

A Qualitative Research on Management of Increase in Bio Medical Waste during Covid-19 among Infection Control Nurses

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Abstract:

According to the data shared by Central Pollution Control Board (CPCB), India generated over 18,000 tons of COVID-19 related bio-medical waste between June and September. This includes personal protective equipment (PPE), gloves; face masks, head cover, plastic coverall, hazmet suit, syringes among other gears and medical equipment used by both healthcare providers and patients. Since April, India has been manufacturing an average of 4.5 lakh PPE suits every day, the Centre said. While these suits have helped contain the spread of the pandemic in a big way, they are now posing an immense risk to the ecosystem. Enormous amount of biomedical wastes (BMW) is produced everyday across the world during covid-19. Management of BMW depends on adherence to protocol. BMW management at generation point, definitely, depends upon the perception of infection control nurses, the purpose of this study will assess the perception regarding different aspects of BMW. As is evident from the current situation of the pandemic, basic infection control practices are the only measures for containment. Proper waste disposal is an integral part of these control measures.

Aim: the aim of the study was to assess the awareness among infection control nurses on increase in BMW during covid-19 and to understand the measures to reduce the BMW waste using proper waste disposal guidelines. It will assess the awareness and practice regarding different aspects of Bio Medical Waste. To improve organization of work, implement standard precautions and dispose Bio Medical Waste properly to prevent occupational exposure.

Method: The study will be conducted at various hospitals among infection control nurses using a qualitative approach to assess the awareness among infection control nurses on increase in bio medical waste due to covid 19 and its management. The study will be of one month and sample size is small of 5 infection control nurses. We conduct this study using demographic data and questionnaires using interviews.

Results: In this case study there were a series of interviews conducted with infection control nurses from various hospitals which stated the problems faced by them due to this increase in bio medical waste such as increased financial burden, improper segregation, storage spaces not enough for the waste to be stored, transport facilities not being on time and improper disposal of the waste if not monitored properly.

The solutions which the nurses provided to these problems were such that using appropriate designated color-coded bins, using double layered bags, adequate storage facility and segregating non covid waste from covid waste and transporting it on time using appropriate transport facilities and proper disposal of the wastes.

Conclusion: The problems were faced initially at the beginning of the pandemic but were resolved after proper guidelines that were issued by pollution control department from Delhi and Maharashtra. There were certain protocols which were issued to all the hospitals to handle the increase in the bio medical waste due to covid-19. The participants informed us about the solutions which they implemented to handle the waste. The use of color coded bins, segregating waste from green and red zone with proper labeling on the bags, using double layered bags helped in managing the issues.

There were separate isolated rooms for storage of covid-19 waste from non covid waste which helped in avoiding contamination and infections. The storage facilities were also monitored and assessable to a few members of the health care team. The transport of waste contaminated with covid-19 was an important step in bio medical waste management as the proper transportation of waste from the generation to the point of disposal is necessary. Following the guidelines and protocols and keeping up with any changes needed in proper management of bio medical waste proved to help greatly with managing it. And applying all the adequate measures to collect the waste and dispose it as necessary to reduce the bio medical waste generated by covid-19

INTRODUCTION

Let the waste of “THE SICK” Not contaminate the lives of “THE HEALTHY”-K.Park

The corona virus disease (COVID-19) pandemic, which originated in the city of Wuhan, China, has quickly spread to various countries, with many cases having been reported worldwide. As of May 8th, 2020, in India, 56,342 positive cases have been reported. Multiple strategies have been used to handle the current outbreak; these include computational modelling, statistical tools, and quantitative analyses to control the spread as well as the rapid development of a new treatment. The Ministry of Health and Family Welfare of India has raised awareness about the recent outbreak and has taken necessary actions to control the spread of COVID-19.

