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The Effect of Health Education Toward Management of Health Care Waste Among Nurses in Port Sudan City, Sudan in 2018-2021

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Introduction

Knowledge is usually gained through information provided by teachers, parents, friends, books, newspapers etc. (1) In many countries, knowledge about the potential for harm from HCW has now become more prominent to governments, medical practitioners and civil society. Increasingly, managers and medical staff are expected to take more responsibility for the wastes they produce from their medical care and related activities. Knowledge of staff regarding Healthcare Waste (HCW) can help patients and visitors to understand their role in maintaining good hygiene, and to become more responsible for the wastes they produce. (2) Practices of HCW management should be a part of total hygiene practice of the society rather than confining it to hospital and healthcare facilities. It is also very important that strict supervision and surveillance is followed in day-to-day HCW management activities. (3) Nurses play a key role in the management of HCW. They should be able to segregate the waste and store it in the correct bins at the point of generation; and in order for them to fulfill this function efficiently, it is important that they have adequate knowledge about the importance of segregation and how to distinguish the different containers and bins for

the various types of HCW. (4) Nurses and all the sanitation staff working in a hospital need to know the health hazards of hospital waste and the proper techniques and methods of handling the waste. This knowledge and proper practice can go a long way towards the safe disposal of hazardous hospital waste and the protection of healthcare personnel, patients, as well as the community at large and the environment. (5)

The aim of the current study was to study nursing staff knowledge and practice regarding HCW management in the port Sudan city (general and private) hospitals in Sudan before and after implementation of an educational intervention program.

Objectives: -

General objective :

To study the effect of health education in promotion of knowledge attitude and practice of nurses towards Health Care Waste Management in governmental and private hospital in port Sudan city.

Specific objectives :

1)To identify basic knowledge and practice of nurses about management of health care waste.

2)To assess proper management of health care waste during nursing practice before and after intervention program.

3)to design and implement training program for nurses about management of health care waste.

4)To assess the effectiveness of the designed program for nurses knowledge attitude and practice regarding management of health care waste.

Methods :

Study design: The Quasi-experimental study was applied on one group of nurses in selected hospital to assess the effect of an educational program on their Knowledge and practices regarding management of health care waste.

Study area: Port Sudan state the capital of the Red Sea State ,estimation population of approximately 18,25180 ,the are 22 governmental hospital and 10 non- governmental hospital

Study population :

Nurses how work in selected hospital

Sampling: Type of sample simple randomized sample

1.Sample size:

The sample size was calculated by using the following equation to estimate the required sample size:

$$\text{Sample size} = \frac{Z2/PQ}{D^2}$$

N = Sample size

Z = the normal standard deviate (Z=1.96)

P = the anticipated population proportion or frequency of event.

d = Absolute precision required on either side of the proportion

q = 1-P

Other formula can be used when the researcher is confronted with limitation of resources. The formula to determine of sample size is:

$$n = \frac{n_0}{1 + (n_0 - 1)/N}$$

N= is the population size

n_0 = is the sample size

N=130 nurse

The sample size from government hospital ,osman degna(18),obstetric (18)and pediatric (17) total (53) From private hospital , al shorta(25),al mawany (30)and al jamark(22) total (77)

Data collection:

By.

1. questionnaire was designed of asset of question of knowledge and practices.
2.ckick list for practice

Data analysis: To analyses data by SPSs program version 21.

Inclusion and Exclusion Criteria: -

The ethical clearance of approval was obtained before data collection and analyses from the following:

1. Selected government Hospital.
2. Participants in the study through verbal and written informed consent forms was obtained from each participant before gathering data and any participant has choice to refuse or accept to be included in

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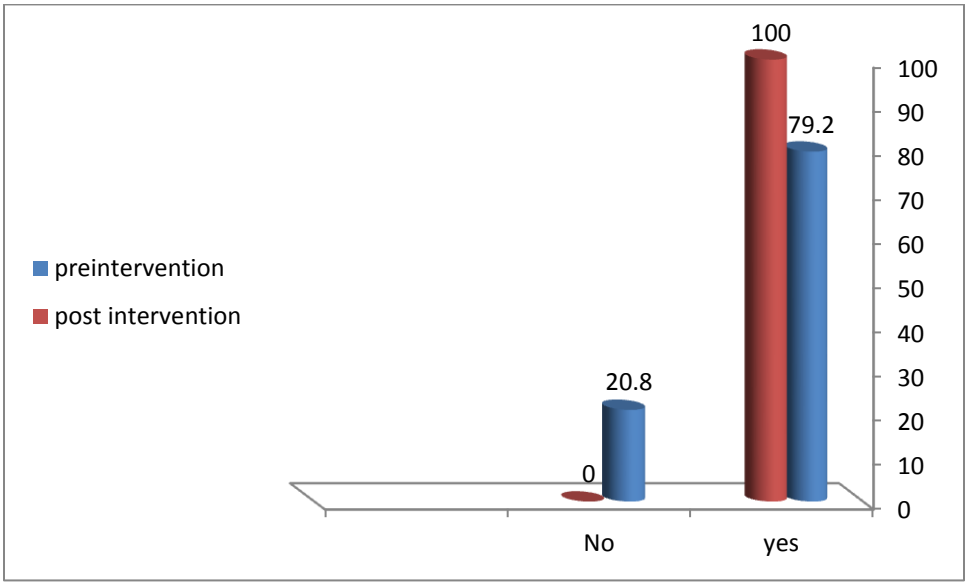
this study. The participants' names was not be involved in the data collection tool, and there will be no harm or costs to participate.

