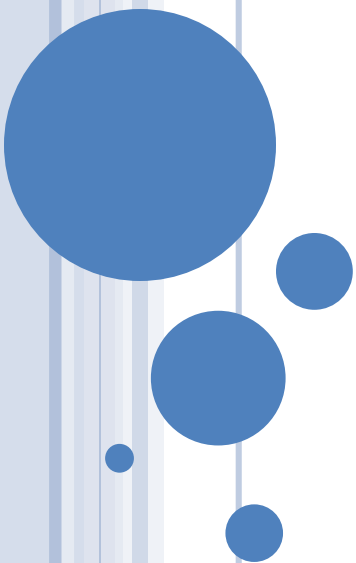


A STUDY ON BIO-MEDICAL WASTE MANAGEMENT AND HANDLING



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**UNDER THE
GUIDANCE OF
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INTRODUCTION

The waste produced in the course of healthcare activities carries a higher potential for infection and injury than any other type of waste. Inadequate and inappropriate knowledge of handling of healthcare waste may have serious health consequences and a significant impact on the environment as well. The hazardous impact of medical waste on the public and environment is enhanced manifold if adequate and appropriate handling of these wastes is not adopted. The hospital waste management has diverse ramifications as it not only affects the health of patients but also of healthcare workers and general public. Hospital waste management has major attitudinal and behavioural components. Safe management of health care waste becomes very important when it comes to environment conservation and health of the community.



BIO-MEDICAL WASTE

Any solid, fluid and liquid or liquid waste, including its container and any intermediate product, which is generated during the diagnosis, treatment or immunization of human being or animals, in research pertaining there to, or in the production or testing of biological and the animal waste from slaughter houses or any other similar establishment. All biomedical wastes are hazardous. In hospital it comprises of 15% of total hospital waste.



SHARP WASTE

Used or unused Syringes,
butterfly needles, lumbar
puncture & cannula needles

Dispose in Sharp Container



INFECTI
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WASTES

SHARPS

TYPES
OF
WASTE
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PATHOLO
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WASTES

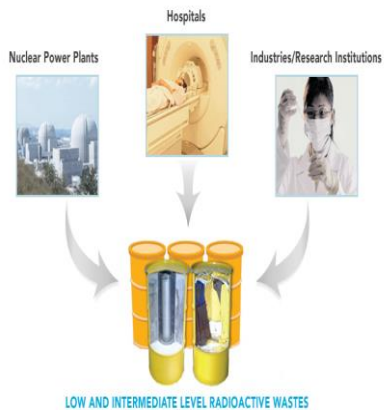
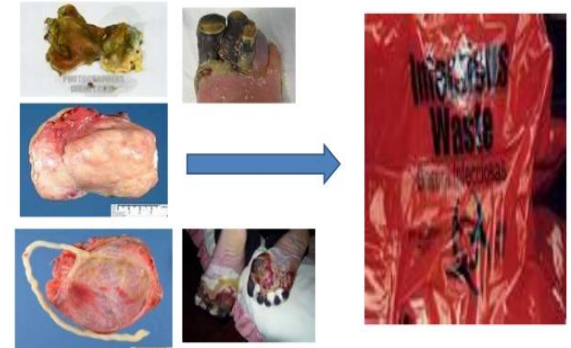
RADIO-
ACTIVE
WASTE

Pathological Waste

Should be kept in refrigeration until handed according to Islamic fatwa
No 8099 dated 21 Safar 1405 H

Human body parts & placenta

Dispose in Red bag



BIO-MEDICAL WASTE CATAGORIES



Classified into 4 categories to improve the segregation of waste at source



YELLOW

TYPE OF WASTE	TYPE OF BAG OR CONTAINER TO BE USED	TREATMENT AND DISPOSAL OPTIONS
A-Human Anatomical Waste: • Human tissues • Organs • Body parts • Fetus below the viability period. B- Animal Anatomical Waste: It includes the waste generated from animals used in experiments or testing.	Yellow colored non-chlorinated plastic bags.	Incineration or Plasma Pyrolysis or Deep burial
C-Soiled Waste: Items contaminated with blood or body fluids(dressings, plaster, cotton swaps)		Incineration or Plasma Pyrolysis or Deep Burial

D-Expired or Discarded Medicines: •Pharmaceutical waste	Yellow colored non-chlorinated plastic bags or containers	•Incineration or Encapsulation or Plasma Pyrolysis •Discarded medicines to be sent back to manufacturer
E-Chemical waste: Chemicals used in production of biological and used or discarded disinfectants.	Yellow colored containers or non-chlorinated plastic bags	Incineration or Encapsulation or Plasma Pyrolysis
F- Chemical liquid waste- liquid waste generated due to use of chemicals in production of biological and used or discarded disinfectants.	Separate collection system	It must be pre-treated
G-Discarded linen,mattresses, beddings contaminated with blood or body fluid.	Non-chlorinated yellow plastic bags or suitable packing material.	Incineration or Plasma Pyrolysis or for energy recovery.
H- Microbiological Biotechnological and other	Autoclave safe plastic bags or containers	Pre-treat to sterilize with non- chlorinated chemicals

RED

Contaminated Waste (Recyclable):

- Bottles
- Iv tubes and sets
- Catheters
- Urine bags
- Syringes (without needles and fixed needle syringes)
- Gloves

Red colored non-chlorinated bags or containers

- Autoclaving/Micro-waving/ Hydro-claving followed by Shredding or Mutilation.
- Treated waste to be sent to registered recyclers.
- Plastic waste should not be sent to landfill sites.

WHITE (TRANSLUCENT)

Waste sharps

including metals:

- Needles
- Syringes with fixed needles
- Scalpels
- Blades
- It includes both used , discarded and contaminated metal sharps.

Puncture proof, leak proof, tamper proof containers

Autoclaving or dry heat Sterilization followed by Shredding or Mutilation or Encapsulation.



BLUE

A- Glassware: Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes.	Cardboard boxes with blue colored markings	Disinfection (Sodium Hypochlorite treatment) or Autoclaving or Microwaving or Hydroclaving and then sent for recycling.
B- Metallic body implants	Cardboard boxes with blue colored markings	



Schedule III: Label for Bio-Medical Waste Containers/Bags

BIOHAZARD SYMBOL

जैविक परिसंकट चिन्ह



BIOHAZARD

जैविक परिसंकट

CYTOTOXIC HAZARD SYMBOL

कोषिकाविष परिसंकट चिन्ह



CYTOTOXIC

कोषिकाविष

AIM OF THE STUDY

The study aims at whether practices adapted for bio-medical waste management complies with the National guidelines especially in the light of honorable supreme court judgment and notification of **Bio-medical Waste (Management and Handling)Rules , 2016** & recommendations would be based on the analysis of the study so that standards of quality of care can be improved



OBJECTIVE OF THE STUDY

- To determine the awareness of healthcare personnel regarding bio-medical waste management policy & practices.
- To assess the attitude towards the criticality and importance of bio-medical waste management.



METHODOLOGY

- Study Design
Cross sectional study
- Study Area
Data had been collected from Blood bank, Heart station, Laboratories, Emergency room, OT, ICU.
- Sample size
60
- The study was conducted on the total of sixty healthcare personnel



DESIGNATION	NUMBER
DOCTORS	10
NURSES	25
PARAMEDICAL STAFF	15
AUXILLARY STAFF	10
TOTAL NUMBER	60

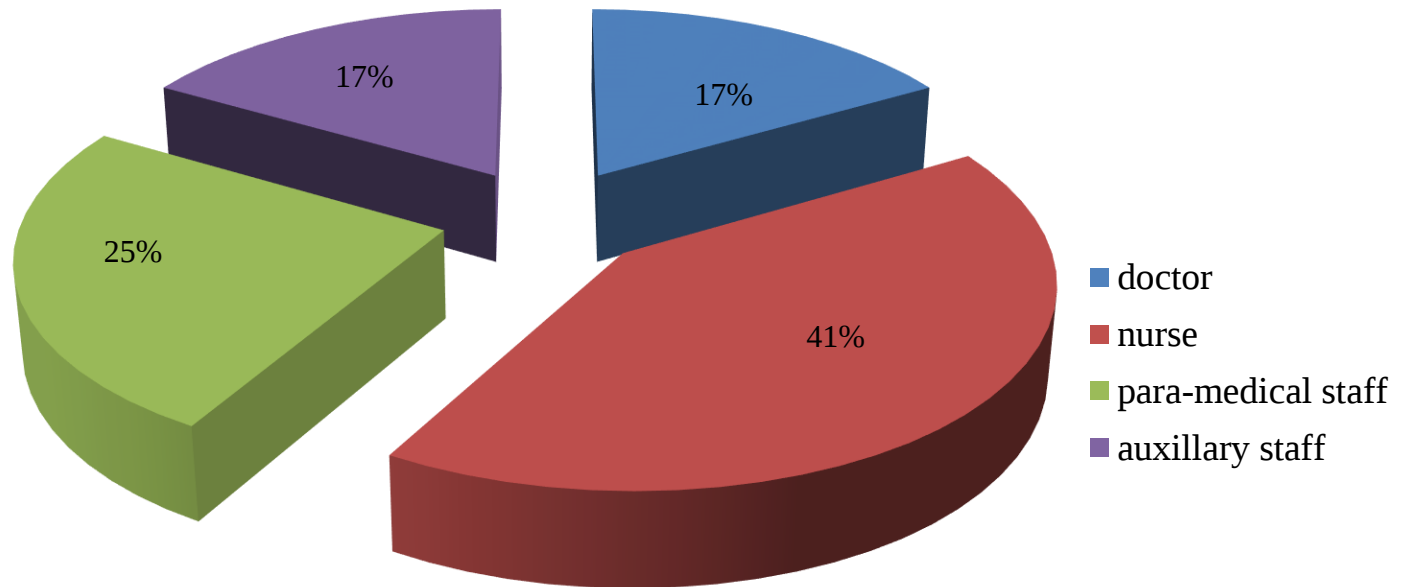


TOOL USED FOR STUDY

- The survey using questionnaire was designed.
- Interview to assess the general view about bio-medical management department functioning and effectiveness.
- Directly observing the activities of BMW department & how training procedure is carried out.