Severe acute respiratory syndrome corona virus 2 (SARS-CoV-2), which causes coronavirus disease (COVID-19), was first identified in December 2019 in Wuhan city, China, and later spread to many provinces in China. As of May 8th, 2020, the World Health Organization (WHO) had documented 3,759,967 positive COVID-19 cases, and the death toll attributed to COVID-19 had reached 259,474 worldwide. So far, more than 212 countries and territories have confirmed cases of SARS-CoV-2 infection. On January 30th, 2020, the WHO declared COVID-19 a Public Health Emergency of International Concern.

The first SARS-CoV-2 positive case in India was reported in the state of Kerala on January 30th, 2020. Subsequently, the number of cases drastically rose. According to the press release by the Indian Council of Medical Research (ICMR) on May 8th, 2020, a total of 14,37,788 suspected samples had been sent to the National Institute of Virology (NIV), Pune and a related testing laboratory. Among them, 56,342 cases tested positive for SARS-CoV-2. As of May 8th, 2020, Maharashtra, Delhi, and Gujarat states were reported to be hotspots for COVID-19 with 17,974, 5,980, and 7,012 confirmed cases, respectively. To date, 16,540 patients have recovered, and 1,886 deaths have been reported in India.

According to the data shared by Central Pollution Control Board (CPCB), India generated over 18,000 tonnes of COVID-19 related bio-medical waste between June and September. This includes personal protective equipment (PPE), gloves; face masks, head cover, plastic coverall, hazmet suit, syringes among other gears and medical equipment used by both healthcare providers and patients. In June, India generated 3,025.41 tonnes of COVID-19 related bio-medical waste; in July the number rose to 4,253.46 tonnes and further spiked to 5,238.45 tonnes in August and 5,490 tonnes in September.

On an average, India generated about 183 tonnes of COVID-19 related bio-medical waste per day in September. Back in June, the figure stood at 101 tonnes per day. This quantity is in addition to the regular bio-medical waste generation of about 609 MT per day (as of June, 2020). While these suits have helped contain the spread of the pandemic in a big way, they are now posing an immense risk to the ecosystem. Made primarily out of single-use plastic, the necessity for these suits has reversed all the ground gained by banning such plastic products in parts of the country.

In response to the COVID-19 pandemic in India, Central Pollution Control Board (CPCB), Ministry of Environment, Forest & Climate has published guidelines for the management of waste generated during treatment/diagnosis/quarantine of COVID-19 patients. These guidelines have advocated use of double layered bags (using two bags), mandatory labeling of bags and containers as “COVID-19 waste,” regular disinfection of dedicated trolleys, separate record keeping of waste generated from COVID-19 isolation wards, in addition to the recommendation for following existing practices of BMW Management Rules, 2016. Enormous amount of biomedical wastes (BMW) is produced everyday across the world during covid-19. Management of BMW depends on adherence to protocol. BMW management at generation point, definitely, depends upon the perception of infection control nurses, the purpose of this study will assess the perception regarding different aspects of BMW. As is evident from the current situation of the pandemic, basic infection control practices are the only measures for containment. Proper waste disposal is an integral part of these control measures.

NEED FOR THE STUDY

Bio-medical waste (BMW) has remained the source of emerging pollutants categorically generated by healthcare practices like medical diagnosis, treatment and immunization of disease, and/or biological research activities on animals. It also includes the medicine excretion by patients wherein the active component of drugs and metabolite, chemical and pharmaceutical residues, iodinated contrast media, etc. Approximately 85% of total BMW volume is regarded as non-hazardous waste. while the remaining volume comes under infectious hazardous wastes.

Biomedical waste (BMW) management is an important commitment of hospitals both in terms of the possible infectious risk and from the financial point of view. Monitoring the perception of infection control nurses

on this topic represents a source of information on BMW management. The aim of this study is to perform a systematic review to identify the reliable and valid tools able to assess the infection control nurses in healthcare centers to manage BMW.

