

The Current Status and Steps Towards Hospital Waste Management in the Public and Private Sector Hospitals of District Swabi, KP, Pakistan.

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Abstract

Hospitals in Pakistan generate a huge mass of waste which has been reported to be managed and handle poorly by the hospital administration. This mismanagement causes several environmental and health problems inside the hospital and outside of the population. The present study aimed to describe the qualitative results of observations of 4 major public and private sector hospitals in the city of Swabi, KP, Pakistan. The required data was obtained through direct and indirect observations of the medical and administrative staff to know the way they handle the waste. One of the important aspects of our methodology was the development of appropriate questionnaires to understand the nature of the system. Findings of the study showed that almost public sector hospitals generate a big mass of solid waste (120-130 kg per day) and don't keep its management on their priority. The practices of waste handling, segregation, storage, transportation and disposal were below the Pakistan biosafety rules-2005. The private sector hospitals participate about 30-50 kg waste generation per day and were observed in better condition for waste handling and management. The recovery efficiency of collected salable waste was calculated as follows: plastic 14-10%, paper 10-15%, glass 12-17% and scrap/metal with 7-12% respectively. Rules and regulations regarding biomedical waste are not adequately followed. The study highlights improper management of waste in public sector hospitals. For better waste management, the hospital needs financial resources, skilled staff and the implementation of the 2005 hospital policy.

Keywords: infectious waste, non-infectious waste, waste management, collection efficiency, waste disposal.

Introduction

Hospitals are a place where patient problems are diagnosed, analyzed and treated. The generation of waste is essential during these activities. This waste is called "hospital waste" and refers to all waste, biological or non-biological, which has been discarded and will never be reused ¹. In hospitals, waste is produced during the treatment of infections and injuries. Most of the time, medical waste is considered contagious waste, if medical waste and other waste are not collected separately. When all waste is combined, then hospital waste is considered contagious waste ².

The term hazardous waste is applied differently in different countries, including harmful chemicals, industrial waste, hospital waste, electronic waste, radioactive waste. These waste put harmful health impacts on human when not handled properly. Hazardous waste is considered risky to health which includes infectious, pathological, pharmaceutical, chemical, genotoxic and radioactive wastes. Traditionally, hospital waste is disposed of with municipal waste. However, since the late 1980s, the proliferation of blood related diseases such as the HIV hepatitis and various other diseases raised public awareness of the dangers of hospital waste recycling ³. Concerns have been raised. Therefore, medical waste requires special treatment and should not be mixed with municipal waste. Good medical waste

management requires special handling such as disposal or landfill facilities. Previous studies show that the best available technology for medical waste disposal is incineration⁴. Non-hazardous waste is produced by food scraps and their packaging⁵. Poor management of hospital waste has serious health effects from a public health point of view. A literature revealed the average production of infectious waste by a local/rural hospital in Pakistan is about 1.35 kg per day⁶. According to a latest study by Sadia et al,⁷, an average of 1.33 kg minimum and upto 5 kg maximum of infectious waste is produced by a rural hospital per day in Pakistan. This happened because many medical accessories and clinical materials have been used in emergency cases, especially in maternity cases.

In Pakistan, the situation of hospital waste management is not much better because solid waste consists of toxic and noxious items that are difficult to handle. Exposure to this solid waste, when not properly managed, has a significant impact on the local environment and public health. For example, biohazardous waste generated by hospitals and other medical establishments contains a variety of components that have potentially infectious properties and pose a particular threat to public health as well as to the natural environment. It becomes more dangerous during pandemics and during curing methods⁷. The literature has revealed that most hospitals and independent doctors in Pakistan do not follow medical waste management practices, resulting in serious injuries and infections for themselves, other staff and patients^{8,9,10}. Hospital waste in Pakistan is a source of various diseases and is also a target for soil researchers who rely on collection, recycling of syringes and other hazardous waste¹¹. In particular, undercover teams in Pakistan are involved in selling used syringes in the markets¹². In Pakistan, junior health workers suffer serious injuries that are of concern to hospitals and account for around 54% of health workers. This is poorly trained staff, poor calibration system, ignorance of waste management and concern for teaching staff¹³. Providing health care is a challengeable task for many underdeveloped countries. Pakistan also ranked among poor countries with 22.3% poverty line covering 5% of population with social health insurance^{14,15}. Therefore, people become dependent on private health care providers. Therefore, the situation of private hospitals is to some extent better than that of public hospitals. It has been pointed out that the legitimacy of all aspects of cervical cancer in Pakistan is due to lack of trust in doctors, tenacity, compassion for female patients in certain issues and this standard should be measured on a large scale¹⁶. The researcher discovered in 2007 that hospitals do not have an infection control committee or any other unit. Healthcare did not show clean hands when treating patients¹⁷. The study found significant differences between public and private hospitals in terms of patient satisfaction and confidence. The standards of hospital services are improved and surgical instruments are safe in private hospitals. In private hospitals, doctors, as well as other service providers, differed in their intellectual skills and professionalism. Patients rely on the services of physicians based on their comprehensive training. Respect for the environment, maintenance staff, cleanliness and invincible products are important to mention in private hospitals¹⁸.