RESULTS

1/Distribution of the nurses according to their knowledge about the classification of waste to infectious and non infectious



There is a highly significant increase in knowledge concerning the classification of waste to infectious and non-infectious after intervention from 79.2% to 100% at df= 0.5 P value 0.000

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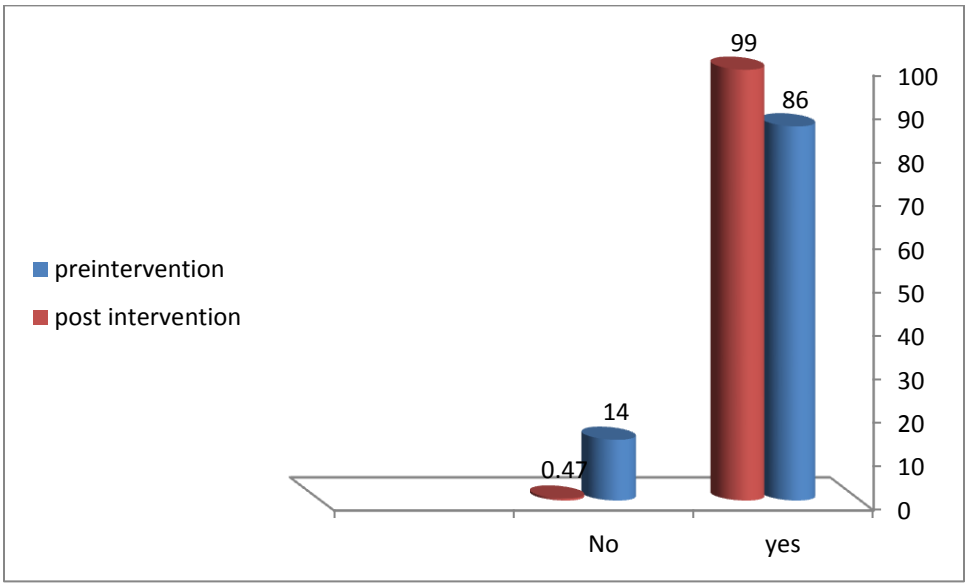
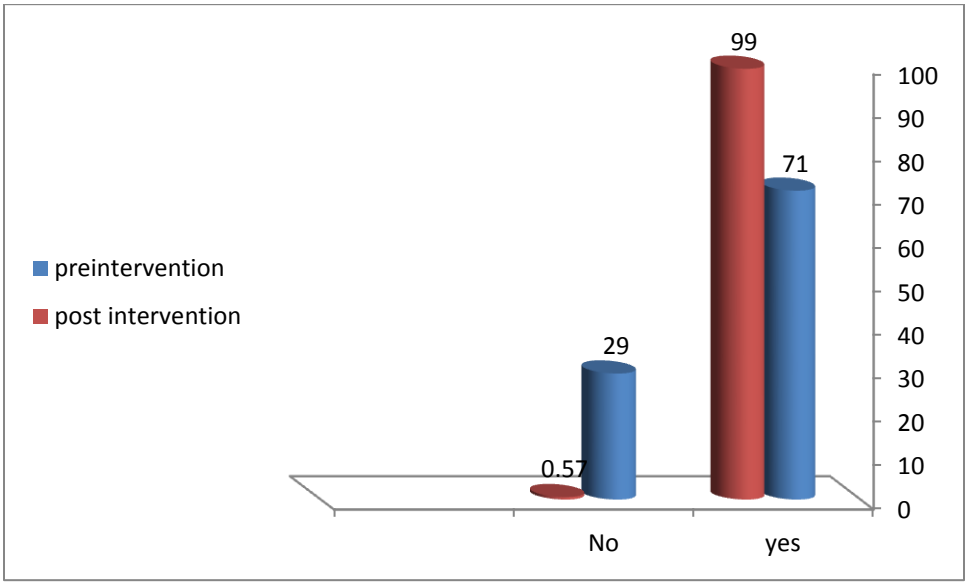
2/Distribution of nurses according to their knowledge about the source of health care waste from hospital ,laboratories and dialysis center



There is a highly significant increase in knowledge concerning the source of health care waste from hospital ,laboratories and dialysis center after intervention from 86% to 99% =.at df= 0.5 P value 0.000

3/Distribution of the nurses according to their knowledge about source of infection from health care waste to personnel



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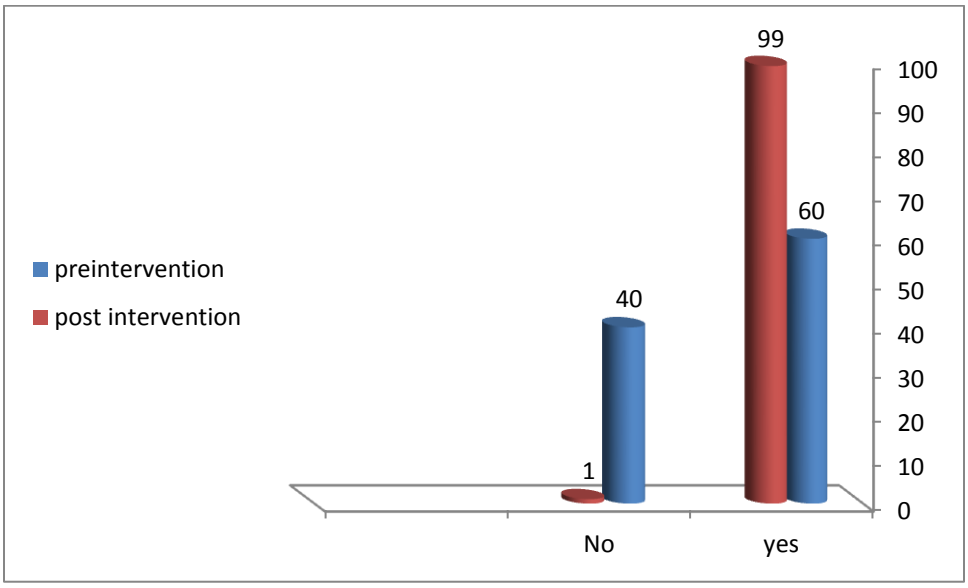
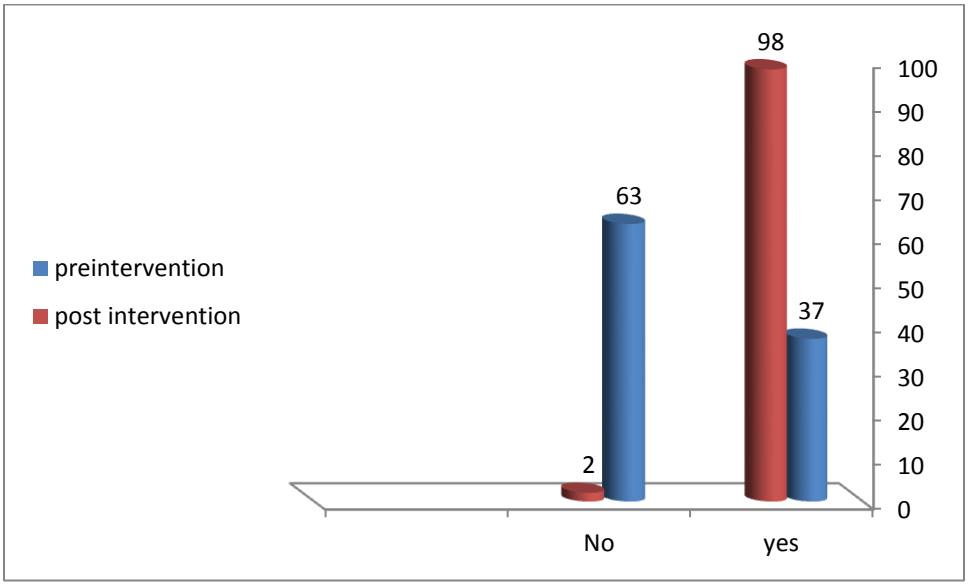
There is a highly significant increase in knowledge concerning to the source of infection from health care waste to personnel after intervention from 71% to 99% df= 0.5 P value 0.000

