>
<td>6.5 (0.43)</td>
<td>2.7 (0.18)</td>
<td>7.7 (0.51)</td>
<td>1,509.7 (100)</td>
</tr>
<tr>
<td>Alborz</td>
<td>Public</td>
<td>1</td>
<td>175</td>
<td></td>
<td>218</td>
<td>203.8 (47.6)</td>
<td>2 (0.45)</td>
<td>1.3 (0.3)</td>
<td>6 (1.31)</td>
<td>458 (100)</td>
</tr>
<tr>
<td>Markazi</td>
<td>Specialised</td>
<td>1</td>
<td>60</td>
<td></td>
<td>172</td>
<td>105.5 (61.5)</td>
<td>0.7 (0.25)</td>
<td>0.6 (0.21)</td>
<td>0.7 (0.25)</td>
<td>280 (100)</td>
</tr>
<tr>
<td></td>
<td>Public</td>
<td>4</td>
<td>666</td>
<td></td>
<td>1,642.5</td>
<td>1,164 (57.9)</td>
<td>9 (0.31)</td>
<td>8 (0.28)</td>
<td>9 (0.31)</td>
<td>2,855 (100)</td>
</tr>
</tbody>
</table>

Table 2 (continued)

Average daily generation of hospital wastes for each province and percent of total (%)
4 Discussion

The general waste generated from food packaging units and visitor activities, compared with the infectious waste makes up a large part that a lot of part this waste have the recycling potential. According to statistics available daily 450 tons hospital waste is produced in Iran (Adib Hesami et al., 2007). Awareness of quality and quantity of waste produced in healthcare centres is important. Factors that affect volume of waste produced can be pointed to the following (Mato and Kassenga, 1997; Zarezadeh and Aghasi, 2004):

- the type of medical services offered and the usage of disposal equipment using disposable equipment increases the volume of waste produced

- the patients socioeconomic and cultural situation and the hospital’s own condition.

The amount of waste produced per capita according to Kg per bed per day for 13 provinces studied is given in Figure 3.

As can be observed in the chart, the highest generation rate for total hospital waste in public hospitals was found at Markazi Province (4.25 kg/bed/day) and the highest amount for hospital waste in specialised hospitals was found at Sistan-Baluchestan province (6.9 kg/bed/day) in contrast the lowest rate for total hospital waste in public hospitals and specialised hospitals was found at Gilan Province (2.45 kg/bed/day) and Khorasan Razavi Province (2.01 kg/bed/day) respectively.

In Iran, per capita rate of hospital waste in public hospitals 3.16 and specialised hospitals were 3.7 kg per beds per day. Also medical waste per capita in public hospitals in Iran was 1.33, infectious waste 1.31, general waste 1.78 and sharp 0.05 kg/b/d and specialised hospitals medical were 1.31, infectious waste 1.29, general waste 2.34 per capita waste and sharp 0.047 kg/b/d that is shown in Figure 4. This amount variable in different countries which in Table 3 list of countries with different amounts of hospital waste is given. The generation rates for the USA and Canada more than the amount reported because generally these countries are modern country with good equipment, and modern services. In Canada and the USA, the generation rates were reported to range
from 4.3–5.8 kg per bed per day that this value is higher than per capita in Iran. Also in Japan medical waste generation rate is between 1.5 and 3.0 kg/bed day, 4.4 in Spain, 4.01–6.1 kg/bed/day in Jordan and 3.3 kg/bed/day in France.

**Figure 3** The amount of waste produced per capita in different provinces

![Figure 3](image)

**Figure 4** Per capita rate (kg/b/d) of hospital waste, medical waste, infectious waste, general waste and sharp in public hospitals and specialised hospital of Iran

![Figure 4](image)
Table 3  Average waste generation rate at hospitals in different countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Waste generation rate (kg/bed/day)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iran</td>
<td>3.16–3.7</td>
<td>This study</td>
</tr>
<tr>
<td>Tabriz-Iran</td>
<td>3.48</td>
<td>Taghipour and Mosaferi (2009)</td>
</tr>
<tr>
<td>The USA and Canada</td>
<td>4.3–5.8</td>
<td>Mato and Kassenga (1997)</td>
</tr>
<tr>
<td>The UK</td>
<td>3.3</td>
<td>US Environmental Protection Agency (2002)</td>
</tr>
<tr>
<td>France</td>
<td>3.3</td>
<td>US Environmental Protection Agency (2002)</td>
</tr>
<tr>
<td>Japan</td>
<td>3–1.5</td>
<td>Kaneko et al. (2003)</td>
</tr>
<tr>
<td>Spain</td>
<td>4.4</td>
<td>Kaneko et al. (2003)</td>
</tr>
<tr>
<td>India</td>
<td>0.5–2</td>
<td>Patil and Pokhrel (2005) and Patil and Shekdar (2001)</td>
</tr>
<tr>
<td>Turkey</td>
<td>1.92–2.1</td>
<td>Karaka (2002)</td>
</tr>
<tr>
<td>Kuwait</td>
<td>3.87–7.44</td>
<td>Alhumoud and Alhumoud (2007)</td>
</tr>
<tr>
<td>Thailand</td>
<td>0.11–0.65</td>
<td>T.C. Report (2001)</td>
</tr>
<tr>
<td>Jordan</td>
<td>4.01–6.1</td>
<td>Bdour et al. (2007)</td>
</tr>
</tbody>
</table>