COVID-19 has significantly affected the health sector, particularly in low-income countries having already a friable system¹⁹. In addition to the loss of life, the COVID-19 pandemic has also affected waste disposal and recycling practices. The excessive use of masks has increased the problems of pollution of the environment (aquatic and terrestrial ecosystems). Total containment has stopped the waste reception centers. An increase in COVID, patients may not delay diagnosis and treatment of the surgical disease, but also played a significant role in poor waste management practices²⁰. Hospital waste comprises a big share of non-hazardous waste and a lower part of infectious waste. Risks to hospital waste can lead to illness. The hazardous nature of hospital waste may be due to one or more of the following characteristics, such as containing infectious agents and being genotoxic. The persons who are in contact or exposed to hospital waste are potentially at higher risk, comprising hospital staff such as medical personnel (doctors and nurses) and sweepers who handle this waste or are exposed to it as a result of mismanagement²¹.

This study highlights the challenges and initiatives adopted to ensure safe waste management services in Swabi district hospitals. Swabi District is located in the south and southwest of Khyber Pakhtunkhwa Province, Pakistan. The city is located near the bank of the Indus River, covers about 1,543 km² area with a population load of 1,624,616²². The district health system is good, but not too good. Several public and private hospitals are available in the district. In Swabi city, the main public hospitals are the Swabi District Health Quarters hospital (DHQ) and the Bacha Khan Medical Complex

(BMC). Among the private sector hospitals, the well-equipped health center is Jamal Medical Center (JMC) and Sardar Swabi Medical Center (SMC). All of these hospitals are located by road and easily accessible to visitors. The availability of medical staff at the public hospitals is not sufficient to treat patients. Therefore, locals used to go to private sector hospitals for medical treatment.

Material and methods

In this study, two type hospitals in the Swabi district of Khyber Pakhtunkhwa were selected and assessed to know the process of hospital waste management. For this, major public and private sector hospitals were selected. i) District Head Quarter Swabi, Bacha Khan Medical Complex (public) and ii) Sardar Medical Center Swabi, Jamal Medical Centre Swabi (private). The hospital investigation consists of critically examining the quantity of waste generated, waste collection, transportation, segregation, treatment and disposal. This assessment studied the protection at work of the responsible person, the degree of intensity with which the various directives are followed in the institutions and the rules and procedures obligatory by the organizational staff to maintain a hygienic environment around. This investigation also focused on potential difficulties to staff and workers associated with disposal of waste. To assess this, a questionnaire analysis was developed and a survey was conducted in selected hospitals. The data was collected on the basis of interactive interview sessions with the person in-charge, the survey of hospital units, field visits and crucial site observations.

Hospital Survey and Analysis

First, a reconnaissance survey was conducted to locate and identify hospitals. In the results, four hospitals were selected as representative for the study. The selection of hospitals was made on the basis of the locality (the most accessible sites), the number of patients and the area covered by the hospitals. The selected hospitals are the well-known health care units in the city having high bed capacity with high volume of patient visitors per day. About 7-8 field visits were paid and the selected hospitals were kept under observation for waste generation process until waste disposal.

Questionnaire Survey

To find out about the waste management strategy, a questionnaire session was supervised. Two questionnaires were designed, comprising both structured and unstructured questions. These questionnaires were completed by the team responsible for the hospital and waste management. These questionnaires were designed to identify various factors that limit the appropriate management of waste generated in various hospital units and its safe disposal. The questions of the mentioned questionnaires were planned to cover subjects of following given categories;

1. Quantity of waste generation
2. Waste collection and transportation
3. Waste storage
4. Waste segregation
5. Waste treatment and
6. Waste disposal.

Composition of Hospital Solid Waste

To know about waste composition, samples were divide into two groups for recyclable and non-recyclable items. For this, different waste items were identified in separate labelled plastic bags. These items were in dry form including paper, plastic glass, sharps etc. (Table-1). Each item was weighted/quantified with the help of digital scale and their quantity was expressed in percentage. Furthermore, scrap collection points locally called as *kabari shops* were also visited to know about the quantity and composition of waste coming from hospitals on daily basis.

Table 1: Composition of Solid Waste at Hospitals

Type	Waste
Recyclable/Saleable Waste	Plastic
	Paper
	Food
	Metal/Iron scrap
	Glass
Non-Recyclable Waste	Syringes and Sharps , Construction and demolition waste including sand, stones etc.