4/Distribution of the nurses according to their knowledge about the responsibility of segregate the heath care waste



There is a highly signification increase in knowledge concerning the responsibility of segregate heath care waste after intervention from 60% to 99% at df= 0.5 P value 0.000

5/Distribution of the nurses according to their knowledge the segregation of heath care waste at the source of generation



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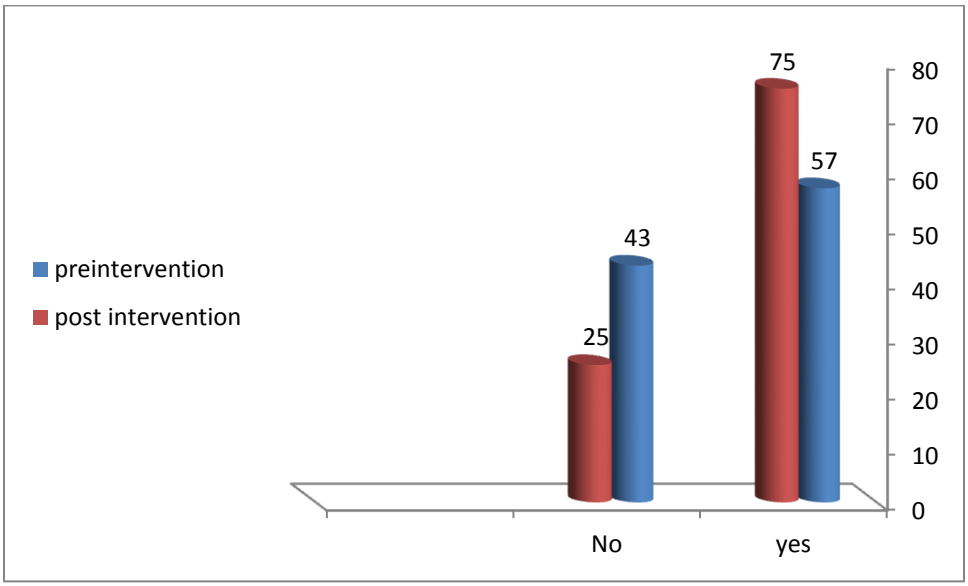
There is highly significant increase in knowledge concerning to segregate of waste from the sources after the intervention from 37% to 98% at df=0.5 p value=0.000

6/Distribution of the nurses according to their knowledge about color coding for waste container/



There is highly significant increase in knowledge concerning to color coding container of waste after the intervention from 57% to 75% at df=0.5 p value=0.000

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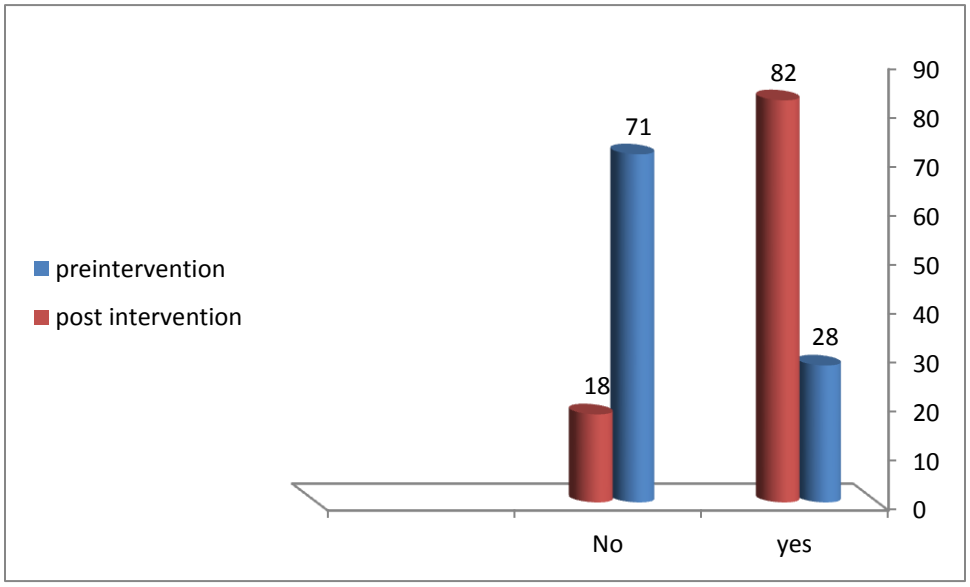
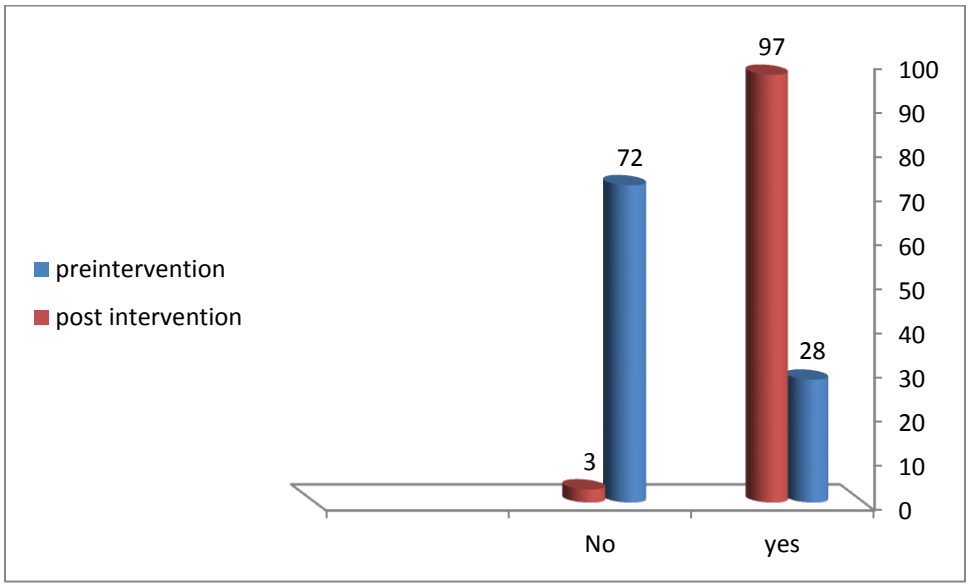
7/Distribution of the nurses according to their knowledge about criteria conceder on treatment technology