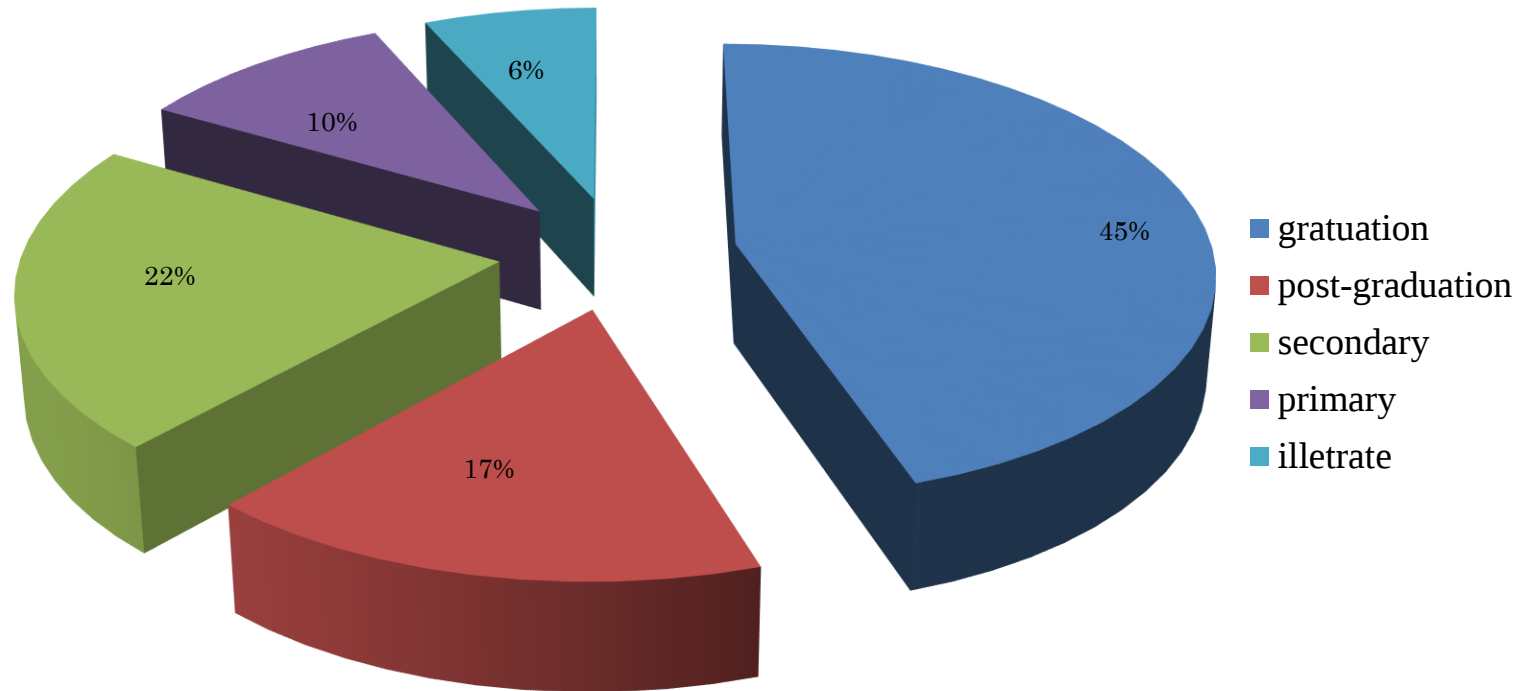
GRAPH NO. 1 REPRESENTS THE DISTRIBUTION OF PEOPLE OF DIFFERENT CATEGORY OF WORKERS TAKEN AS SUBJECTS OF SURVEY



- The survey was conducted in different departments of Shalby hospital Mohali. The subjects were chosen from different departments of hospital e.g. Blood bank, Heart station, Laboratories, Emergency room which are always the main source of bio-medical waste in any hospital settings.
- Out of 60 respondents 17% are doctor equal percentage is of auxiliary staff (housekeeping), 25% are Para-medical staff and 41% are nurse.
- This fraction has been chosen keeping in consideration the extent of involvement in segregation, handling of bio-medical waste & their vulnerability to get injury or infection.



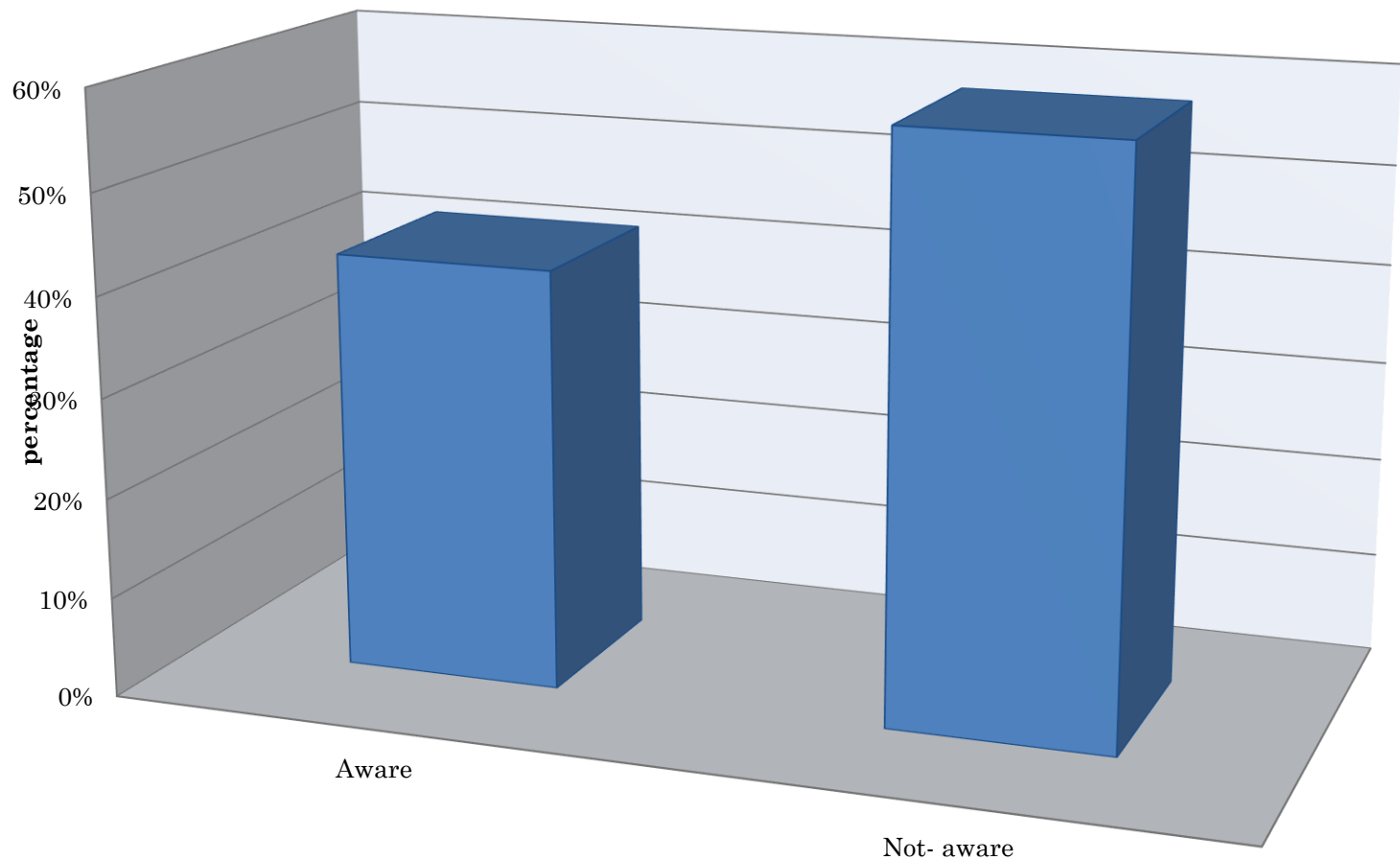
GRAPH NO. 2 REPRESENTS THE EDUCATION AND QUALIFICATION LEVEL OF THE STAFF TAKEN AS SUBJECTS OF THE STUDY



- The subjects taken for the study include nearly all categories of healthcare workers who are involved in bio-medical waste management directly or indirectly e.g. doctors, laboratory technicians, nursing staff and house keeping people, because no separate department can perform all the activities involved in hospital waste management.
- As graph no. 2 shows that most population surveyed is graduate which mostly include doctors, nursing staff and technicians and very few people (17%) are post graduate which mostly included the house surgeons and rest (32%) fraction of subjects have reached up to primary and secondary education level which constitutes some nurses and housekeeping staff and rest small fraction of 6% people also include the illiterate people which mostly belong to housekeeping category