Visit to Tehsil Municipal Administration (TMA)

The 3rd part of the questionnaire was designed to gather information from Tehsil Municipal Administration Swabi (TMA). TMA is an administrative department, responsible for solid waste collection and its disposal. The office of the TMA was visited and data was collected regarding the following categories as:

1. Quantity of waste collection
2. Number of vehicles used for waste collection
3. Number of waste management team
4. Pattern of waste collection for hospitals
5. Pattern of waste Disposal
6. Site of disposal

Data Analysis

The data was analyzed using Microsoft Excel sheet-2007.

Waste Collection efficiency: The collection efficiency of waste generated by hospitals was calculated using equation (Equ.1).

$$E = CW/TW \times 100 \dots\dots\dots (1)$$

In this equation, E shows the collection efficiency of solid waste, CW shows the overall waste collected where TW shows the total waste generated by particular hospital. TW was calculated by investigating hospitals for waste generation while CW was measured at dumping site, ensuring waste carried by vehicles per day.

Results and discussions

Management and Implementation in Public/Private Sector Hospitals

Personal observation of the present study observed that both public sector hospitals were two-story buildings with 33 and 22 departments in the DHQ and BMC respectively. In private sector hospitals, the buildings were also double-stories with 22 (SMC) and 6 (JMC) departments respectively. These departments include the department of Surgery, Medicine, Ayurveda, Radio-diagnosis and Imaging, Pediatrics and Adolescent Medicine, Gynecology and Maternity, Orthopedic Surgery, Dentistry and Physiotherapy. Inside the hospital premises, the hospital wards are well equipped with adjoining toilets and intercom facilities in the general wards and ventilators, piped oxygen, central vacuum and compressed air in intensive care units (ICU). The hospital waste is looked after by the waste management team in the public sector hospital included 30-36 staff members and it is around 8-10 members in the private sector hospitals. The medical staff record in the public sector hospital was in the range of 350-403 and 10-12 in the private hospitals (Table 2).

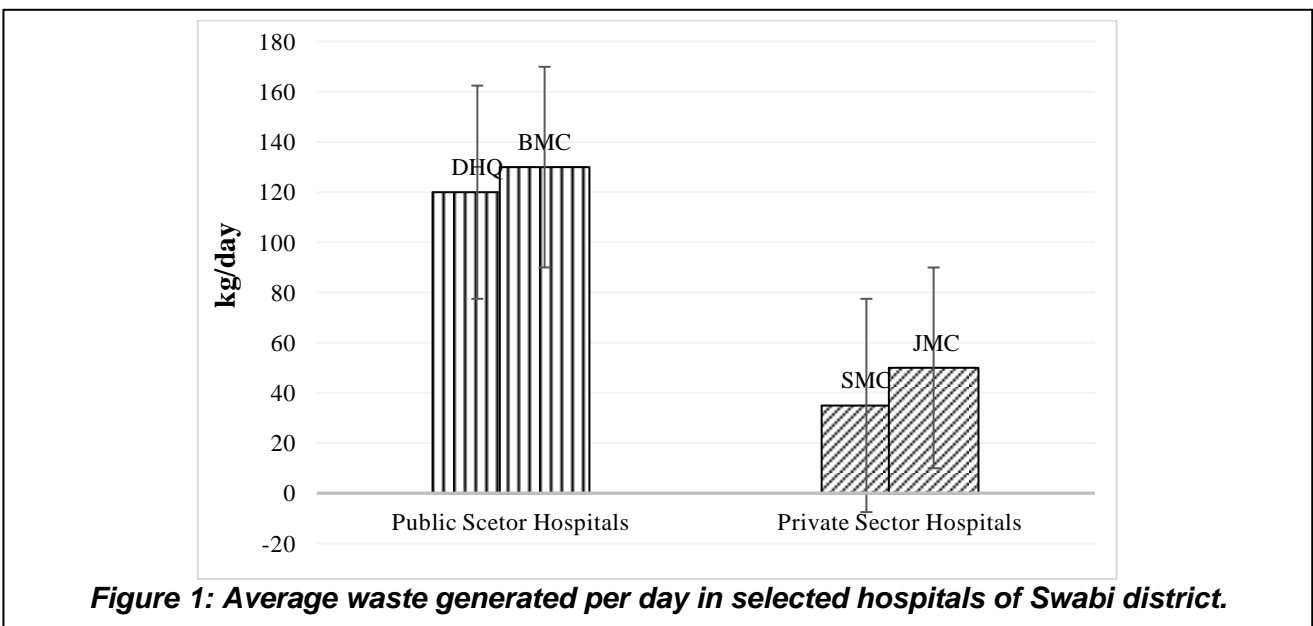
Table 2: Data collected from Public and Private Sector Hospitals