There is highly significant change in knowledge concerning to health care waste treatment technology after the intervention from 71% to 82% at df=0.5 p value=0.000

8/ The methods of health care waste treatment among the nurses :-



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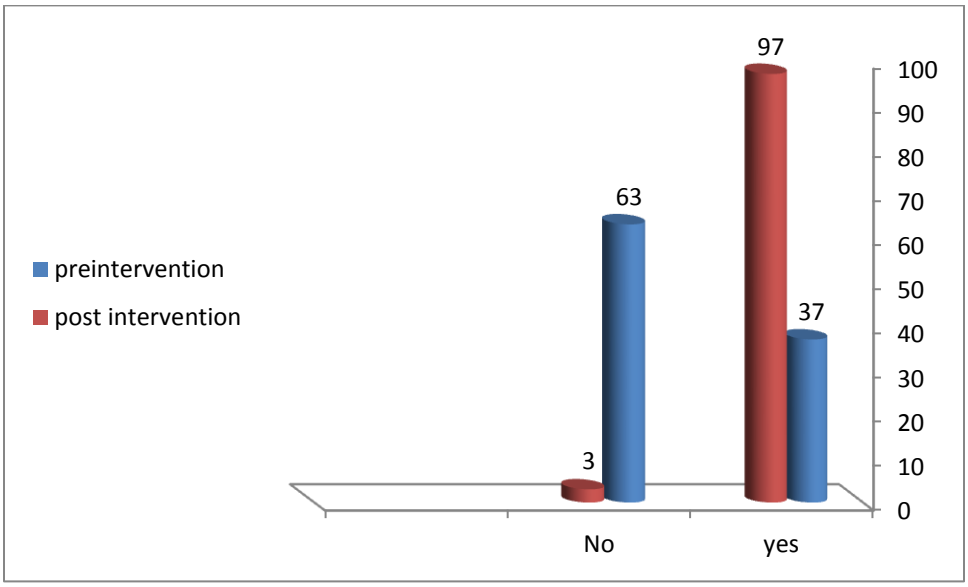
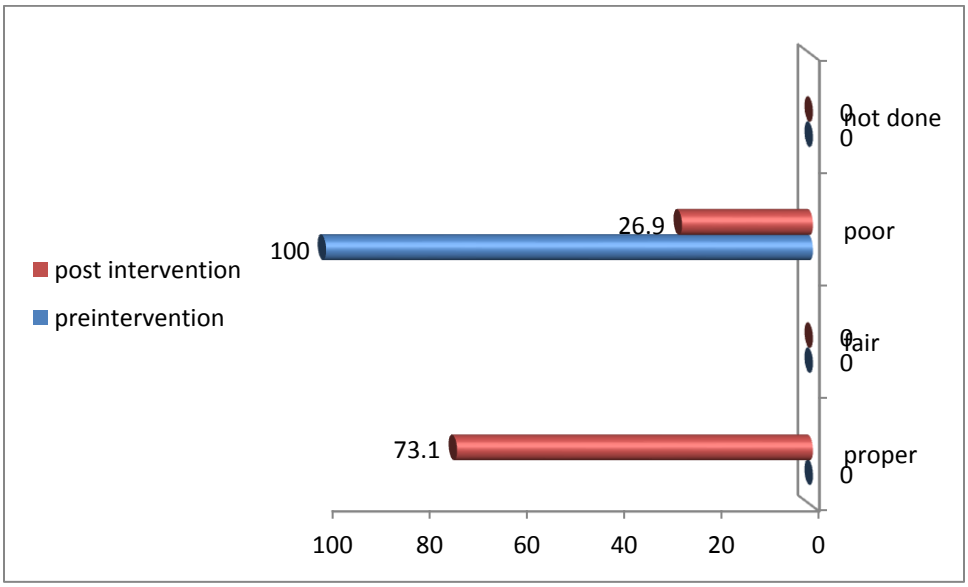
There is highly significant change in knowledge concerning to methods or technology of health care waste treatment technology after the intervention from 28% to 97% at df=0.5 p value=0.000

9/ Distribution of nurses according to their knowledge of the Requirement for storage facilities



There is highly significant change in knowledge concerning to the Requirement for storage facilities health care waste after the intervention from 37% to 97% at df=0.5 p value=0.000

9/Distribution of nurses according to their practice of touching infectious material



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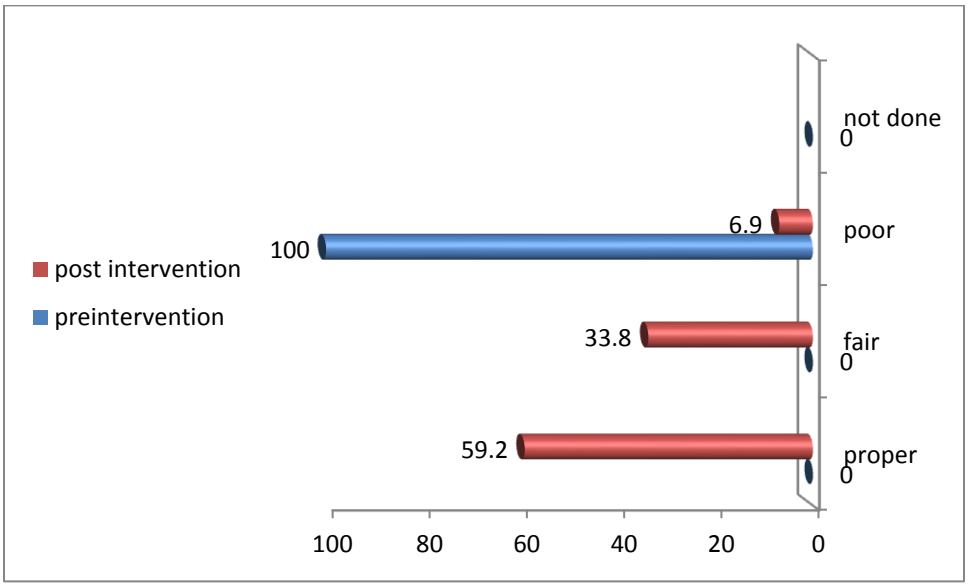
There is highly significant change in practice concerning the touching contaminating cotton and linen after intervention from 100% to 73.1% at df =0.05 p= 0.000