GRAPH NO. 3 REPRESENTS THE RESPONDENTS' AWARENESS ABOUT THE LEGISLATION APPLICABLE TO HOSPITAL WASTE MANAGEMENT



	Aware	Not-aware
■ Series1	42%	58%

Analysis

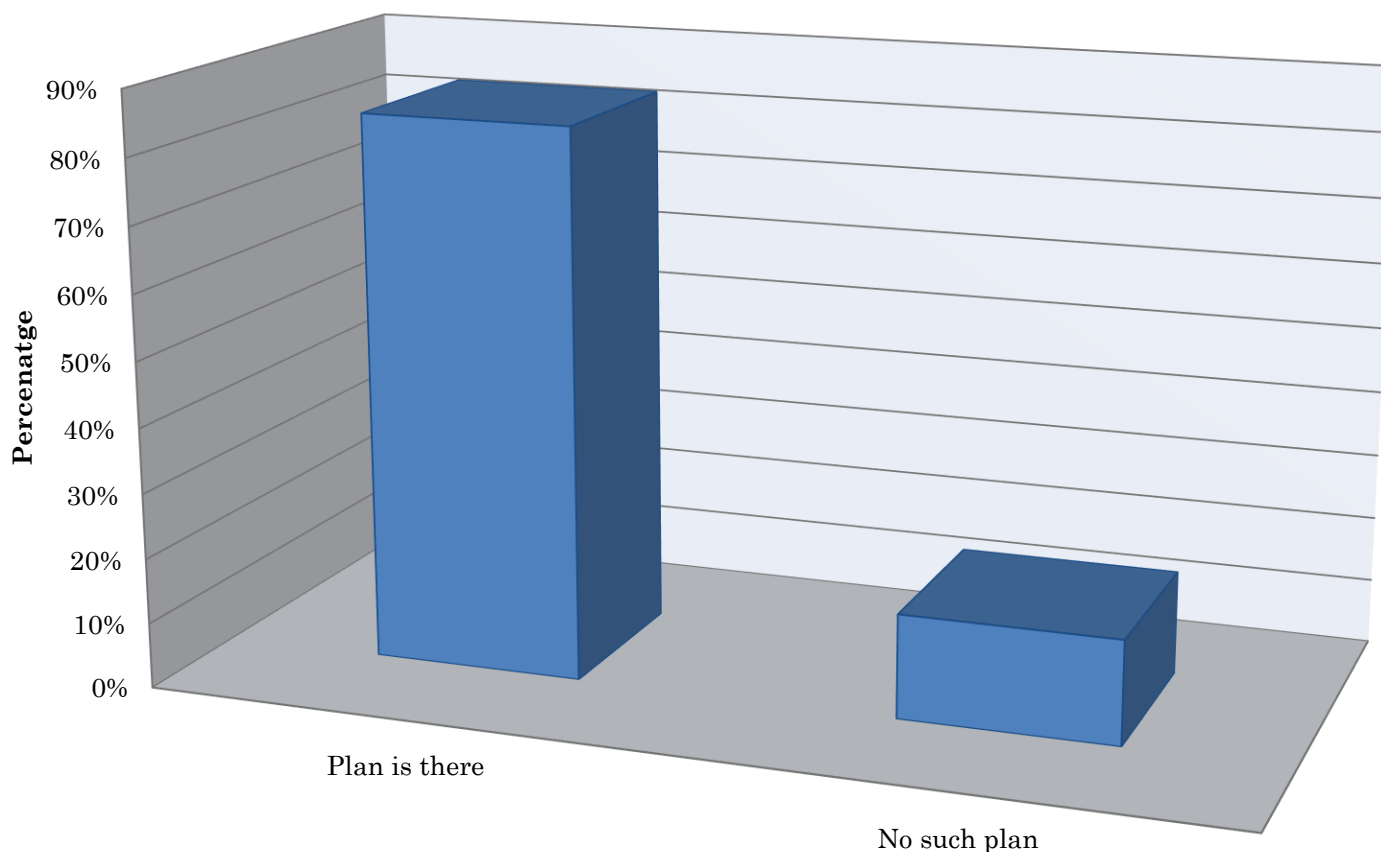
- During survey it was observed that when subjects were asked whether they do have knowledge of any legislation applicable to Hospital waste management only 1/4th of the respondents reacted positively but rest didn't have any idea about any such rules or legislation and out of those 42% of respondents who claimed to be aware of legislation very few were able name them all.

Inference:

- It may be due to lack of detailed training being given.
- Healthcare worker are taking the training casually.
- Workers are not attending the training sessions.
- Training department is not evaluating the performance of the workers.



GRAPH NO. 4 REPRESENTS THE PERCENTAGE OF SUBJECTS AWARE OF HOSPITAL WASTE MANAGEMENT PLAN



■ Series1	Plan is there	No such plan
	84%	16%

Analysis

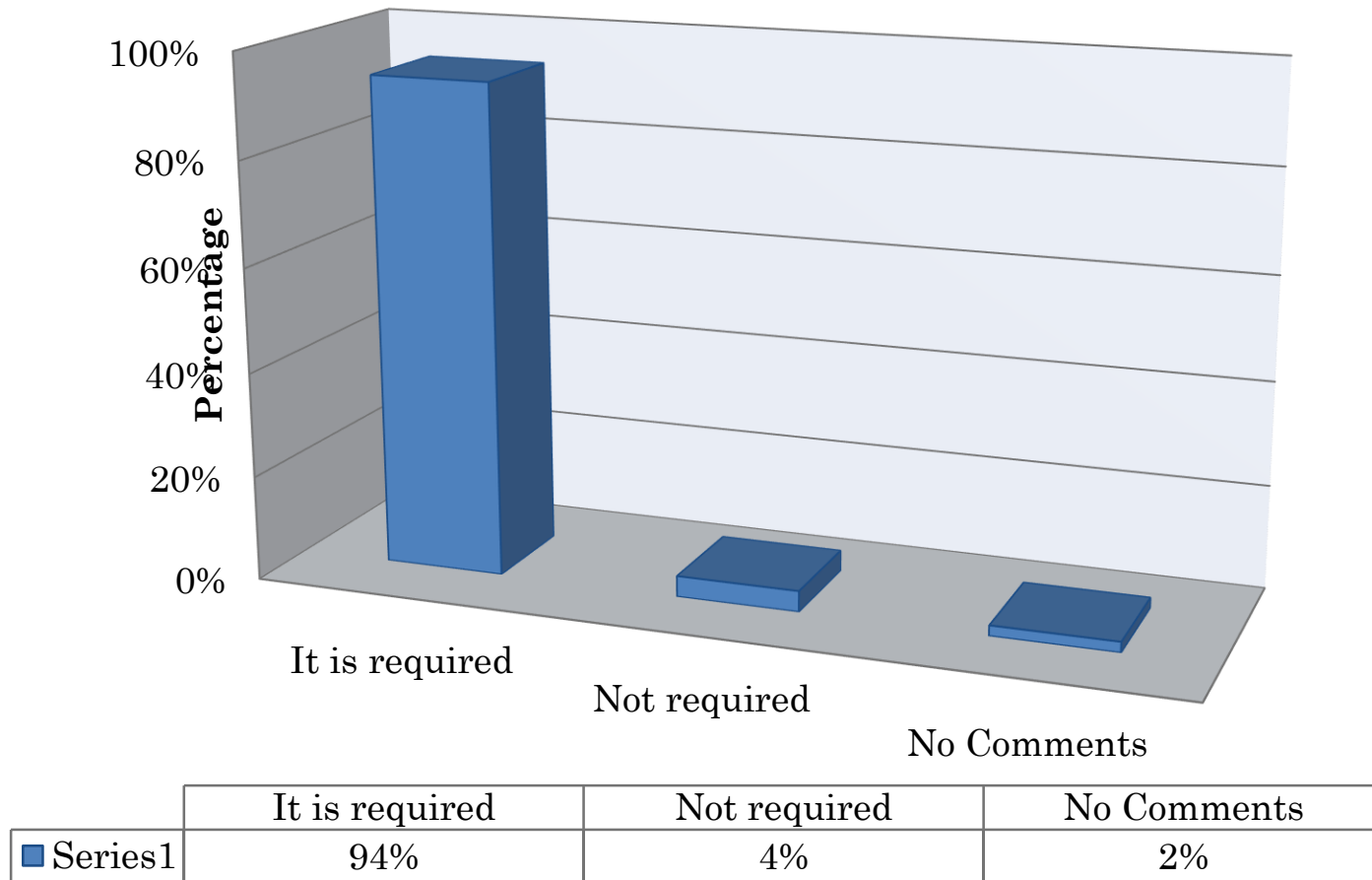
- When the subjects were asked how the hospital waste is managed to know if there is any kind of such plan in the hospital It is found that 84% of the respondents were aware of hospital waste management plan but still 16% of the subjects are unaware of any such kind of plan.

Inference

- They are new joiner and might not have given relevant training.
- They might not be attending the training classes because of lack of compulsion.
- They might not be contributing in hospital waste management.



**GRAPH NO. 5 REPRESENTS THE RESPONSES ON REQUIREMENT OF
SEGREGATION OF HOSPITAL WASTE IN TO DIFFERENT CATEGORIES**



Analysis

- The above graph convincingly shows that more than 90% of the respondents think that it is a sensitive issue & different type of waste should be kept in different color coded bins. But in contrast to this it is observed that on asking the reason for this only a few were able to give the convincing answer.