National capital Delhi accounts for 11 per cent of India’s daily COVID-19 bio-medical waste generation. Delhi has only two incinerators and 70 per cent of their capacity is already utilized. In September, Gujarat generated over 600 tonnes of biomedical waste, followed by Tamil Nadu (543) and Maharashtra (524). Overall, Maharashtra generated a whopping 3,587 tonnes of Covid-19 biomedical waste, followed by Tamil Nadu (1,737 tonnes), Gujarat (1,638 tonnes), Kerala (1,516 tonnes), Uttar Pradesh (1,432 tonnes), Delhi (1,400 tonnes), Karnataka (1,380 tonnes) and West Bengal (1,000 tonnes). With the above evidence and statistics of the world and nationwide showing huge increase in bio medical waste related to covid-19 which has doubled within the last 8 months we researchers found it necessary to assess on the management of increase in bio medical waste during covid-19 among infection control nurses

SCOPE OF THE STUDY

- To bring awareness among infection control nurses on increase in BMW during covid-19
- To help understand the measures to reduce the BMW waste using proper waste disposal guidelines.

PROBLEM STATEMENT

“A Qualitative study on management of increase in bio medical waste during covid-19 among infection control nurses”

OBJECTIVES OF THE STUDY

The main aim of the study is to find out the common interactions and discussions on management of increase in biomedical waste during covid-19 among infection control nurses

RESEARCH METHODOLOGY

Study setting-This study will be conducted at various hospitals among infection control nurses.

Study design - This study will include qualitative approach and a descriptive study on management of increase in biomedical waste during covid-19 among infection control nurses

Study duration :1 month

Sample size:Sample size will be 5 infection control nurses.

Sampling procedure

Measurements such as multiple-choice questions for demographic data which is section A.

Questionnaire’s discussions in relation to management of increase in biomedical waste during covid-19 among infection control nurses

SELECTION CRITERIA:

Inclusion criteria: infection control nurses will be included on the basis of:

- 1.Those infection control nurses who are willing to participate in the study.
- 2.Infection control nurses who have worked in COVID-19

Exclusion criteria: Infection control nurses will not be included if:

1. Infection control nurses who are not willing to participate in the study.
2. Infection control nurses who have not worked in COVID-19

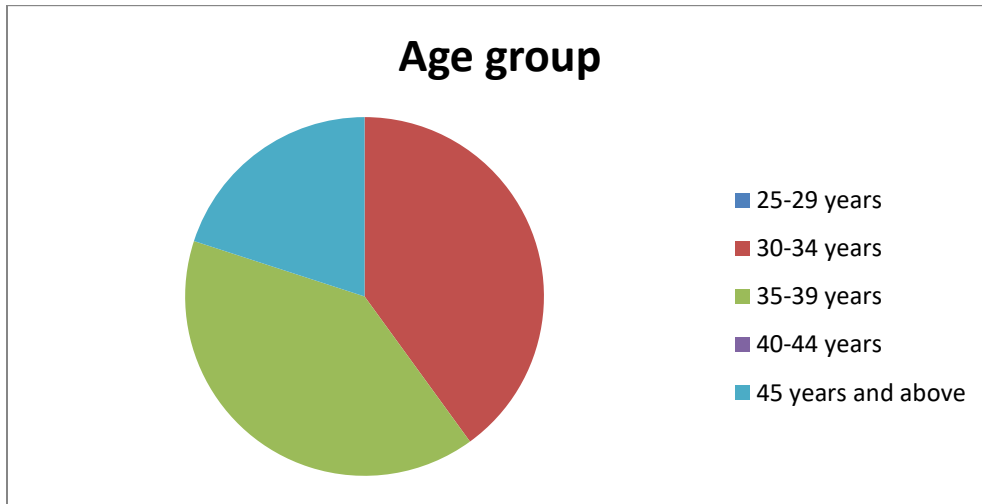
RESULTS OF THE STUDY:

Results on Demographic Variable

1. Distribution of participants from selected hospitals according to their demographic data and age group

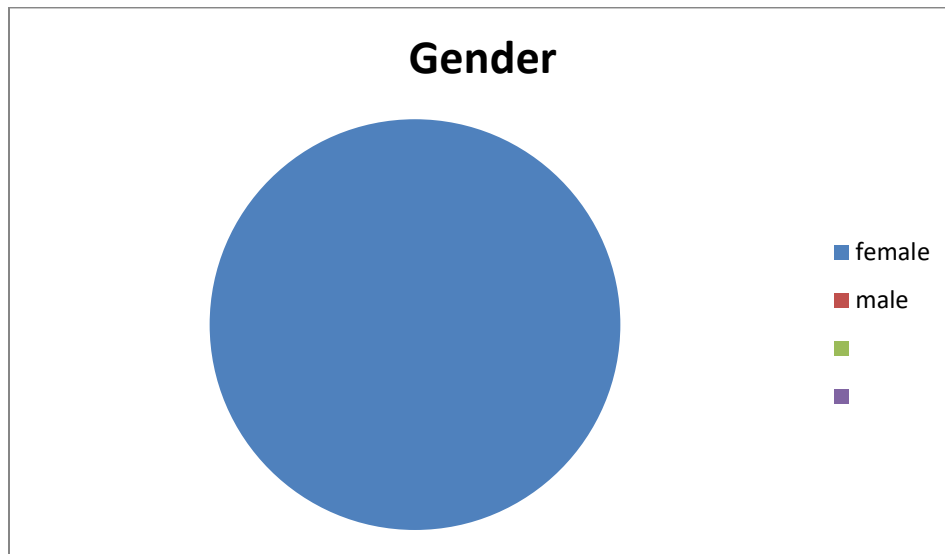
Age group	Frequency	Percentage(%)
25-29 years	0	0
30-34 years	2	40
35-39 years	2	40

40-44 years	0	0
45 years and above	1	20



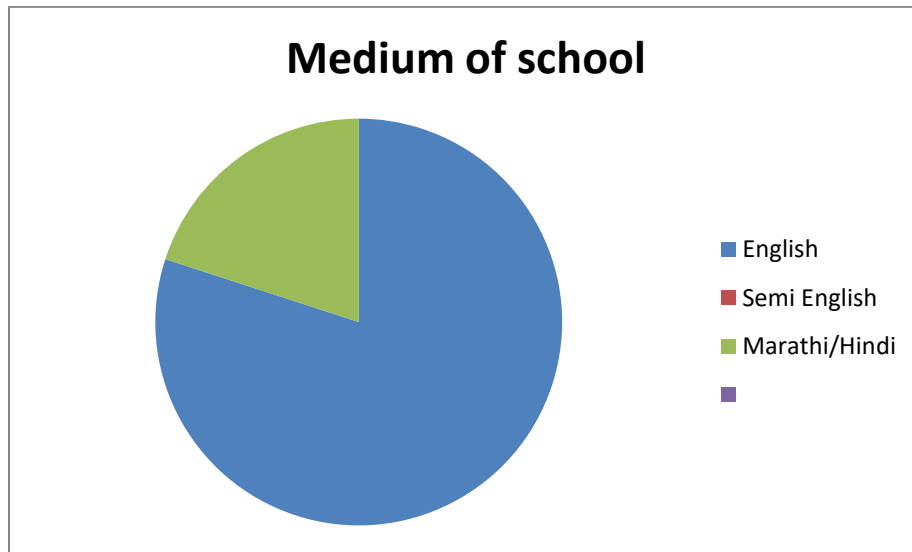
2. Distribution of participants from selected hospitals based on their gender