S.No	Question	Response			
		Public Hospital		Private Hospital	
		DHQ	BMC	SMC	JMC
1	Bad capacity/patient	90-100	360	30	35
2	Outdoor patients per day	1500-2000	2700-3500	250-300	500-800
3	No. operation theaters	3	6	1	3
4	No of medical wards	5	10	2	3
5	Major operations conducted per day	12-15	18 -20	5-8	10-15
6	No. Medical staff	403	350	10	12
7	No. HWM staff	30	36	10	8
8	knowledge about HWM-2005 rules	No	No	No	Somehow
9	Existence HWM plan	No	No	No	Yes
10	Record of HWM in written	Monthly	No	Monthly	Annually
11	Budget for HWM	NA	NA	80000/ month	100000/ month
12	Tasks for HWM team	Not specified	No	Neat and clean	Neat and clean
13	Training about health care waste management	No	No	Yes	Yes
14	Quantity of waste generation (kg per day)	120	130	35	50
15	Waste collection	Yes	120	Yes	Yes
16	Temporary waste storage site	Yes	Yes	Yes	Yes
17	Color coding for waste segregation	Yes	Yes	Yes	Yes
18	Waste handling and transport	Yes	Yes	Yes	Yes
19	Use of proactive equipment's (gloves, masks, proactive shoes, aprons etc.)	All	All	All	All
20	Waste transportation (Onsite, Offsite, Both)	Both	Both	Both	Both
21	Internal transport containers	Plastic bags/bins	Plastic bags/bins	Plastic bag	Plastic bags
22	Transport vehicles	Trolley	Trolley	Trolley	Trolley
23	Waste treatment (Incineration, chemical disinfection, autoclaving, Encapsulation, Microwave irradiation)	Incineration	Incineration	Incineration	Incineration
24	Waste disposal (open dumping, landfill, discharge into sewer, burying inside premises)	Open Dumping	Open Dumping	Open Dumping	Open Dumping
25	Incinerators (Functional, non-functional)	Functional	Non-Functional	Functional	Functional
26	Is hospital waste segregated	Yes	Yes	Yes	Yes
27	Who segregate the waste	Municipality Workers	Municipality Workers	Municipality workers	Municipality workers
28	Place of segregation available	Yes	Yes	Yes	Yes
29	Are containers identified and disinfected	No	Yes	Yes	Yes
30	For how long the medical waste used to be storage	24hrs	24hrs	24hrs	24hrs
32	Any expectations from the government in terms of waste management.	To facilities hospitals with trained staff, budget, and health facilities.			

The bed/patient capacity in the public sector hospital was recorded as 100 to 360. In private sector hospitals, the bed limit 30-35. The number of outdoor patients per day was 2000-3500 per day in the public sector hospitals and 300-800 per day at the private sector hospitals. The number of wards was observed respectively 5-10 and 2-3 in public and private hospitals. While the number of operations theaters in the public sector was 3-6 where major operations of 15-20 are conducted per day. In the private sector hospitals, the number of wards observed as 1-3 where 5-10 major operations were performed daily. In public sector hospitals, supervisors of the hospital waste management team were unaware of the HWM-2005 rules. While the private sector hospitals had appropriate HWM plan. To follow up on this plan, a training session on health care and waste management is organized once a month, replied the respondent of the private sector hospitals. The HWM file is recorded monthly in written form. All these hospitals are operational for 24 hours (Table 2).

Waste Generation

Comparative observations of the hospitals surveyed revealed that the both type of hospitals generate both infectious and non-infectious waste. The average amount of solid waste generated by the public sector hospitals studied was found to be 120 kg and 130 kg per day. The private sector hospitals generate waste as 35-50 kg per day by (Figure 1). The investigations of the present study reveals that greater part of infectious waste is generated in O.T, ICU and Cardio-thoracic vascular surgery 30-35 kg per day. While the causality monitoring & O.P.D. departments generate 25 kg per day waste. In addition, construction and demolition waste was observed about 30 kg per day due to construction work in hospitals. In both hospitals, the greatest contribution among infectious and non-infectious infections was observed for sharps and syringes and food waste.