Inference:

- It is not appropriately told in the training the reasons for the segregation that how it can result in hazardous consequences in the community or in the population if not properly segregated.
 - Or there is attitude problem among the workers and they don't want to learn because may be they are more concerned for their job only.
 - They think it is not their job to do the segregation.
- 

MATCH THE FOLLOWING TABLE

Color code(A)	Type of waste(B)
White	Human Anatomical Waste, Animal Waste, chemical waste, soiled waste(blood& body fluids, expired /discarded medicines, lab waste
Red	Sharp Waste including metals.
Yellow	Contaminated waste(recyclable)
Blue	Glassware broken or discarded & contaminated glass ampoules, metallic body implants.

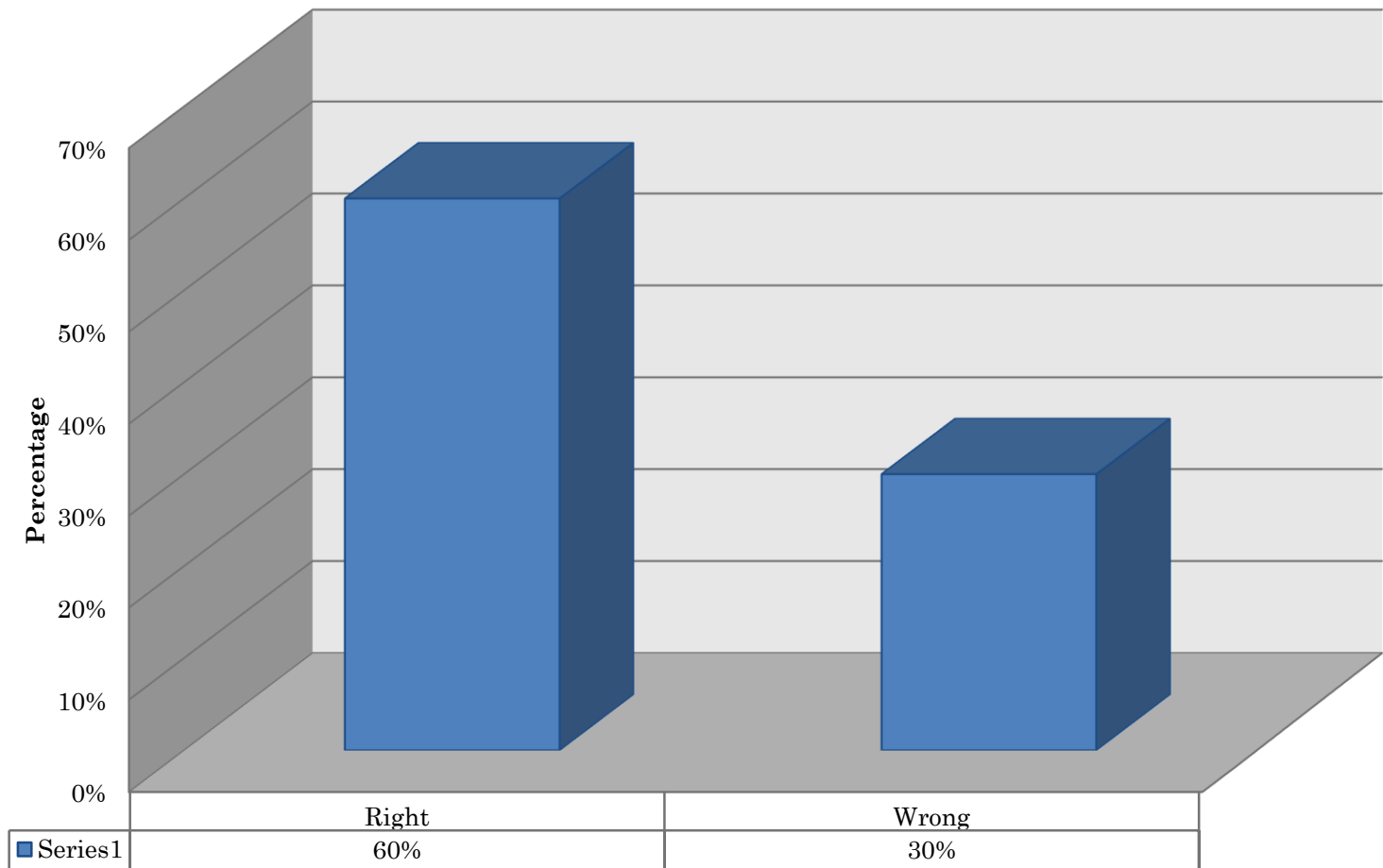


Analysis

- When the respondents were asked to match the color code column with type of material column, in the form above table.
- It has been shown in the graph no. 8 that no doubt 60% of the respondents match the table correctly but still nearly 1/3rd of the subjects were not able to match in right manner. So it can easily be assumed that they might be putting the waste in the wrong colored bins.



GRAPH NO.6 REPRESENTS THE RESPONDENTS RESULT WHEN ASKED TO MATCH COLUMN A TO COLUMN B IN TABLE NO. 1

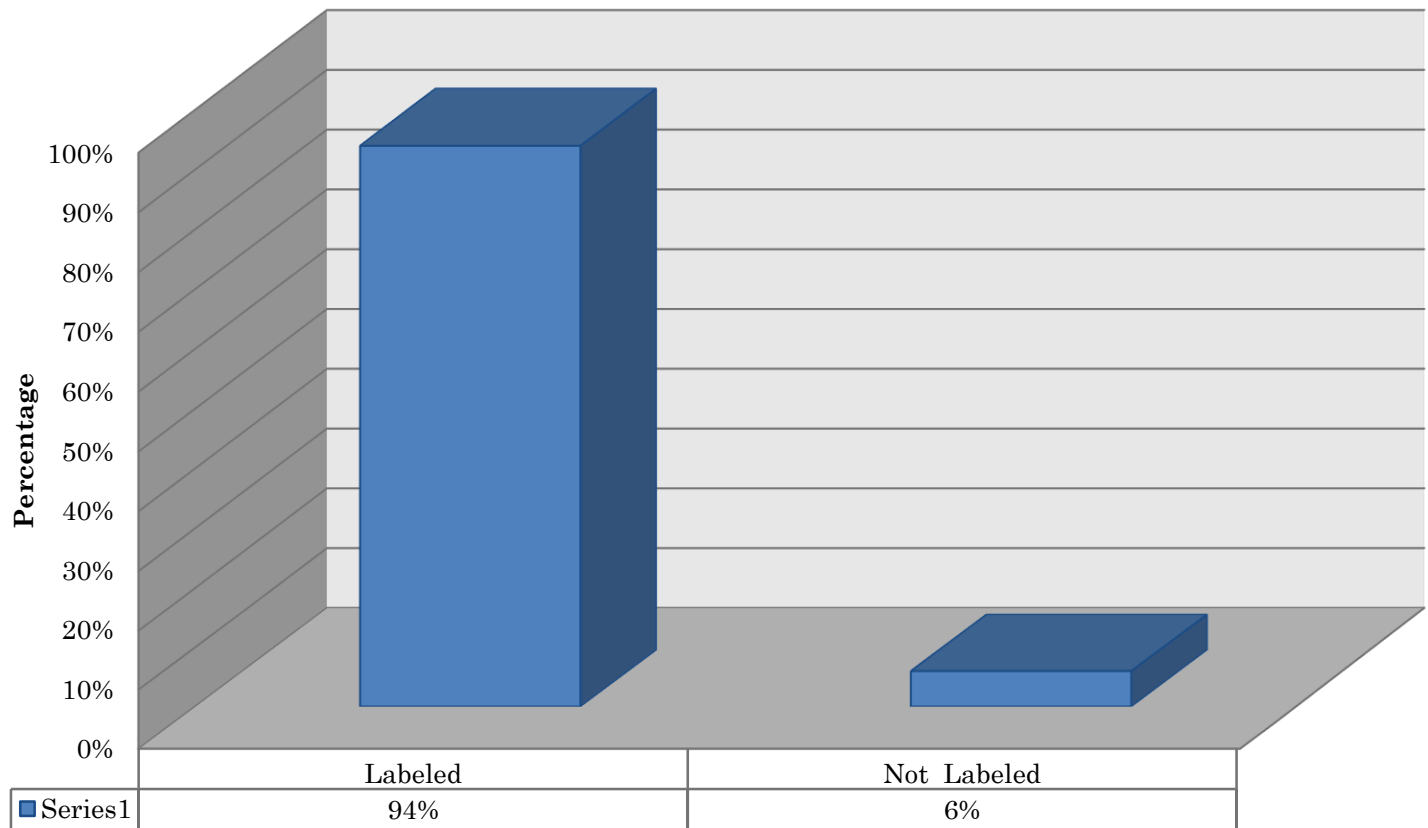


Inference

- Either they are not properly or periodically trained.
- They don't attend the training sessions.
- The training is not given in a comprehensive way.
- The staff is not appropriately supervised.



