ASSESSMENT OF HOSPITAL WASTE MANAGEMENT PROTOCOLS IN TERTIARY CARE HOSPITALS OF LAHORE

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ABSTRACT

Background and Objectives: Health care waste management is an essential part of infection control in a health establishment and apposite measures are imperative to prevent nosocomial infections.Aim of the study was to observe hospital waste management protocols and assess awareness of staff regarding these protocols.

Methods: Cross sectional study was conducted on six tertiary care hospitals of Lahore giving permission. A tool adopted from WHO infection control assessment protocol was used to record observations and interview the staff.

Results: In all of the six hospitals, waste was being segregated using color coding.Collection was timely and from all areas. Transportation in uncovered trolleys from within the hospitals 3 (50%). As observed 5 (83%) hospitals had designated storage space with impermeable flooring and ventilation. However direct water supply and air conditioners were not ensured in 2 (33.3%). Average 8 – 10 staff was working, showing positive trend of usage of personal protective devices. Workers of 4 (66.6%), were vaccinated with initial dose of Hepatitis B vaccine and Tetanus Toxoid, with screening for Tuberculosis in 2 (33.3%) hospitals. Displaying of hand hygiene posters, running water facilities 3 (50%), availability of soap or sanitizer 2 (33%) was observed. Majority hospitals 5 (83%) were following injection safety protocols. Staff, 54 (100%) considered waste disposal important, 40 (74%) were aware of color coding system, 27 (50%) ultimate disposal of infectious and non-infectious waste, 49 (90%) importance of personal protective devices and 40 (74%) occurrence of diseases due to waste mishandling.

Conclusion: It was concluded that majority hospitals were following appropriate protocols but standards of hospital waste management varied with lapses in the transportation of waste.

Keywords: Hospital waste, Tertiary care, Waste Management.

INTRODUCTION

Since the industrial revolution and advancements in science, technology and medicine the average life expectancy and general human population has increased to an unprecedented number. At the same time Industrialization has led to a sharp increase in death and disease.[1] As a result there is a worldwide increase in the number of hospitals and healthcare facilities in order to meet the demands of an ever growing population leading to even larger amounts of healthcare waste being churned out.[1]

"Healthcare waste" also known as biomedical waste is a term that is used to indicate all the waste that is produced by healthcare centers which include public and private hospitals, dispensaries, Basic Health Units and Rural Health Centers during diagnosis, treatment, immunization and biomedical procedures.[2,3] The healthcare waste can be classified as non-hazardous and bio hazardous. It includes sharps, non-sharps, blood, body parts, toxic chemicals, pharmaceuticals, medical devices and radioactive substances.[2-6] Almost 75 – 90 percent of this waste is non-hazardous compared to domestic waste. The rest of the 10 – 25% (USA 15%, India 15 to 35%, and Pakistan 20%) can be regarded as hazardous and are a serious health risk necessitating special attention by a skilled staff.[7,8,9] In Pakistan 250,000 tons of hospital waste / year is produced; (0.5– 2.0 kg / bed / day) and in Punjab it is 15 tons / day.[9]

The process of hospital waste management includes proper management, prevention, characterization, segregation, monitoring, treatment, handling, reuse and residual disposal of wastes.[9] Health care waste management is an essential part of hygiene and infection control in a health establishment and apposite measures are imperative in order to prevent nosocomial infections. Hospitals are multifaceted and dynamic institutions which are visited by people of all ages,

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genders, ethnicities and religions.[4,8]

Then there is a group most vulnerable: the hospital staff including doctors, nurses, sanitary staff and hospital upholding workforce.[5] So, hospital waste, if inadequately handled becomes a danger, not only for the staff handling it, but to the patients as well as the society.