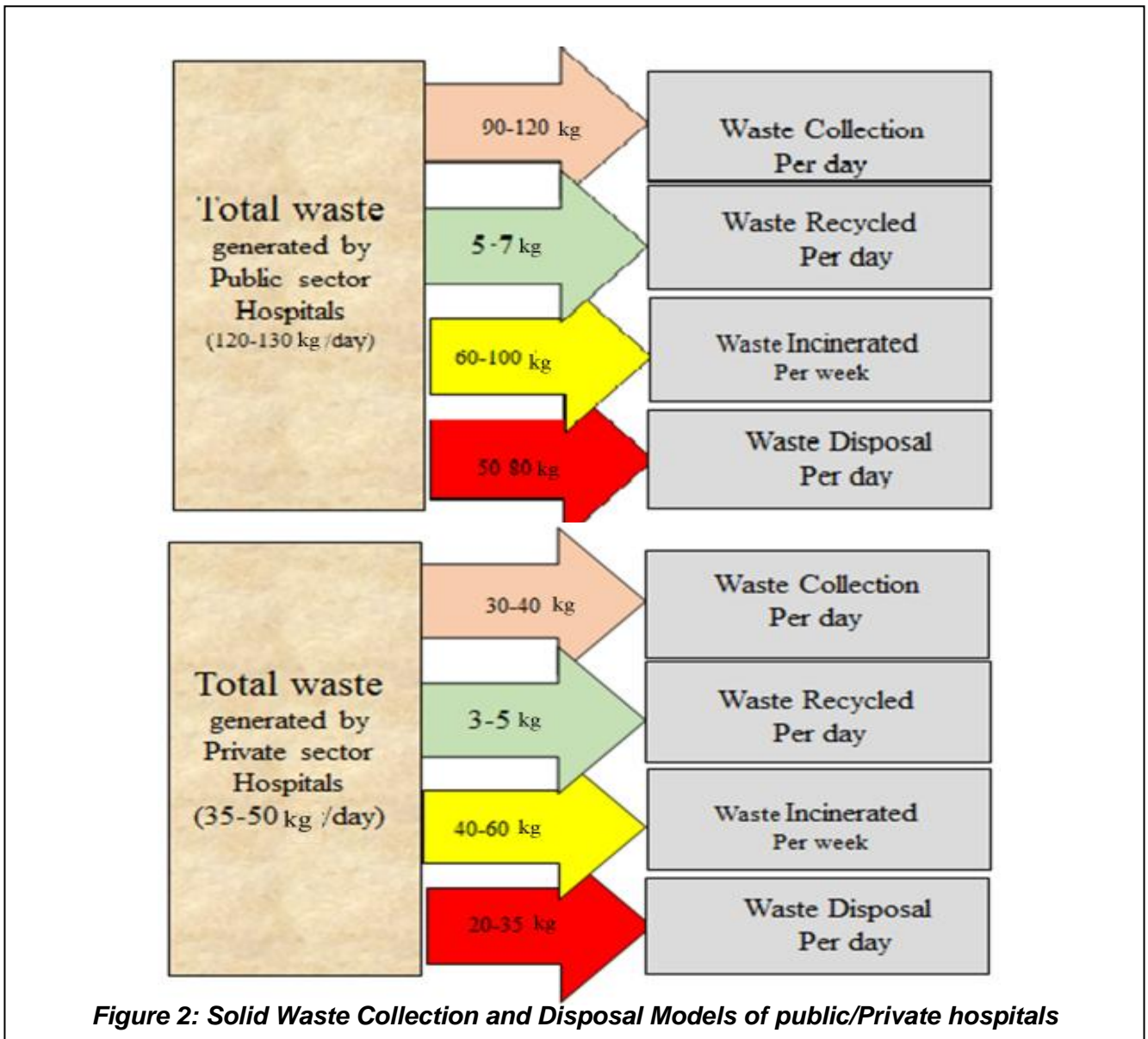


Waste Collection and Transportation

Hospital waste is collected by the hospital waste management team (HWM-team). Waste is collected and stored in plastic bins. The daily collection of solid waste by the Tehsil Municipal Administration (TMA) is approximately 50-80 kg from the public hospitals and approximately 20-35 kg from the private sector (Figure 2). These hospitals have their temporary waste storage sites inside the hospital. Proactive equipment was used like gloves, masks, proactive shoes, aprons, etc. The transport of waste takes place both indoors and outdoors. The internal transport containers were plastic bags and mobile bins. The collected waste is transported to the hospital storage site where it is stored for 24 hours. Collection efficiency was calculated as 53-60% and 60-70% for public and private sector hospitals. This waste is transported to the disposal site by vehicles. Each hospital discharges its wastewater into the sewer system directly. The quantitative account of wastewater discharge on daily basis was not in their record.

Waste Segregation

All the investigated hospitals were observed with labeled colored bins with color coding of Yellow, Red and Green to collect different types of wastes. The red bin is for infectious waste (sharps), the green bin collects non-infectious (food, paper) while the yellow bin collects the recyclable items (plastic). In public sector hospitals, the infectious waste such as sharps is segregated at the spot and then subjected to incineration plant. While the rest is sent to the disposal site. The same method is followed by the private sector hospitals. Each hospital has claimed that waste is transported with proper labeling through labeled containers to the central storage point. Dumping site is located outside of the hospital at a distance of about 5-km from hospitals.