GRAPH NO. 7 REPRESENTS THE RESPONSES ABOUT LABELING THE INFECTIOUS WASTE WITH BIO-HAZARD SYMBOL

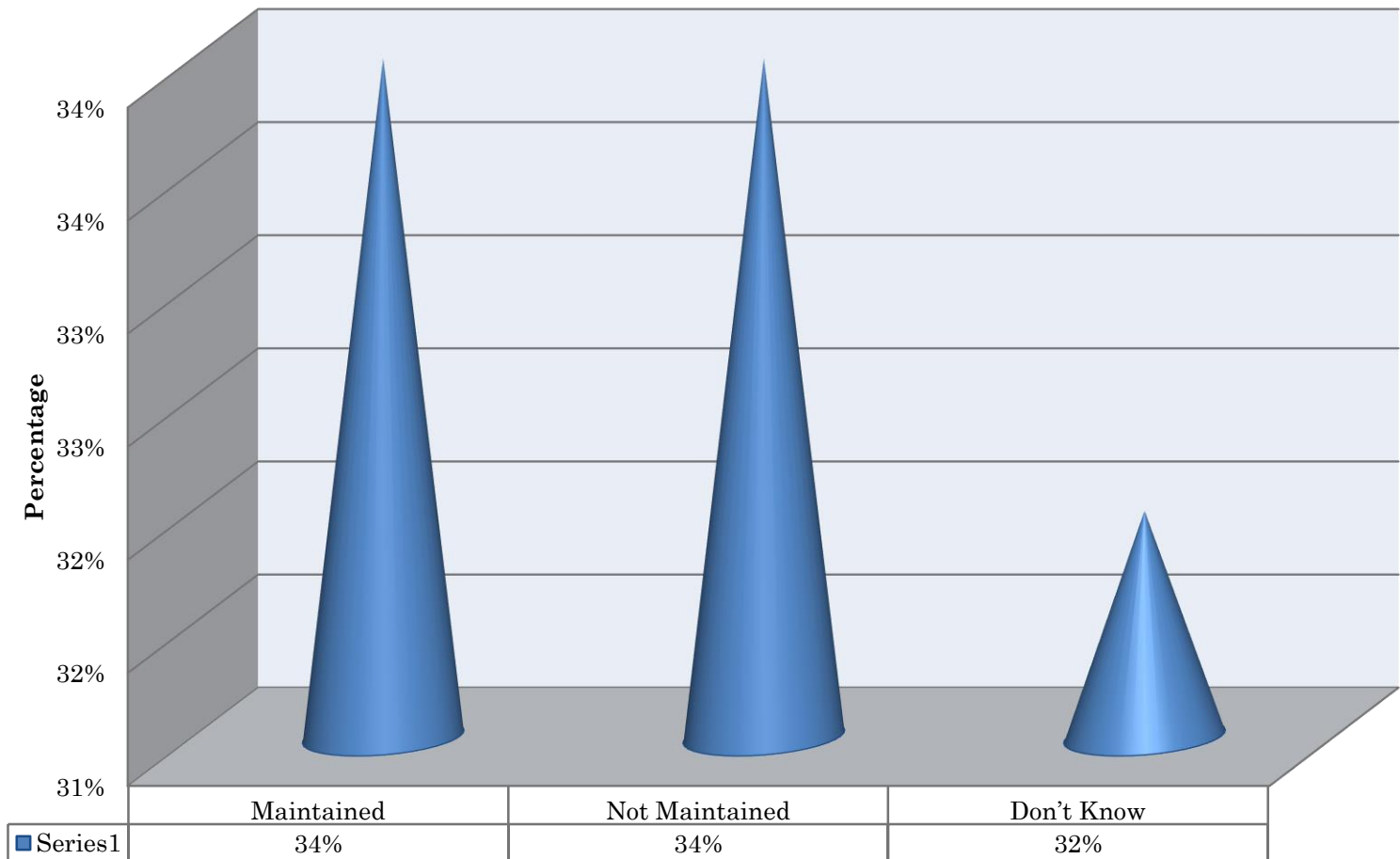


Findings:

- On asking are these colored bins are labeled with the bio-hazard symbol it is evident from the above graph that nearly 94% people respond positively which is a good practice being exercised in the hospital.
- This symbol is put on the bins so that:
- The personnel responsible for internal & external transportation of the bio-medical waste should not touch the bin without wearing the personal protective equipments.
- The patients and other staff would know that on touching the bins with bare hands could be health hazard as it can lead to infection and needle stick injuries.



GRAPH NO. 8 REFLECTS THE RESPONSES ABOUT MAINTENANCE OF WASTE DISPOSAL REGISTER



Analysis

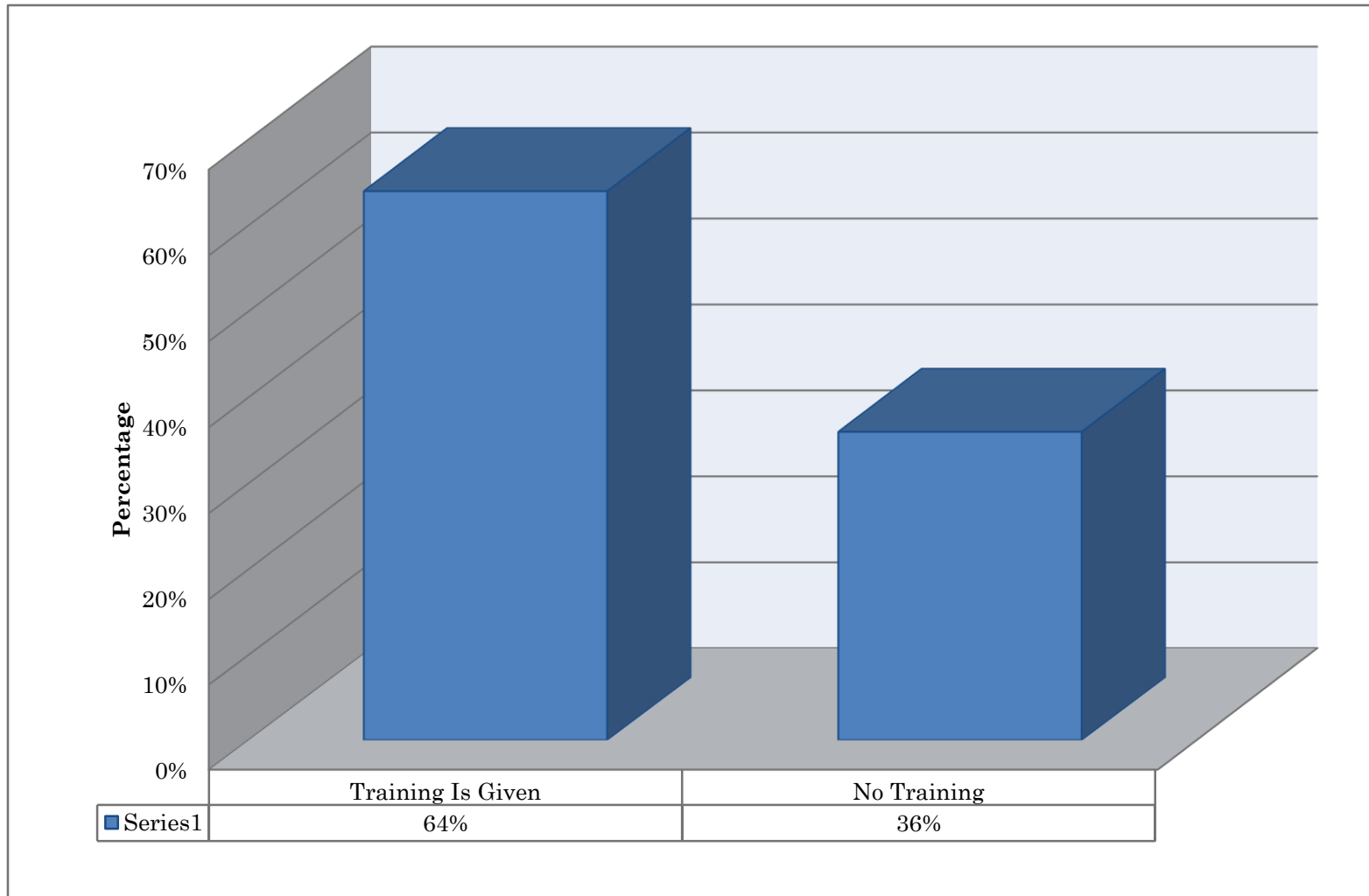
- From the survey it has been found that no register is maintained for the amount of bio-medical waste disposed / day by the different departments from where hospital waste is generated.

Inference

- So waste minimization can't be done until we know from where maximum amount of waste is generated so that alternate ways can be acquired to reduce this amount which would eventually alleviate the financial burden for the hospital and it would also a constructive step towards conservation of environment