As shown in Figure 2, general waste is generated from packaging, food preparations and visitors’ activities. This waste, compared with the infectious waste makes up a large part that has potential for recycling, but some of them maybe contaminated with infectious agents. As a result, 56–63% of the hospital waste in Iran is general waste while in other countries it was 75–90%.

Also sometimes cleaning workers in healthcare units collect and sell recyclable materials such as plastics, glass and metals. This is a hazardous act that is associated with high risk for serious infection and disease.

4.1 Collection, storage and transportation

Waste collected from wards, in 25% of hospitals is done manually, in 50% of hospitals wards collected from a wheeled cart and in 25% of the centres wheeled trolley.

Cleaning workers and nursing assistants are responsible for collecting, storing and transporting medical waste generated for external storage. Temporary storage area of waste should be sanitised and according to scientific standards. The infectious wastes in the tropical area can be kept in a temporary storage area for 24 h during the hot season and up to 48 h in cooler seasons (Prüss et al., 1999). That in 67% of hospitals the temporary area was kept sanitised and temporary area in some hospitals lack bins and waste bags placed on the floor and the leachate is current on the floor that this issue can cause health problems.

4.2 Healthcare workers

In the hospitals under study, all solid waste services workers have personal protection equipment’s and only 25% of studied hospitals waste services workers in terms of health checked every six months.
4.3 Health training to hospital staffs

In Tehran hospitals, 15% of managers, 45% of nurses and practical nurses, 40% of cleaning workers in each hospital were undergoing training hospital waste management that health training healthcare workers in quantity of waste production and the safety of staff is very helpful. For example, in a hospital in Sistan va Baluchestan after health training infectious waste rate from 2 kg/b/d to 1 kg/b/d decreased.

4.4 Problems observed

- In some hospitals, hospital waste management and separation of hospital waste management was improper. It was observed that inside infectious waste bag contain a lot of non-infectious waste that causes their contamination and increase volume of infectious waste.
- In most cases, the hospital does not label of infectious waste for bags.
- In temporary positions in some hospitals, an adequate and separate bin with door waste does not exist for infectious and non-infectious wastes.
- Workers related to the collection and transportation solid waste do not have enough information on the hazards of hospital waste.
- In most hospitals, there was no proportion between device capacity and volume of infectious solid waste.

5 Conclusions and recommendations

Insufficient segregation, classification of waste were noted at all surveyed hospitals. For the most part, some of the general waste was mixed with infectious waste, which was collected, transported and disposed of in a similar manner as infectious waste. Environmental measures or recycling programs were not available. To implement better solid waste management, there should exist bins with different colours and appropriate yellow bags for infectious solid waste, blue or black suits bins or bags for household like solid waste, brown plastic bags or bins for pharmaceutical and chemical waste and safety box for sharp infectious waste it seems necessary.

- waste bags and safety box, after 3/4 it feels full should be properly tied and it labels related to should be attached.
- for easy emptying waste in the centre waste production, trolleys or bins used for each type of waste
- the temporary storage waste to reduce the spread of any disease should be properly kept clean
- environmental health education is needed for nurses on hospital waste management followed by strict monitoring for compliance
- safe making of infectious waste is associated with cost centres and infectious waste volume reduction seems to be necessary, studies show that in many cases
non-infectious waste is disposed into the infectious bins and this action due to lack of compliance the separation of hospital waste is intensified by the patient and associated patient is intensified

- it is suggested that the yellow bins apart from the maternity rooms, emergency rooms and dialysis, CCU and ICU isolates be gathered until access accompanying patient and patient to an infectious bin reduced and better separation is performed
- for using safety maker equipment, initially waste management is initially trained until reduced problems and optimal use of the devices is taken
- before buying a safety maker device, initially volume of infectious waste in centres be calculated then device proportional to waste volume of the centre will be purchased.

References