Waste Treatment and Disposal

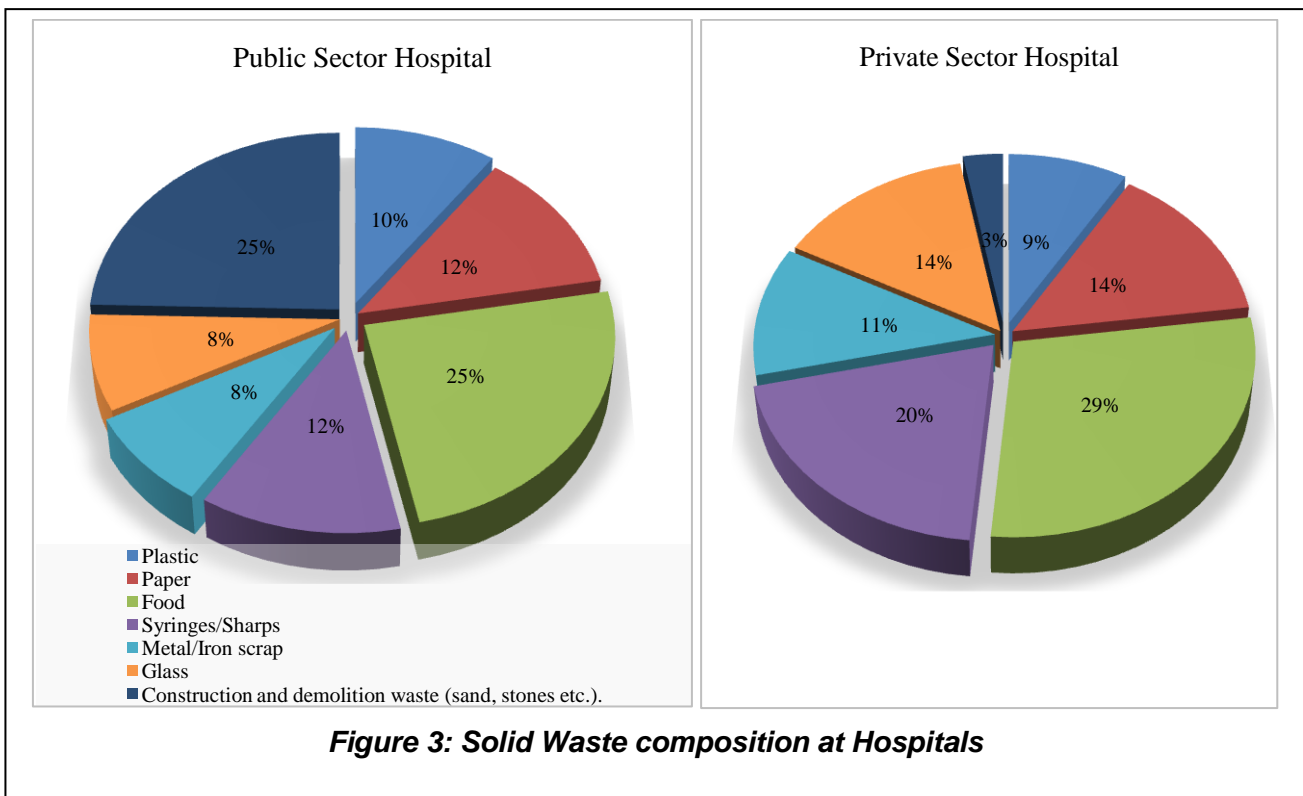
The hospitals were observed with no proper treatment plants inside or outside of the hospitals. All the collected waste is segregated at the plant site. The plastic waste is transported for the recycling whereas, the sharpen waste are subjected to incineration. For the incineration, there was a separate department. Incineration plants are installed in hospitals to incinerate the hazardous waste materials. Incineration was carried out at 8000°C to 1100°C. The resultant ash latter is dumped into the dumping site. The technician was observed fully covered with protective dress, gloves, mask, shoes and eye

protector. About 60-100 kg waste is burnt in the incineration plant once in a week by the public sector hospital. But, the incineration plant of one of the public sector hospitals (BMC) found non-functional for longer time. The person-incharge claimed that due to lacking of technical experts and financial funds, this plant is usually remained non-functional which reflects a bad picture of waste management. It was observed that the people which are directly involved in disposal and treatment procedure were not undergone any proper training program. In the private hospital, about 5-6 kg infectious waste is burnt per day. In case of any troubleshoot problem, the hospital has an expert of mechanical engineering for maintenance and fault checking. Usually the infectious waste is disposed to the dumping site, segregated by sweepers and the containers were not disinfected. For liquid wastes, no hospital has autoclaving or other methods of waste sterilization and the selected hospitals were not found serious about it.

For management of biomedical waste, incineration is considered as the most common method that reduces 10% of waste by volume. But some wastes (urine bags, body parts) cannot be disposed by incineration and thus need other treatment methods. According to legislative sections and hospital policy of Pakistan, the installation of incineration plant is mandatory in all big hospital. While failure of law is punishable by imprisonment of maximum 5-years and 1000000 rupees cash or both due to negligence of law.