GRAPH NO. 9 REPRESENTS RESPONSES OF SUBJECTS ABOUT TRAINING PROGRAMME ON HOSPITAL WASTE MANAGEMENT



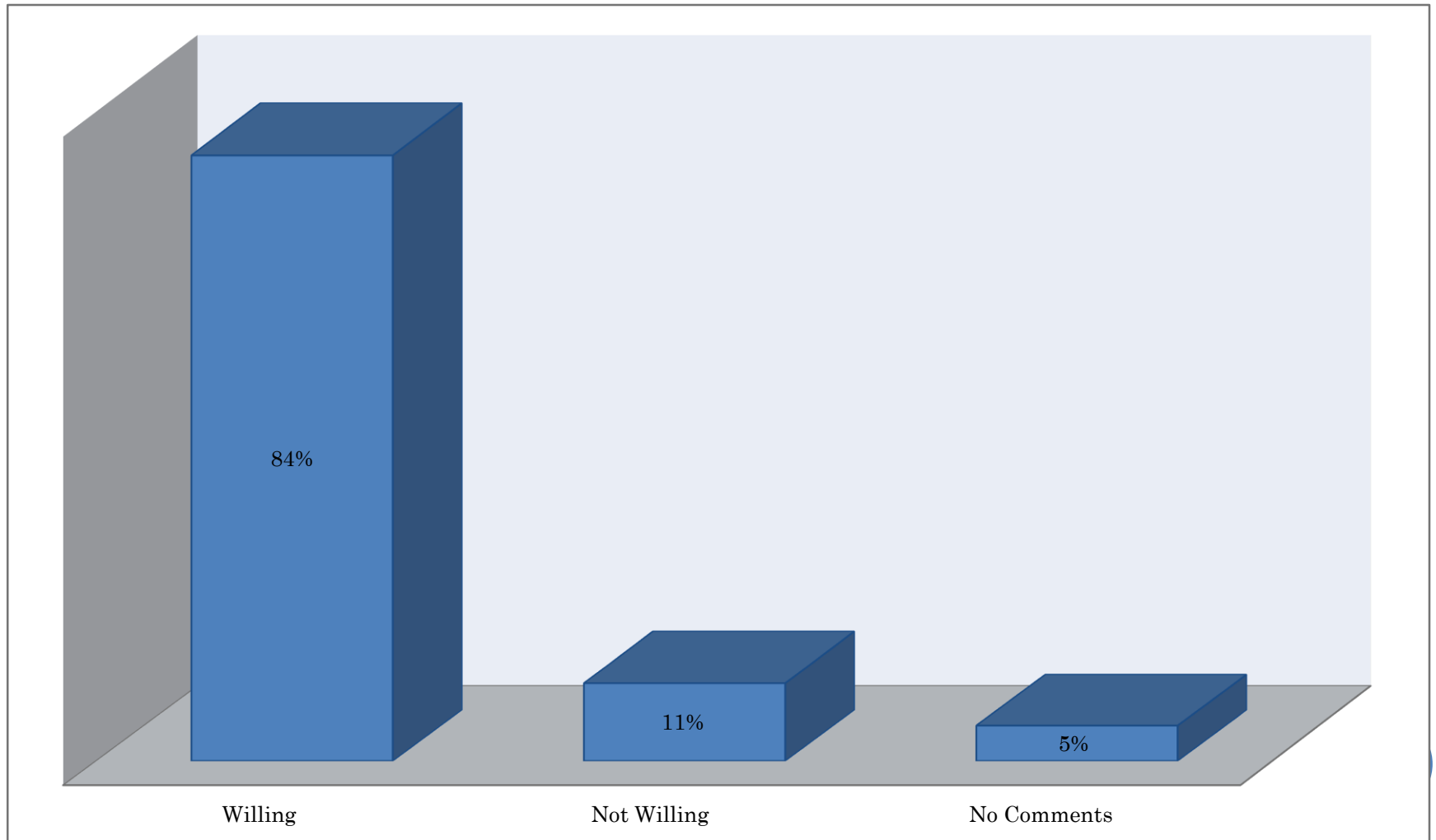
Analysis

- From the graph it can clearly be seen that although majority(64%) of the respondents said that they have gone through training sessions on the hospital waste management but still accountable portion of the respondents denied , if they have got any king of training concerning hospital waste management.

Inference

- So it can be inferred that this segment of the health work force would be unaware of how the hospital waste is handled & what precautions they should acquire while handling the waste which ultimately can result in hospital acquired infection or injuries not only to the house keeping people who collects these waste but also to the community. Apart from that it conveys the wrong message to the co-workers.
- 

GRAPH NO. 10 REPRESENTS THE WILLINGNESS TO ATTEND THE TRAINING SESSIONS ON BIO-MEDICAL WASTE MANAGEMENT



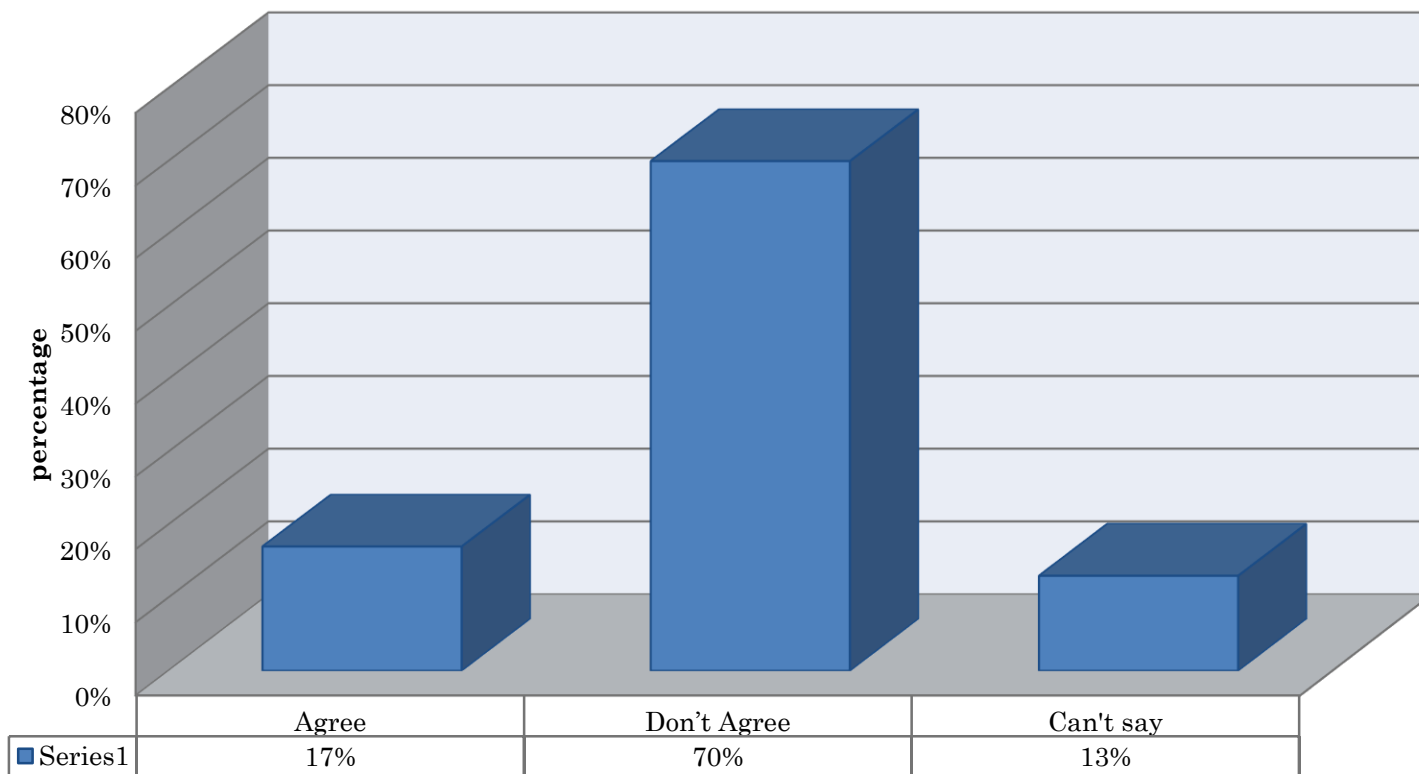
Inference Analysis

- On asking the respondents whether they are willing to attend any kind of program on hospital waste management, it can clearly be observed from the graph that 84% of respondents find it useful and they want these kind of programmes to happen in future.
- Attitude of majority of the people is positive so training would result in constructive outcome



GRAPH NO. 11 ATTITUDE ASSESSMENT

Safe management of Healthcare Waste is not an issue at all.



Analysis

- From the above graph it is very much evident that 70% of the respondents understand that hospital waste management is a serious issue and it should be handled carefully but still 3 out of 10 persons are either insensitive or don't understand the criticality of the matter.