10/ Distribution of nurses according to their practices of hand washing



There is highly significant change in practice concerning hand wash after intervention from100 % to 59.2 at df=0.05 p value =0.000

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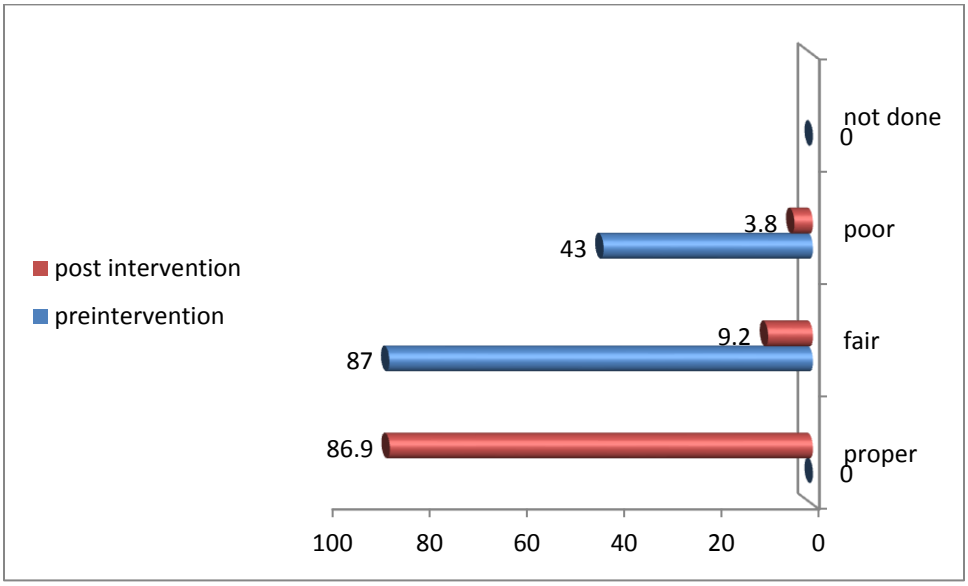
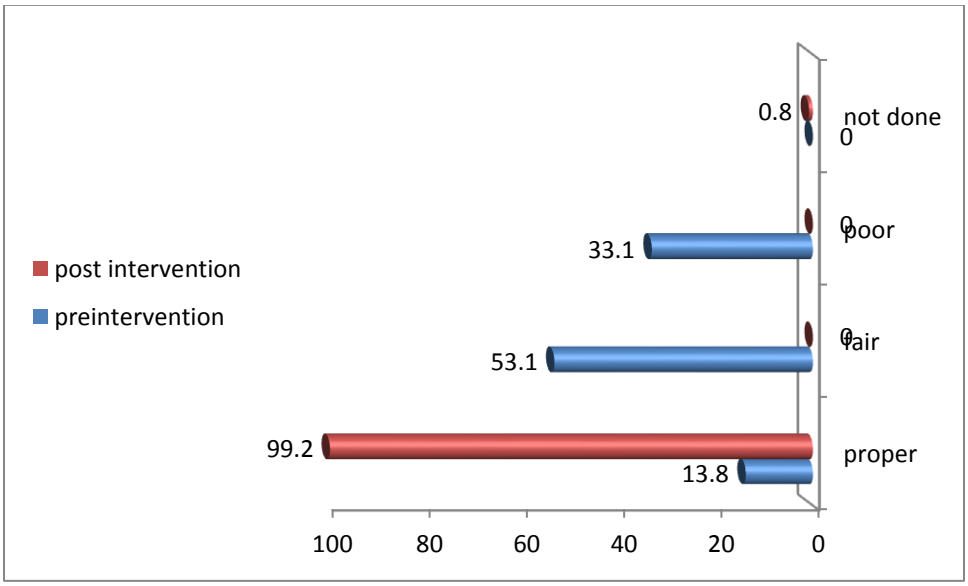
11/ Distribution of nurses according to their practices to wearing gloves when dealing with health care waste



There is significant change in practices concerning wearing gloves after intervention from 100% to 86.9% at df= 0.05 p valve =0.00

12/ Distribution of nurses according to their practices to wearing protective clothes



There is highly significant change in practices concerning wearing protective clothes after intervention from 13.8% to 99.2% at df= 0.05 p valve =0.000