Composition of Hospital Waste

The hospital waste of public sector was consisted of recyclable/saleable items such as paper (12-16%), plastics (10-12%), glass (8-15%) and iron scrap/metals (5-8%). The non-recyclable waste was observed as sharps (12%), and 25% (sand and stones etc.) as shown in Fig-3. Food waste was observed as 19-25%. Some paper and plastic shoppers, degraded or damaged cannot be recycled. In private sector hospital, the non-infectious waste was food waste (22-29%), glass (14-18%), paper (14-16%) and plastic (9-11%). The infectious waste was about 18-20% sharps produced by the outpatient department (OPD) shown in Fig-3.



Tehsil Municipal Administration

The daily waste collection by the TMA is recorded as 50-60 kg and 20-30 kg from public and private hospitals respectively. This waste is evacuated to a common landfill in Swabi located at a distance of 5 km. It has been observed that no hospital has its own treatment methods for paper and food waste mechanism. In response to a question, TMA officials replied that they were collecting garbage from 14 Union Councils in Swabi District. The number of workers in the TMA is 26. The type of waste collected is municipal, commercial and hospital. There are 6 vehicles for waste collection including trolley and pickup. The number of containers placed at different points is 15. The number of containers placed near hospitals is 4. No special type of vehicle for the collection of hospital waste is used. Hospital waste is mixed with municipal waste. Daily trips for waste collection are made from the hospitals by the TMA. The overall daily collection of hospital waste form Swabi area by the TMA is about 2000 kg (Table-3). It was observed that on-site workers associated with the collection and transport of waste wear a mask, gloves and an apron. The TMA does not organize any formal training on the management of medical waste. The waste is disposed of in the form of an open dump. A register of waste collection and transport is drawn up each year. No landfill is present in the district of Swabi. The collected waste is transported to an open dumping site, located in Swabi (shago dapaan). The TMA expects the government to facilitate them by providing quality health care facilities as well as setting an additional budget for health workers and they should be given life insurance to deal with dangerous situations (Table 3).

Table 3: Responses of the Questionnaire by the TMA

S.No	Question	Response
1	Area for waste collection	14 union council
2	Number of workers	26
3	Number of vehicles	6
4	Number of containers placed at various points	15
5	Number of containers or dustbins placed near hospitals	4
6	Type of vehicles for waste collection and transportation (Trolleys/ carts/ others)	Trolleys, tractor, Carry
7	Do you collect waste from hospitals	Yes
8	the pattern of waste collection from hospitals	Daily
9	Quantity of Waste collection kg per day	2000
10	Any special type of vehicle for hospital waste collection	No
11	Use of proactive equipment: gloves, masks, proactive shoes, aprons etc	Yes
12	annual budget for TMA	
13	Any formal Training about health care waste management: (monthly, annually)	No
14	Disposal of hospital waste	Open dumping
15	Are containers identified and disinfected	Yes
16	Record of waste collection and transportation in written	Yes
17	Expectations from government	The government should facilitate us by providing quality health care facilities as well as to fix some extra budget for the sanitary workers and they should be provided life insurance for dealing with such risky situations

Composition of Solid Waste at Scrap Collection Shops

The quantity of waste collected from dumping site was consisted of items such as paper, plastic, glass bottles, and iron scrap. These items are collected by scavengers and then sold to scrap collection shops (*Kabari shops*). The scrap collection shops are located outside the hospitals and dumping site. The shops buy saleable items with different rates according to item type (Table 4).

Table 4: Composition and Collection Efficiency of Hospital Waste

S.No	Composition of Solid Waste	Average Quantity of Recyclable Waste generated (kg per day)		Total weight sold to kabari Shops (kg per day)	Price per kg (PKR)	Recovery Efficiency (%)
		Public Sector Hospitals	Private Sector Hospitals			
2	Paper	14	06	08	15/-	10-15
3	Plastic	17	04	10	20/-	14-10
4	Glass	15	07	07	05/-	12-17
5	Iron scrap/metals	8	05	08	07/-	07-12

Solid Waste Collection Efficiency

The collection efficiency for hospital solid waste was calculated as 48 and 62% for public and private sector hospitals. Based on composition of hospital waste, the recovery efficiency of plastics, paper, glass, iron scrap/metal was calculated as 14-10%, 10-15%, 12-17%, and 7-12% respectively (Table-5). About half or less than half of disposed waste is collected while remaining part is dumped openly or thrown near road side which is one of the major environmental problems. When compared with solid waste collection in other parts of the province, the situation was almost similar. In Pakistan general and KP particular, the hospital waste is usually discarded into open dumps and not treated. This mismanagement causes severity of hazard to environment²³. In Pakistan, solid waste management practices in hospitals are not effective due to lack of government law enforcement. While in China and other developed countries, the gradual development of waste disposal and utilization is high. This study found that the management of hospital waste in Pakistan needs adequate funding trained personnel and effective policies²⁴.