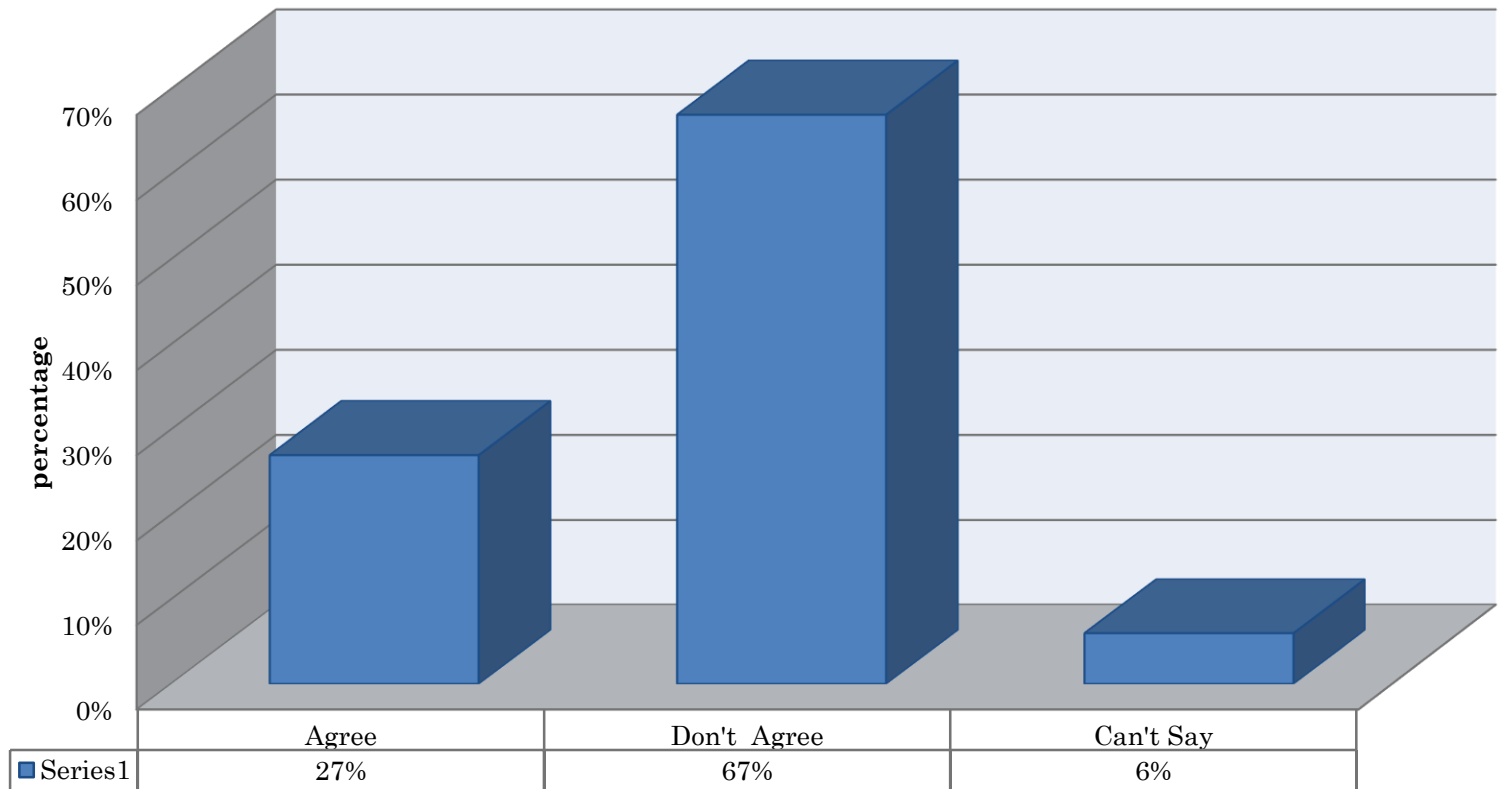
Inference

- Subjects who didn't come up with any answer/ reacted negatively lack the knowledge of bad effects of hospital waste mismanagement or don't care about anything due to attitude problem.



GRAPH 12

Safe Management of Healthcare Waste is the Responsibility of Government



Analysis

- When healthcare workers were asked the above question 6% respondents refused to answer but 27% people said hospital waste management should be the responsibility of the government. Yet majority of workers didn't agree from the statement.

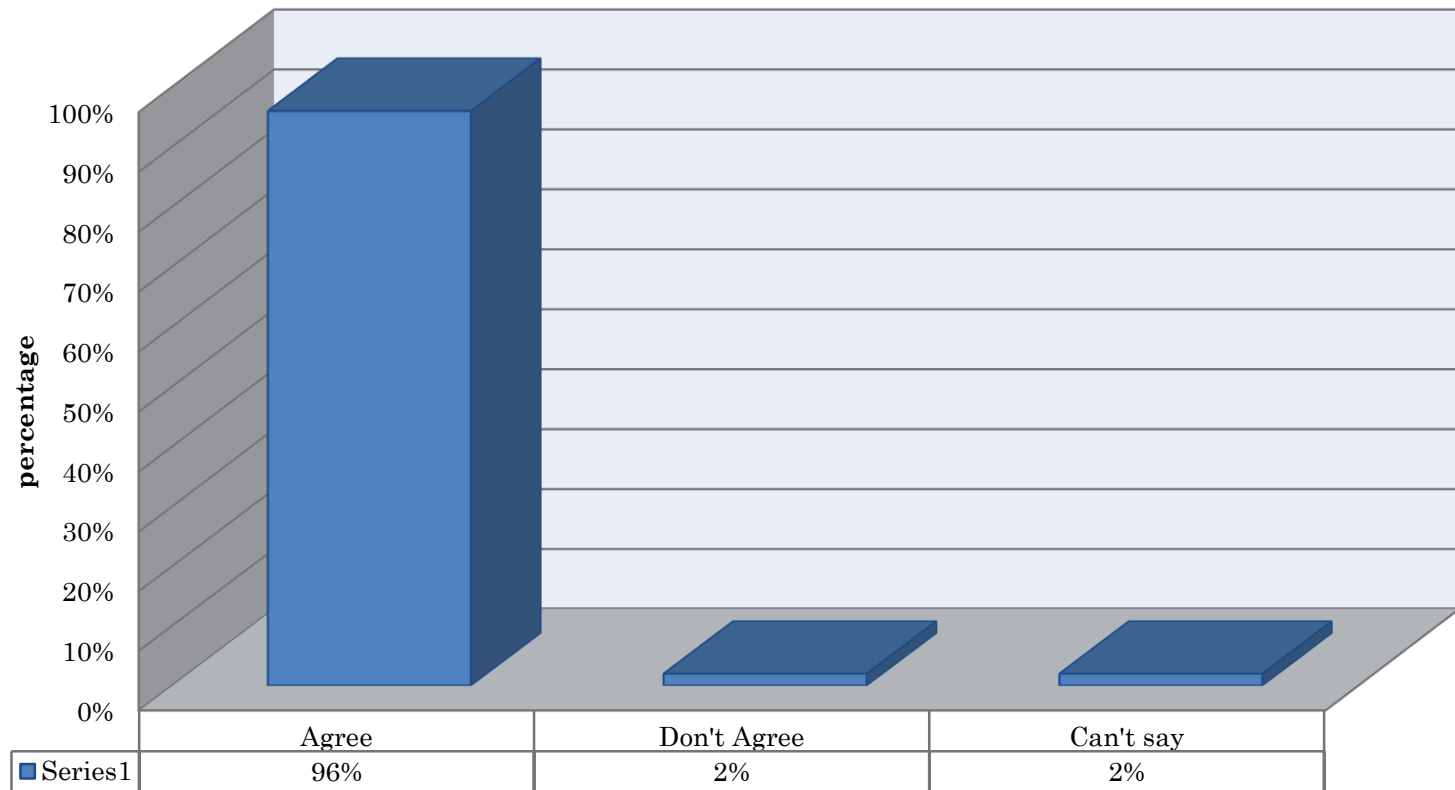
Inference

- The subjects, who agreed, might be taking the responsibility of segregating and handling of hospital waste as extra load on their work.



GRAPH NO 13

Waste Management is a team work & not a single Man's job



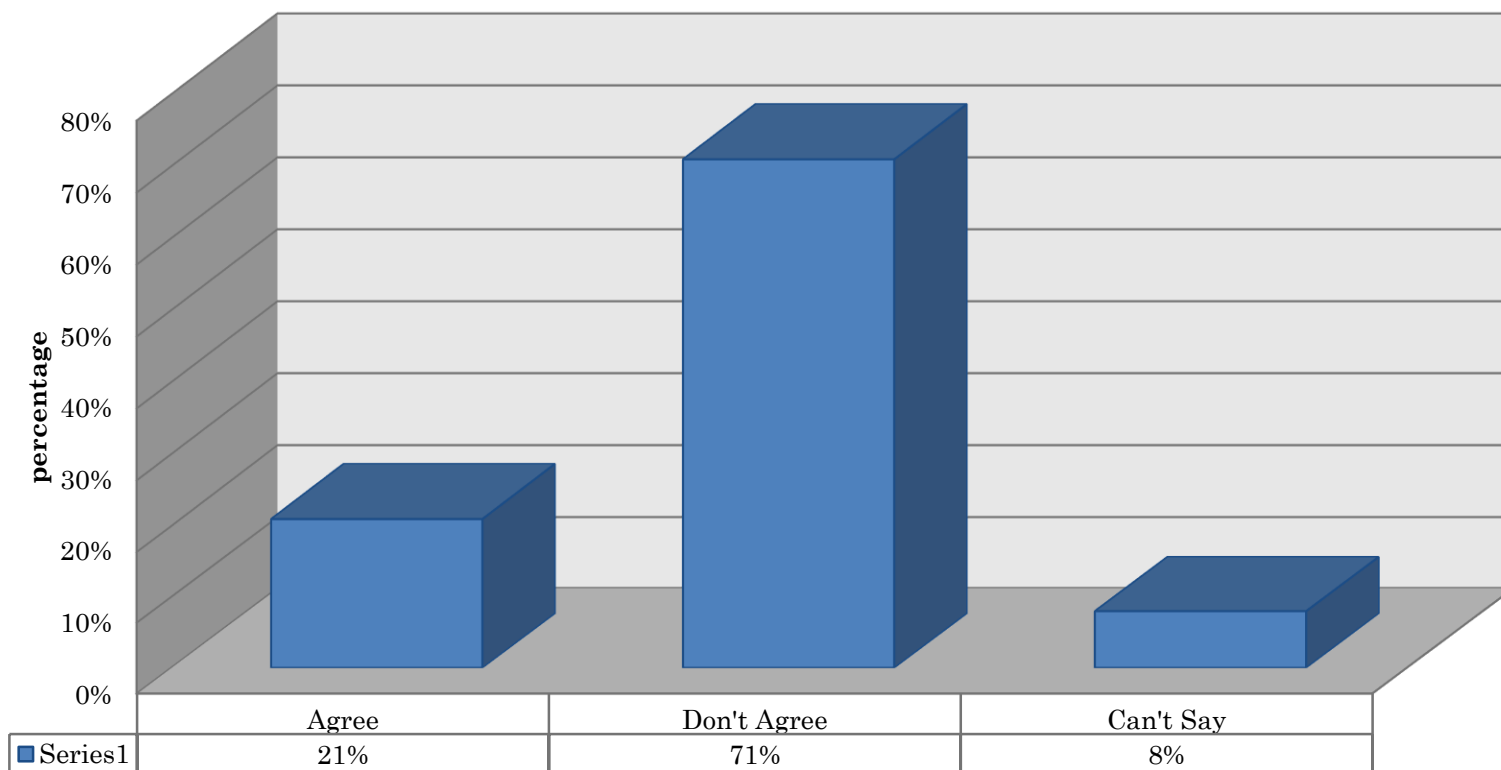
Analysis

- Approximately 95% of the health-workers agreed to the statement that hospital waste management is a team work not a single man or department can handle this job. So it requires a coordinated action from all the concerned departments to perform it effectively.