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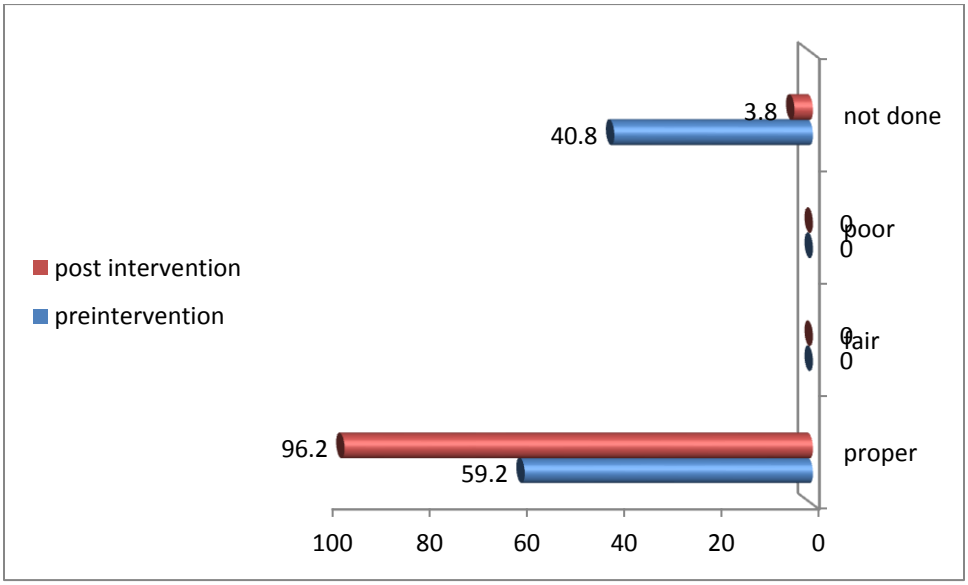
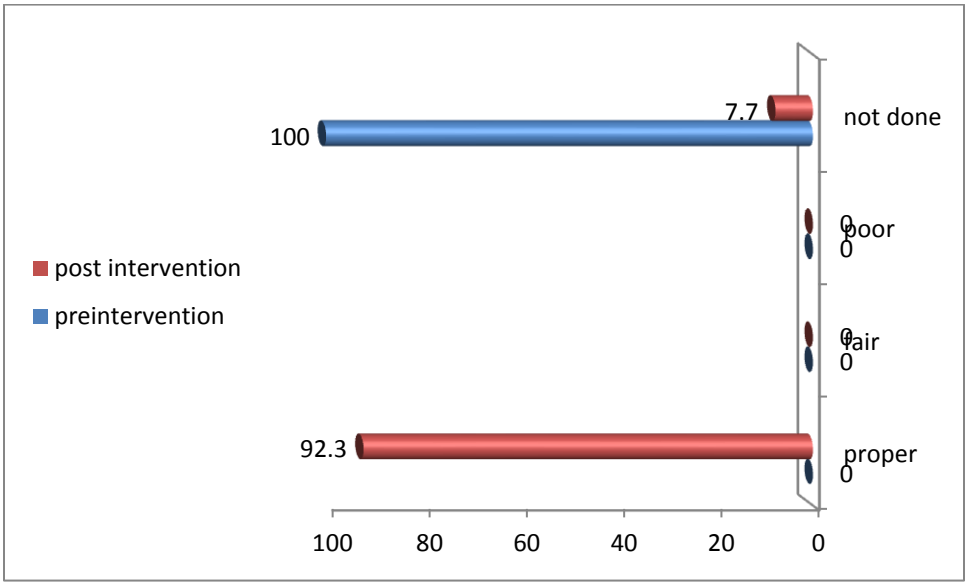
13/ Distribution of nurses according to had vaccine to hepatitis B



There is highly significant change in vaccine taken after intervention from 59.2% to 96.2% at df= 0.05 p valve =0.000

14/ Distribution of nurses according to the exposure of the needle stick injury



There is highly significant change in practice concerning the exposure of the needle stick injury after intervention from100 % to 92.3% at df= 0.05 p valve =0.000

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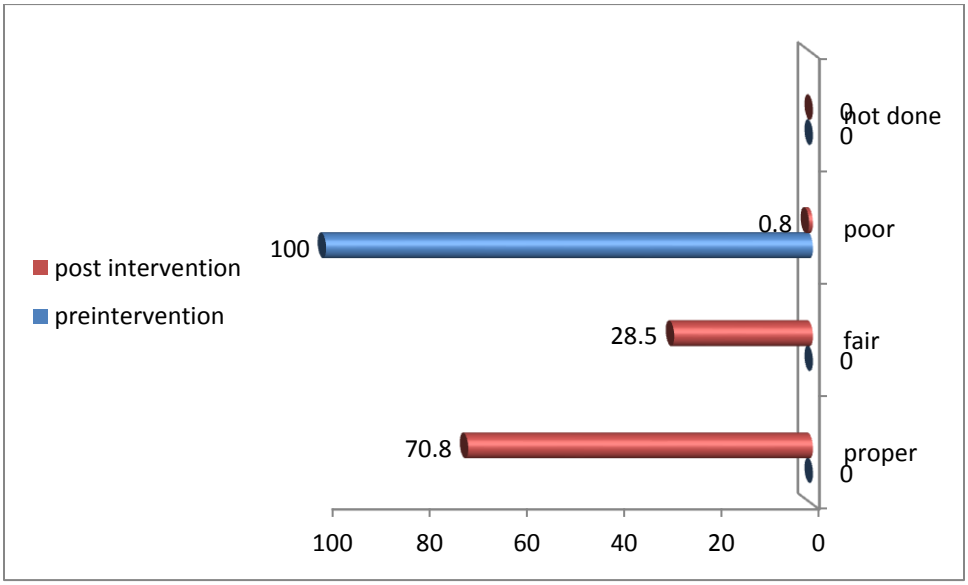
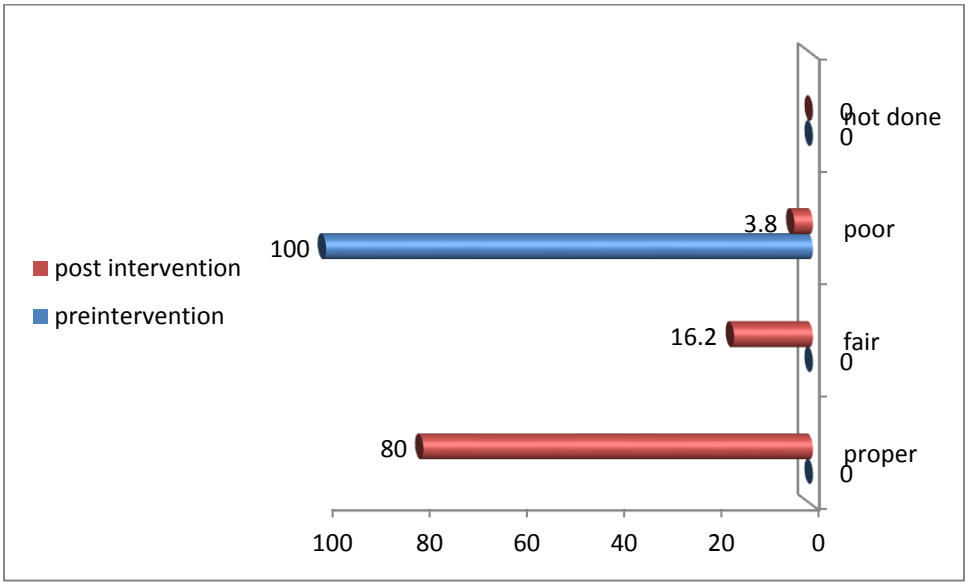
15/ Distribution of nurses according to their practices to Discard of sharp in safety box