Conclusions

According to the observations and report from public and private sector hospitals in Swabi District, it is concluded that all no hospital has its own treatment mechanism. They keep the waste in bins and after that, the municipal authority collects all the waste in a common place. The discharge point is located approximately 5 km from the hospitals. It has also been observed that there is waste leakage during collection and transport from the source level to the target location. Staff at the private sector hospitals are trained to handle waste but in the public sector hospital the staff were not aware. There is no attempt to minimize the amount of waste generated nor any mechanism to decrease the toxicity of the waste. Likewise, there is no provision from the management to have innovations, equipment in the future to deal with the generation of waste at the basic level.

At the central disposal and management plant, there is an ease of accumulation and separation of solid waste especially through colored and labeled containers. Central plant staff are not properly trained. Thus, it is clear that in the hospitals of Swabi district, there is little effective management of hospital waste. The rules and regulations regarding biomedical waste are also to some extent adequately followed. Private sector hospitals are the least interested in good management and disposal of their waste in accordance with environmental rules.

Recommendations:

- **Awareness:** The hospital staff needs proper trainings to know the healthcare effects due to infectious waste of hospital.
- **Financial funding:** The efficiency of the hospital waste management should be enhanced by funding.
- **Skilled Staff:** Formal trainings are important to be conducted by the health department about public health awareness and waste handling in hospitals.
- **Monitoring:** A regular inspection of collection, transportation and storage facilities need to be monitored on regular basis.
- Monitoring team should keep proper and regular check and balance to evaluate the number, location, condition, appropriate colour coding, and waste collection. Also, mapping and inspection of storage areas and transport routes needs to be managed.
- **Implementation of Effective Policies:** Efficient and effective policies are required to be implemented in hospitals. The hospital rule-2005 policy needs direly to implement. For Furthermore, review of health care waste policy, procedures and list of hazardous health care is important or regular basis.
- **Research:** Researchers can take a cue from the present study to conduct similar surveys in other hospitals of the country.
- Once enough information is available, the findings can be used for public policy making.
- This is a serious issue and needs to be tackled in a timely manner to avoid future crises.
- It is important to effectively mobilize resources for the management of COVID- 19 patients and also maintain the surgical services necessary for the population.

Acknowledgement

Authors are thankful to the department of Environmental Sciences, University of Swabi for giving the opportunity to work on hospital waste management of the particular area.

Authors contribution

This work has been done as research work of the BS degree in Environmental Sciences.

Conflict of Interests

The authors declare that they have no issue, no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Současný stav a kroky k nakládání s nemocničním odpadem v nemocnicích veřejného a soukromého sektoru v okrese Swabi, KP, Pákistán

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Abstrakt

Nemocnice v Pákistánu produkují obrovské množství odpadu, o kterém bylo hlášeno, že s ním správa nemocnic špatně nakládá. Toto špatné nakládání způsobuje několik environmentálních a zdravotních problémů uvnitř nemocnice i mimo ni. Cílem této studie bylo popsat výsledky sledování 4 velkých nemocnic veřejného a soukromého sektoru ve městě Swabi, KP, Pákistán.

Požadovaná data byla získána přímým i nepřímým pozorováním zdravotnického a administrativního personálu, abychom věděli, jak s odpadem nakládají. Jedním z důležitých aspektů naší metodologie byl vývoj vhodných dotazníků pro pochopení podstaty systému. Studie ukázala, že nemocnice veřejného sektoru produkují velké množství pevného odpadu (120–130 kg/den) a jeho nakládání s ním není prioritou. Postupy nakládání s odpady, třídění, skladování, přeprava a odstranění nesplňovaly pákistánská hygienická pravidla hygienické z roku 2005. Nemocnice soukromého sektoru se podílejí na produkci asi 30-50 kg odpadu za den a byla pozorována lepší úroveň nakládání s ním. Úroveň využití sebraného prodejného odpadu byla vypočtena následovně: plast 14 – 10 %, papír 10 – 15 %, sklo 12 – 17 % a kovy 7 – 12 %. Pravidla a předpisy týkající se biomedicínského odpadu nejsou dodržovány.

Studie poukazuje na nesprávné nakládání s odpady v nemocnicích veřejného sektoru. Pro lepší nakládání s odpady potřebuje nemocnice finanční zdroje, kvalifikovaný personál a realizaci nemocniční politiky z roku 2005.

Klíčová slova: infekční odpad, neinfekční odpad, odpadové hospodářství, účinnost sběru, likvidace odpadu.