GRAPH NO . 14

Safe Management efforts increases Financial Burden on Management



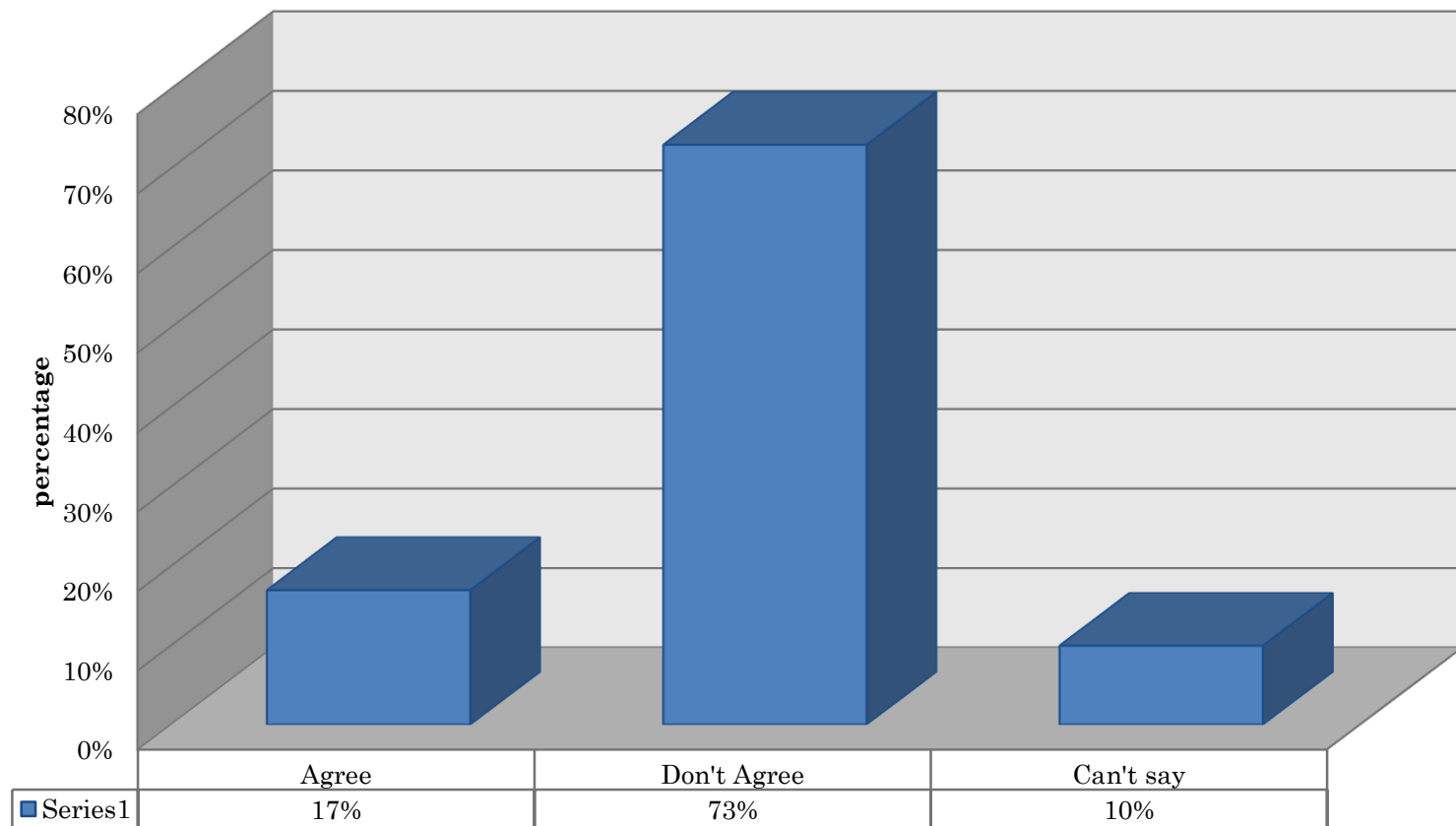
Analysis

- Nearly 70% of the respondents don't think bio-medical waste management increases the financial burden on the management because this is not a burden but a responsibility of a health-care institution because it may not result in financial out comes but by doing this a institute can provide a healthy environment to the society. But still there is need to correct the misconception of 21% of the health workers.



GRAPH NO. 15

Hospital Waste Management of Healthcare Waste is an Extra Burden on Work



Analysis

- It is evident from the above graph that although 73% of the respondents don't take hospital waste management an extra burden on their work but still nearly 20% of the respondents clearly agreed to the point.

Inference:

- Most of the people find it their responsibility.
- Fraction of respondents who find it as a burden may be due to deficiency of right attitude.
- But the respondents, who didn't answer, may be unaware of the practices
- of hospital waste management.



DATA COLLECTION BY GENERAL OBSERVATIONS & INTERVIEWS ON BIO-MEDICAL WASTE MANAGEMENT FROM DIFFERENT DEPARTMENTS.

Medical Intensive Care Areas

- Bins are not functioning properly.
- 
- Lid of bin is not opening even on pressing the foot opener.
 - In Medical Intensive Areas big garbage bins are paced in open just adjacent to the isolation room.
 - Cardboard boxes with blue tape should be placed instead of Bins
 - In emergency room bins are not properly placed. It is difficult for the nursing staff or doctor to put waste in respective bin because they are placed at uncomfortable distance.

Laboratory Bio-Chemistry

- Bins are not properly placed.
- Bins are without cover.



- Bin has been placed away from the place of generation.
- House keeping people put all kind of garbage in one bag (untrained).
- Housekeeping staff don't have personal protective equipments. They ask the department people for the gloves.



Blood Bank

- Overloading of bins.
- Housekeeping staff is not equipped with PPE.
- Solid waste is spilling out of the bin.



Analysis of Findings

- After analyzing the responses of healthcare workers to the questions asked in questionnaire, direct observations and from interviews it can be easily assumed that although various departments like housekeeping, heart station , emergency room, wards, blood bank and all the laboratories are coordinating well enough to handle the hospital waste appropriately but still there are some pitfalls which any stat of art healthcare institution would like to eradicate by taking the early progressive steps. Because perfection is achieved, not when there is nothing more to add but when there is nothing left to take away. And these pitfalls are:
- All categories of health workers are not getting the regular periodic training on hospital waste management.
- The attitude of all the workers is not right.
- Some workers are not able to attend the training sessions because of odd working hours.
- It has also been found some housekeeping people who are not proficient even in routine English language for e.g. color in English, so they do not perceive the things accurately while training.
- The nursing staff was not confident while answering the questions asked in questionnaire.

- Most of the time registered is not maintained at the garbage room by a single person but waste is weighed and entry is made by the housekeeping person themselves. So in case of any problem not a single person can be held responsible.
- Many of the bins are not in functional state, which may lead to mishandling of the bio-medical waste.
- In blood bank wrong color coded bins are placed near the donor room. And if they are rightly placed they are not in working position.
- Because bins are not functioning well healthcare workers tend to put the waste in wrong bin because nobody wants to touch the bin bare handedly
- In wards patient tend to spit or throw the soiled waste on floor because either the bins are not in working condition or patient don't want to step down from the bed to open the lid.



RECOMMENDATIONS

- Hospital waste management training should be given to all categories of healthcare workers because this is not a job of single department but it should be joint effort of healthcare workers of all the departments.
- Along with hospital waste management classes, behavioral modification programme should also be started so as to change the wrong attitude towards bio-medical waste management.
- The language used during training classes should be easily understandable by all specially for house keeping people because it has been observed that they often confuse even in English and Hindi name of the same color.
- Along with teaching, demonstration should also be given in the form of play which help in minimizing any kind of confusion and also it develop the interest of the workers.



- Attendance in the training session must be made compulsory.
- The house keeping people should be equipped with sufficient amount of personal protective equipments to minimize the risk of getting infection.
- The security person should be assigned the duty of weighing and maintaining the log book of waste coming out from different departments so that alternate methods can be acquired to minimize the waste which eventually would minimize the waste disposal cost.
- Positioning of waste bins should be accurate to minimize the risk of mixing of infectious waste with non infectious waste.
- Waste bins should be periodically checked for the proper functioning and should be replaced when required to minimize the chances of infection.



CONCLUSION

- In Indian scenario, ever increasing environmental pollution has become a menace .
- As the medical practitioners, we are very sincere to fight out the effects through administration of vaccination, but we do lack in sincerity to fight out the cause.
- Strict rules for ICUs, OTs and blood banks recommended.
- Technological driven advancements in treatment and disposal of wastes
- While lots of steps have been taken towards the BMW management, a lot more is still required for this alarmingly increasing problem of society.

“Let the waste of sick not contaminate the life of healthy”



THANK YOU