There is highly significant change in practices concerning to discard of Sharpe in safety box after intervention from 100% to 70.8% at df= 0.05 p valve =0.000

16/ Distribution of nurses according to their practices to use health care waste bins



There is highly significant change in practices concerning to uses of health care bins after intervention from 100% to 80% at df= 0.05 p valve =0.000

Discussion

Among other health workers in hospitals, nurses play a key role in the management of health care waste, they need to segregate the waste and store it in the correct bins at the point of generation, in order for them to fulfill this function efficiently, it is important that they have adequate knowledge about the importance of segregation and how to distinguish the different containers and bins for the various types of health care waste,

the health hazard of hospital waste, proper technique and methods of handling the waste, and practice of safety measures can go a long way toward the safe disposal of hazardous hospital waste and protect them, their patients, as well as the communities and the environment (Pandit, Tabish and G.J. Qadri, 2007).

So, the aim of the study was to introduce an intervention program for nurses about health care waste management.

The findings of the present study revealed that one third of the nurses gave

in correct answers related to classification , sources, health hazards of health care waste,

people at risk to the hazard of waste & responsibility of waste segregation before implementation of the program. The poor knowledge of nurses may be due to absence of in-service training program in the hospital. This has significantly improved after implementing of the program. This improvement indicates that the program succeed in raising the scores of this items of knowledge & reflects the desirable effect of the program, however at the post test, the findings point to a general decline of the frequency of in correct answers, compared to the pretest. These findings were supported by(Goddu et al,2007) who compared the existing health care waste management practices in a general government hospital in India, with that of the practices in a national health service hospital in England founded that the staff nurses are not aware of the potential hazards of the material (of waste) they were handling.

The findings of the present study revealed that more than fifty of the studied nurse gave

in correct answers related to segregation, collection, storage and treatment of health care waste in the pretest. This has significantly improved after implementing of the program.

The present study findings disagree with the result reported by(Singh et al,2002) who found that less than half of staff nurse

were aware of methods of treatment & disposal of biomedical waste before implementation of the program.

This scores has significantly improved after implementation of the program. Also Patil and Pokhrel ,2005) found that the process of segregation, collection, transport, storage and final disposal of infectious waste was done in compliance with the standard procedures. It was also found that the non-infectious waste was collected separately in different containers and treated as general waste. Similarly (Shafee et al,2010))

The finding in the present study revealed that 43% of the studies nurse gave

in correct answer related to color coding system. this was similar to a study done in Pondicherry- India reported that 50% of HCPs had the knowledge of color coding and segregation of MWM [by M. Azage, G., and M. 201,], this result was also comparable to a study done in Pakistan reporting that 86% HCPs have information about waste color codes [A. Malini, B. Eshwar,2015]. Another similar study from West Bengal revealed that 76% HCPs knew about various types of color coding bags for collection of MW (R. Kumar, A. Zulfiqar, AG. Zulfikar,2013).

In relation to experiencing injuries, in the current study100% of nurses not avoid injury by used needle/sharps during their working time, which was consistent with a study from India reporting that 55% HCPs had experienced needle prick injuries in their work life (I. Sabbah, H. Sabbah, S. Sabbah, H. Akoum, N. Droubi,2013]. Another study done in Cairo revealed that 46 % of HCPs had needle prick injury or sharp injury and 19% of health care worker had sharp or needle prick injury within the last year [M. Asadullah, GK. Karthik, B. Dharmappa,2013]. Another study identified that 51% HCPs were subject to injuries caused by a sharp tool in a 6-month period and that 80%of those injuries were inflicted by injectors (SA. Hakim, A. Mohsen, I. Bakr,2014]. In a study from Karnataka, India experiencing of needle prick injury was less than the present study and only21% of medical staff reported needle prick injuries (H. Fiedler,2007].
This difference may due to lack of occupational health and safety section and guidelines in the HCFs. This risk could be minimized or avoided by opening regular training courses, and enforcement of all HCPs to enroll in these courses.

The present study showed that 52% of HCPs when injured by needle/sharps did not report even verbally persons in charge which is not a safe practice and is in contrast to the study in which only 19.9% of the needle pricks injured respondents did not report to the hospital authority [V. Ferreira, M. Ribau,2009]. Another study from India reported that 55% of HCPs had reported the incident to the higher authority [S. Pradhan, S. Prasad, BR. Chinmaya, S. Tandon,2016]. It is important to issue clear guidelines and procedures to HCFs and HCPs to report any such injuries to the authorities and provide required treatment and support needed

Concerning hand washing practice after collection and segregation of HCW, the majority (100%) of the nurses showed poor practices. The finding of the present study was consistent with two studies implemented in Egypt in Damietta city in 2009(. Mohamed AM.) and in Mansoura International Specialized Hospital in 2008. (El-Awady SM.) These studies revealed that the majority of nurses wash their hands after dealing with blood or patient body secretion and after using infected equipment. On the other hand, the study by El-Sayed, Zakaria, and Gheith in Egypt in 2012 (. El-Sayed SH, Zakaria AM, Gheith NA.) reported a low percentage of nursing and sanitation staff washing their hands (12.8%). Potter and Perry in 2009

mentioned that
hand washing is the most basic and effective infection control measure that prevents and controls the transmission of infectious agents and that barrier precautions are also used to minimize the risk of exposure to blood and body fluids.

Barrier precautions mainly consist of using personal protective measures, such as masks, gowns, and gloves to create a barrier between the person and the microorganisms.
In the current study, 99.2 (after intervention)of the nurse reported always wearing protective clothes during HCW operations, This may be attributed to inadequate knowledge about the importance of wearing personal protective clothing, lack of sufficient training in infection control, and/or shortage of disposable supplies and protective personal equipment (PPE). These explanations are generally supported by previous study findings in Egypt in 2012, and in 2004, (Hassan AK, Moftah FM, Alaa El-Din SM, Bayomi SS) where a low percent of nurses regularly wore protective clothing. The study by Ibrahim in Cairo University Hospital, Egypt in2009 (. Mohamed AM) concluded that wearing gloves and hand washing were two areas of weakness that needed more training among staff nurses

On the other hand, the present study revealed that the majority of nurse always wore gloves when dealing with HCW (86.9% after intervention).
This result was in agreement with the previous studies conducted in Mansoura in Egypt (.Radha, R. (2012)) and in England and India in 2007.