In Pakistan, in most of the tertiary care hospitals infectious waste is disposed of in yellow bags, non-infectious in white, blood products or placenta in red and sharps in boxes or containers.[11]

Improper handling of healthcare waste is a worrisome issue of global importance. Lack of concern over its proper handling can lead to serious consequences. Studies from Pakistan suggest that most hospitals and private practioners do not abide by the rules regarding health care waste management (HCWM) exposing, not only themselves, but the paramedical staff as well as their patients.[10,11] Used syringes are improperly disposed, recycled and sold, especially by the janitorial staff and they are the worst culprit in spreading blood borne diseases.[10] Other sharps can cause cuts and puncturing of skin leading to wound infection. Pathogens present in infectious waste can cause serious, and often life threatening conditions-like Hepatitis B, Hepatitis C, AIDS, Typhoid, Cholera, Tuberculosis, skin infections, urinary tract and respiratory infections.[8,10] Improperly handled waste is also a catalyst in producing antibiotic resistant bacteria. Radioactive waste can cause headache, vertigo and serious birth defects. Anatomical waste, organs such as placenta, carelessly disposed of in plain sight cause a very negative "visual impact" to the casual observer.[13] Healthcare sewage sometimes containing lethal infections mixed with the municipal sewage or times drinking water can have a serious negative impact on the health of the community.[13]

Pakistan is a developing, third world country which spends only a small percentage (approx. 1% of GDP) of its budget on health.[10] Health reforms are not being implemented with the verve as they should be and consequently the health sector is suffering.Waste management of health care institutions is not optimal, but along with that there is also a dearth of data regarding the exact condition and practices regarding the disposal of hospital waste in Pakistan especially in Punjab.

The objective of this study was to observe the hospital waste management protocols in tertiary care hospitals of Lahore.

METHODS

A cross sectional study was conductedand completed within four months. Six tertiary care hospitals of Lahore both from public and private sectors giving permission after assurity of confidentiality were selected by non-probability convenient sampling. Data was collected with the help of a validated tool adopted fromWHO Western Pacific Regional infection control assessment tool for infection control link persons in Lesser Resourced Settings and Infection control assessment tool for long term care facilities.After taking formal consent and IRB approval the hospital waste management areas of all six hospitals were visited and observations were recorded. Randomly 54 staff members was selected and after consent interviews were conducted regarding their awareness of hospital waste management and important protocols. SPSS version 20 was used to analyze data. Percentages, proportions were calculated and presented with the help of bar charts, pie diagrams and frequency tables.

RESULTS

All of the six tertiary care hospitals under study had waste management protocols developed as well as displayed in the premises.Majority of the hospitals practices regarding segregation and collection of waste were satisfactory. Proper and timely collection of waste was being done from all the observed wards, laboratories and operation theatres as well as general public areas like waiting areas and bathrooms. As far as transportation was concerned trolleys used were uncovered, with 3 (50%) hospitals using a route within the hospital rather than a separate pathway. Separate storage areas were designated in 5 (83%) hospitals with categorization of infectious and non-infectious waste. Number of staff members designated for handling and supervision of hospital waste also varied which can be attributed to the varied waste production within the hospitals. Majority of the hospitals had 8 to 10 staff members with only 1 (16%) hospital having more than 10 people delegated to conduct this task. A positive trend regarding usage of personal protective measures was observed. Masks, gloves and industrial strength boots being used maximally. However, the usage of goggles and aprons was not widespread and only 1 (16%) hospital was providing goggles. Vaccination status of the staff was satisfactory compared to screening for tuberculosis. Hand hygiene practices and facilities were not up to the mark in 3 (50%) hospitals. Running water was available for waste management workers in all hospitals. Soap or hand sanitizer was available in 2 (33%) and only 3 (50%) hospitals had hand hygiene posters displayed for awareness of the staff, thus workers in the remaining 3 (50%) did not follow proper hand washing protocols due to lack of awareness. Adherence to standard injection safety protocols had been displayed. Majority of the hospitals 5 (83%) disposed of needles by cutting or collecting them in separate boxes. Improper disposal of syringes with multiple usage of a single syringe was observed in 1 (16%) of the hospitals under study.