These studies reported that staff nurses were handling HCW with appropriate health and safety measures by using impervious gloves.

Regarding previous vaccination to Hepatitis-B virus, 40.8% of the nurses in the intervention group were not vaccinated for hepatitis B before intervention .
Three months after the intervention program, the number of vaccinated nurse grew to 96.2. This result is still lower than the result reported by the study conducted by Assadallah in India in 2013, which showed that 74.5%of the study respondents were vaccinated for the Hepatitis-B virus

Attitude toward waste management among nurses : Most of nurse agreed that medical waste should be segregated at the point where it is generated. This was
consistent with the results from a study in India(by Mane V, Nimbannavar SM, Yuvaraj2016) Pertaining to the practice of waste where 96.9% of respondents agreed that waste should be segregated.
management, the study established presence of high level of agreement that there was a colour-coding system in the hospital under study. Nonetheless,
segregation of medical waste was problematic with mixing of the different types of waste. Segregation was found to be high in Indian studies conducted by
(Chudasama *et al.* and Charania and Ingle 2011)

who found that the correct response was as high as 86.9% and 82.4% respectively.,
In the current study regarding the attitude of nurse towards the safe management of heath care waste, is an extra burden of work
majority of (studies nurses
agreed that the waste management is a team work and no single class of people is responsible for its
safe management (P=0.024). Whereas in another study conducted in a tertiary care rural hospital in India, high
proportion of housekeeping staff felt that the safe disposal of biomedical waste was an extra burden at work and is
entirely the responsibility of the hospital not an individual responsibility. They also felt that the safe management
of biomedical waste is not an issue at all (Radha, 2012)

Poor management of health care waste has serious health implication to health workers, patients and the public. Also, due to the toxic nature of health care waste, improper handling may lead to the destruction of natural environment and disturb the balance of the ecosystem The study revealed that both general and medical wastes are generated inside the hospitals Medical waste is generated from medical practice such surgery, delivery, resection of gangrenous organs, autopsy, biopsy, .as therapeutic procedures like dialysis Para-clinical exams, and

injections among others. all hospitals do not quantify health care waste, where the researcher could not , obtain information on the actual amount of waste generated in the hospital daily. Segregation of health care wastes into infectious waste and non-infectious waste is not conducted according to definite rules and standards.

The hospitals do not label infectious waste with Biohazard symbol. Separation of health care waste and general waste dos not practiced to a satisfactory extent though. Wheeled trolleys are used for on-site transport of waste from the sites of production (different wards) to the temporary storage area or to the Municipal containers for final disposal. The nurses staff when dealing with waste in the

,hospital do not use almost complete personal protective equipment, such as

.protective equipment and gloves

The main treatment method used in the final disposal of waste is incineration.

The hospital does not provide training for nurses and other personnel about health care waste management and their potential hazards. The study showed that all hospital governmental and non-governmental hospitals don't have any policy and plan in place for managing health care waste . There is

no definite policy or plan for purchasing the necessary equipment and for providing the facilities for the correct management of health care waste in the hospital

The main problems confronting the hospitals with respect to the management of health care waste include: lack of necessary rules, regulations and instructions on the different aspects of collection and disposal of medical waste, mixing of hazardous wastes with domestic waste of the hospital sometimes, failure to quantify the waste generated in reliable records, lack of use of colored bags there by limiting the bags to two color and sometime one color for all waste, the absence of a committee responsible for monitoring health care waste management practices, and the lack of education and training on health care waste management. From the results of the study, it is obvious that health care waste management is not adequately practiced according to WHO's recommended standards. There are some areas where health care wastes are not properly managed. It is imperative for significant investment in the proper management of health care waste in order to reduce the health risk it poses.

Recommendations

Based on the finding of the present study, the following is recommended:

• It is important to measure and quantify the amount of medical waste generated in each unit of the hospital periodically to identify which unit or department generates the highest and lowest amount of wastes.

• To follow the WHO standards in health care waste management

• Proper training is necessary to develop awareness of health, safety and environmental issues for all health workers mainly nurses.

• Environmental health experts must be included in the Infection Control team in the hospital, as well as some waste management experts.

• The availability of essential supplies, such as color-coded plastic bags

and puncture- resistant containers is necessary.
• Healthcare waste management duties must be including in the job description of the staff nurses.

• further in-depth studies should also be encourage to cover different aspect of health care waste management.

• Great emphasis should be directed towards the educational aspects on Health care waste management by providing educational posters , guidelines , pamphlets , manual and modern educational facilities,

collaboration should be encourage between institutions and federal ministry of health to formalize a protocol of infection control and health care waste management.

Conclusion

-Poor management of health care` waste has serious health implication to health workers, patients and the public.

The study revealed that both general and health care wastes are generated inside the hospitals health care surgery, delivery,.waste is generated from medical practice such as therapeutic procedures like dialysis

All hospitals do not quantify health care waste, where the researcher could not obtain information on the actual amount of waste generated in the hospital daily.

Segregation of health care wastes into infectious waste and non-infectious waste is not conducted according to definite rules and standards.

The hospitals do not label infectious waste with Biohazard symbol. Separation of health care waste and general waste.

Wheeled trolleys are used for on-site transport of waste from the sites of production (different wards) to the temporary storage area or to the Municipal containers for final disposal.

The nurses staff when dealing with waste in the hospital do not use almost complete personal protective equipment,

The main treatment method used in the final disposal of waste is incineration.

The hospital does not provide training for nurses and other personnel about health care waste management and their potential hazards.

The study showed that all hospital governmental and non-governmental hospitals don't have any policy and plan in place for managing health care waste .

The main problems confronting the hospitals with respect to the management of health care waste include: lack of necessary rules, regulations

lack of use of colored bags there by limiting the bags to two color and sometime one color for all waste, the absence of a committee responsible for monitoring health care waste management practices, and the lack of education and training on health care waste management.

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