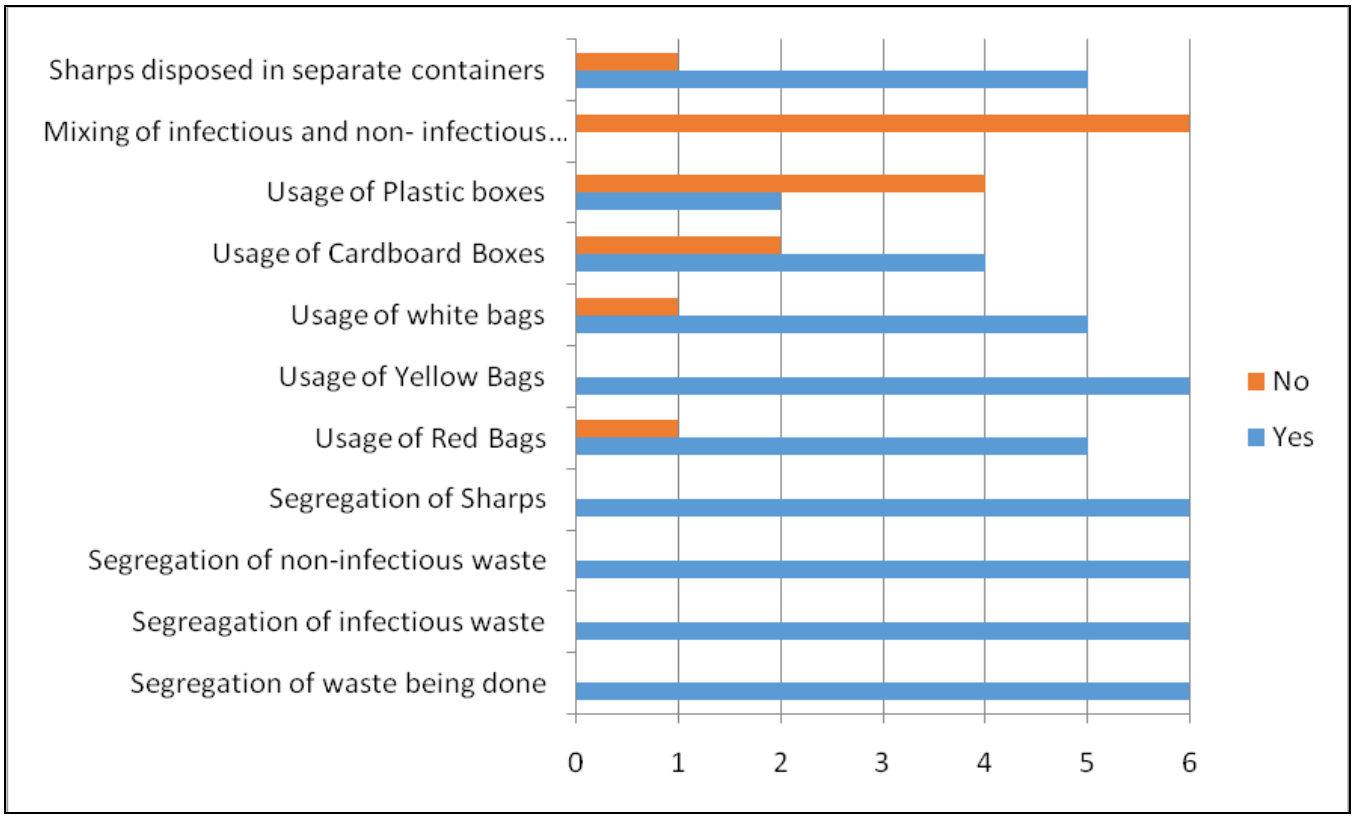

Fig. 1: *Segregation of Waste.*

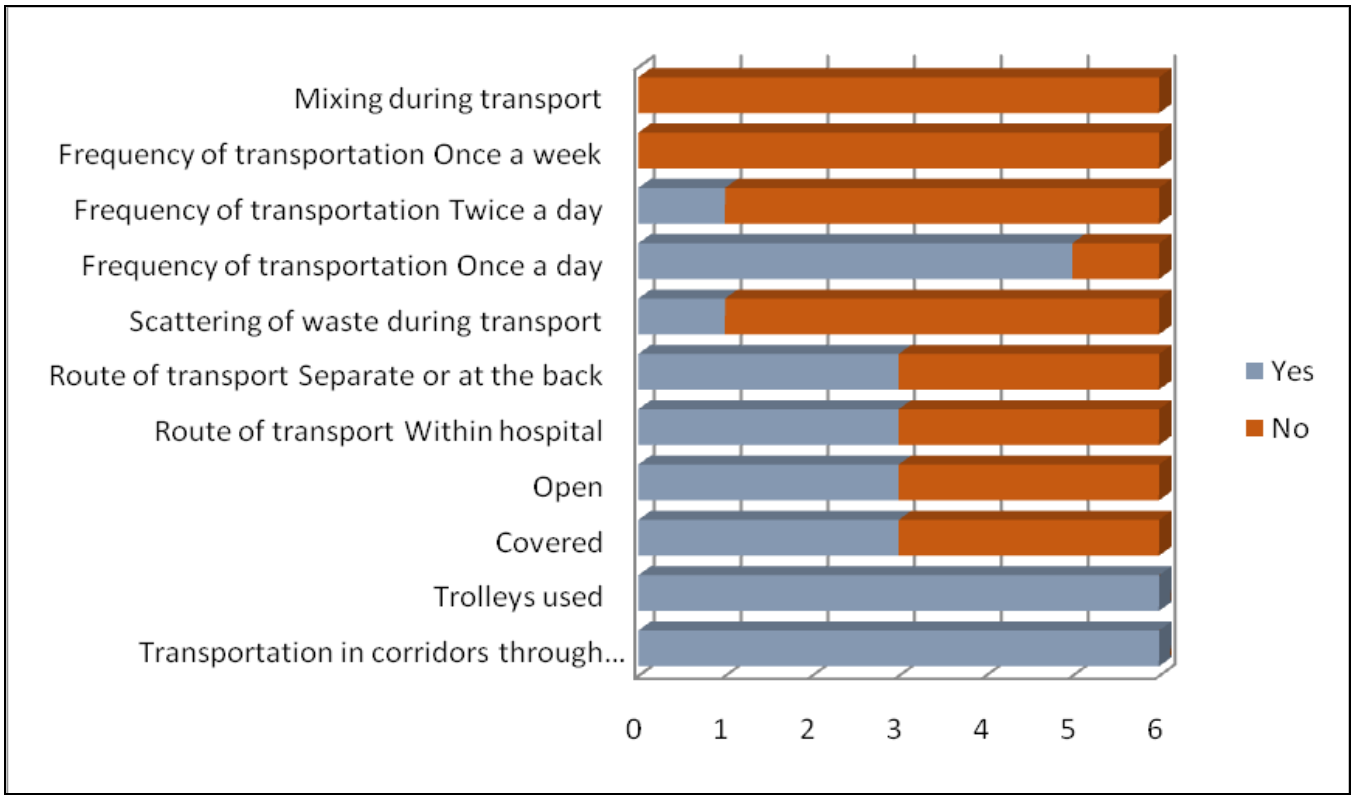

Fig. 2: *Transportation of Waste.*

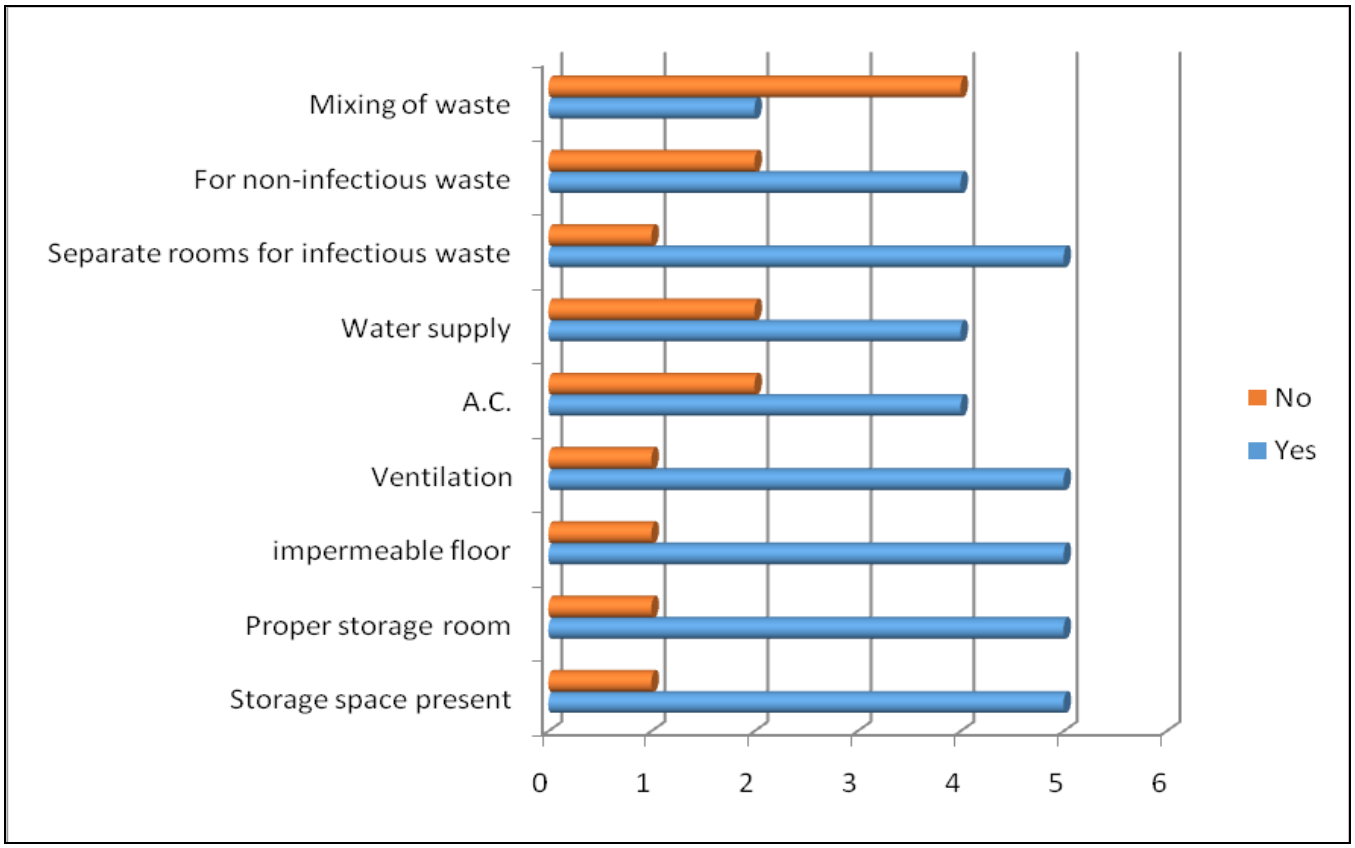

Fig.3: *Provision of Storage Facilities.*

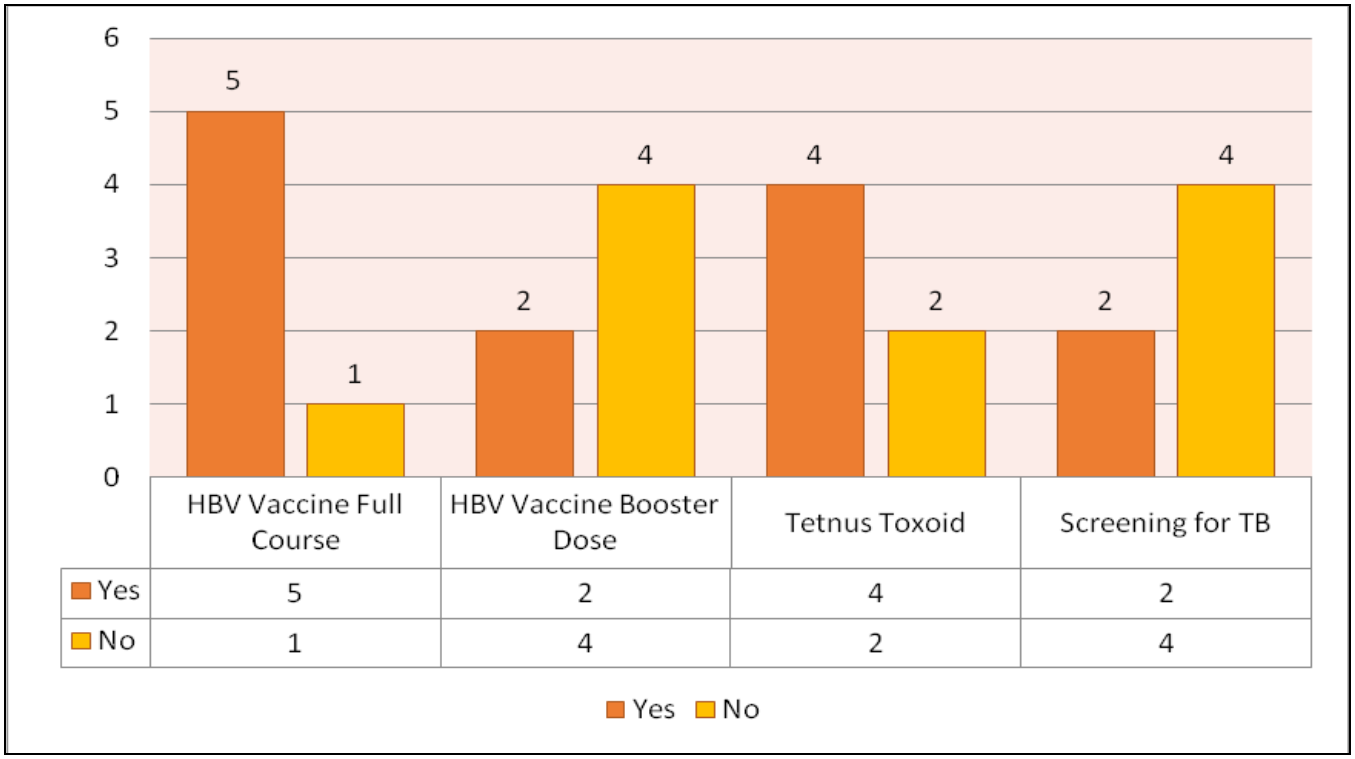

Fig. 4: *Vaccination Status of Workers.*

Table 1: *Awareness of Staff regarding Hospital Waste Management.*

Awareness	*Yes*	*No*
Importance of proper waste disposal	54 (100%)	0 (0%)
Infectious waste includes	45 (83.3%)	9 (16.6%)
Non-infectious waste includes	43 (79.6%)	11 (20.3%)
Sharps include	43 (79.6%)	11 (20.3%)
Are you aware of color coding system used to dispose of hospital waste	44 (81.4%)	10 (18.5%)
Are you aware of which color bags are used for which type of waste	40 (74.0%)	14 (25.9%)
Do you know which diseases can occur due to mishandling of waste	40 (74.0%)	14 (25.9%)
Do you know which protective devices should be used	49 (90.7%)	5 (9.25%)
Are you aware of how and where infectious waste is disposed of	30 (55.5%)	24 (44.4%)
Are you aware of how and where non-infectious waste is disposed of	27 (50%)	27 (50%)
Are you aware of how sharps are disposed of	37 (68.5%)	17 (31.4%)

DISCUSSION

Hospital waste especially hazardous waste should be managed from the source of its generation to its final treatment. A standard system comprises of the following components collection, segregation, transportation and storage of hospital waste.[14] The current study conducted in six tertiary care hospitals highlights the results of observations of availability of equipment, their use and practical implementation of hospital waste protocols according to specified standards at different units as well as interviews of the staff made during visits to hospitals.

In the current study, collection of waste was being done from all the areas of the six hospitals visited consistent with the findings of another study according to which waste was being collected according to protocols from all areas of the hospital.[15]

In the current study it was observed that segregation protocols were being followed by all the six hospitals under observation. There was no mixing of infectious and non-infectious waste in any hospital. Majority of the hospitals, 90% were following the color coding system opposed by the findings of a study in which 85% of wards were not following the color coding system.[4] Segregating infectious waste from non-infectious is the core responsibility of nurses but in the current study it was observed that sweepers and sanitary staff were more involved in it. Only 1 out of the 6 hospitals had an adequate number of staff assigned to conduct this task. Sharps were being disposed of properly in 5 out of 6 hospitals, showing variability, as 4 hospitals were using cardboard boxes while the remaining were using plastic containers. As has been observed in other studies too, segregation at source into different categories reduces the management, operation and treatment costs along with the risk of infections with these contaminations.[16]

Other studies have also witnessed that more than 75% of their respondents used proper disposal protocols for sharps.[17]

Transportation protocols were being followed in 3 out of the 6 hospitals, with scattering of waste in 1 hospital visited in the current study. Almost half of the trolleys used for waste transportation were uncovered and an alarming 50% of the trolleys used a route within the hospital instead of a separate pathway. These findings corroborate with the findings of other studies stating that health-care waste should be transported in such a manner that it does not cause any stress at site or route and waste should never be transported directly by hand.[15]

Majority of the hospitals 5 (83%) were equipped with storage areas supporting basic protocols like impermeable flooring and ventilation , however, direct water supply and air conditioners for waste storage rooms were not ensured in 2 (33.3%) of the observed institutions Separate storage rooms for infectious waste were available in 5 (83%) of the hospitals.

Hand hygiene protocols were being followed in 3 (50%) of the hospitals visited, with provision of hand sanitizers. Health education and awareness posters related to hand hygiene were seen displayed in different areas of these hospitals. Similar findings were observed in another study in which 45% of the hospitals were following hand hygiene protocols.[18] In majority of the hospitals 5 (83%) disposal of needles by cutting or collecting them in separate boxes was being done. Improper disposal of syringes as well as multiple usage of a single syringe was observed in 1 (16%) of the hospitals under study.[17]

Hospital management is legally obliged to provide their staff protective measures comprising of masks, gloves, aprons, industrial boots and goggles.[19] Our study highlighted a positive trend of usage of personal protective devices by the handlers of hospital waste management. Protective caps, masks, gloves and industrial strength boots being used maximally. However, the usage of goggles and aprons was not widespread with staff of only 1 (16%) hospital using goggles. These findings were observed in another study too according to which none of the staff were utilizing standardized protective devices.[20]

Studies quote that immunization programs for staff working in the hospital waste management is the prime responsibility of the institutions. Hepatitis B and Tetanus immunization should be mandatory for all the staff members especially for those at risk, due to handling of infectious waste.[15] In the current study it was commendable on part of the institutions, as 5 (83%) of the hospitals were vaccinating their staff against Hepatitis B and Tetanus. The dilemma being that only primary doses were being given. Only 2 hospitals were ensuring booster doses for Hepatitis B. As far as Tuberculosis screening was concerned only 2 hospitals were complying.

Education without training is outrageous but training without education is redundant.[19] In the current study a total of 54 staff members from 6 hospitals were interviewed regarding their awareness, and practices regarding hospital waste management. It was observed that nearly 50% staff was aware of the waste management protocols, 80% were aware of the color coding system especially regarding yellow and white colored bags, 20% of them lacked knowledge regarding different types of waste and their disposal mechanisms. Majority (74%) of the staff were aware of the various diseases which could occur during handling of waste.

The results of the current study may serve as a stepping stone in evaluating the success and failure of pre and post intervention projects and could be useful for the development of operational guidelines for the management of healthcare waste in health facilities nationwide supported by studies in the literature[1].

In the study conducted it was ***concluded*** that standards of hospital waste management of different hospitals visited varied. It was promising to observe that majority hospitals were following appropriate protocols for hospital waste management with lapses in the transportation of waste.

Limitations

Sampling technique and size were limited due to budgetary constraints.

Recommendations

1. All hospitals especially tertiary care setups should follow standard protocols for hospital waste with emphasis on improvement of transportation of hospital waste especially using covered trolleys on separate routes which do not traverse the hospital premises to reduce the risk of spread infections.
2. Strict monitoring and quality assurance of management of hospital waste should be ensured by the hospitals.
3. Complete vaccination schedule against Hepatitis B and Tetanus of all workers should be followed and ensured. In addition Tuberculosis screening of workers should be done too.
4. Education regarding standard protocols of hospital waste management should be imparted to all workers.
5. Further researches should be conducted on all hospitals to help generate data and establish better guidelines and protocols according to the observations recorded and facilities.

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Authors' Contributions

M.T.F.: Concept, Questionnaire development, Analysis of Results, Discussion, Proof reading. N.O.: Concept, Questionnaire development, Analysis and Interpretation of results, Discussion, Drafting of article. F.S.: Questionnaire development, Discussion. S.K.: Literature review, Interpretation of results. A.K.: Introduction, Results. N.A.: Tables, Figures, References. I.M.: Intellectual input and supervision.

Conflict of Interest: None.

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