Gender	Frequency	Percentage (%)
Female	5	100
Male	0	0



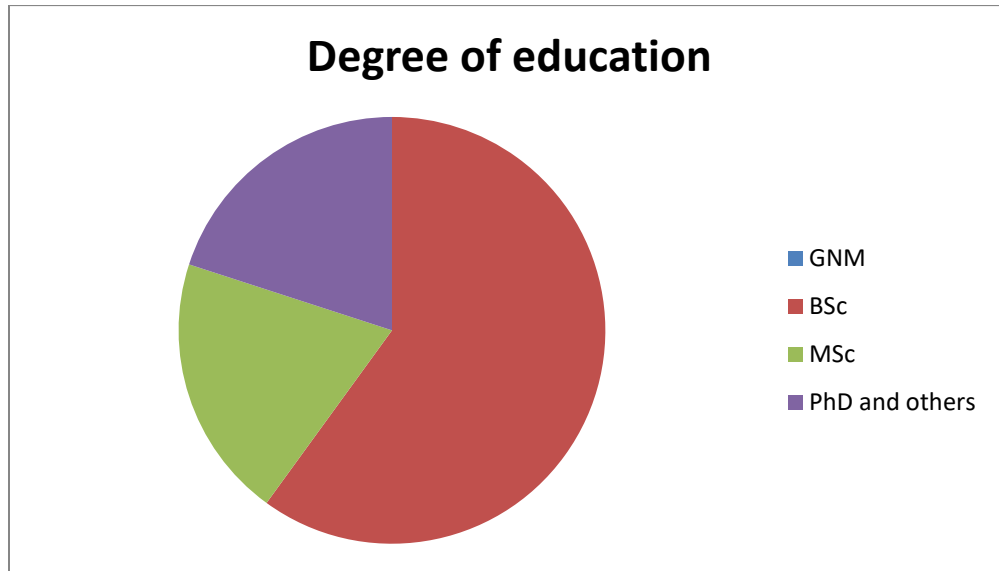
3. Distribution of participants based upon their medium of school

Medium of school	Frequency	Percentage (%)
English	4	80
Semi English	0	0
Marathi/ Hindi	1	20



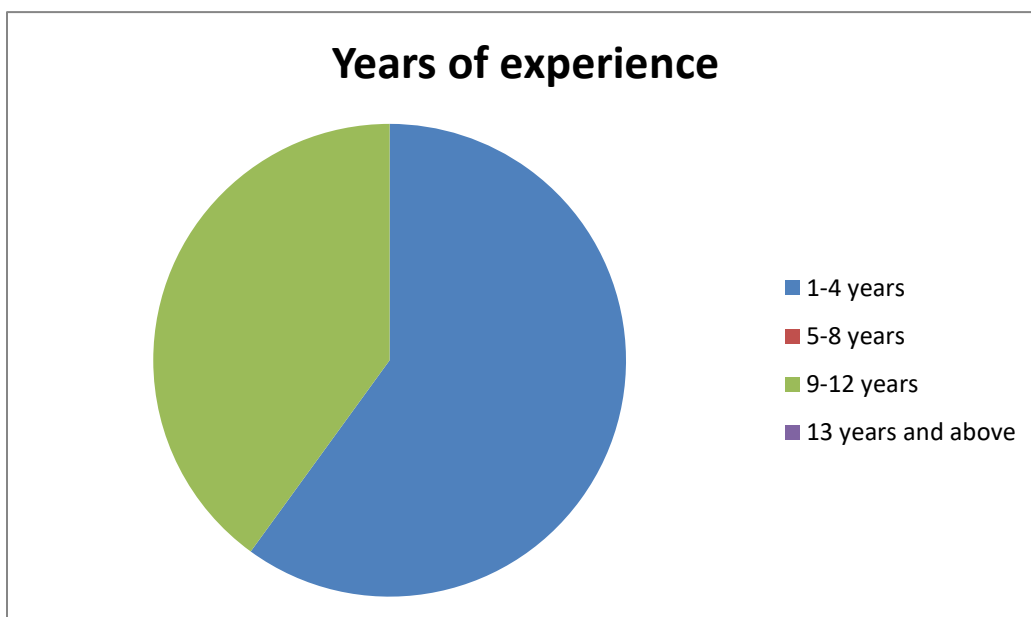
4. distribution of participants based upon their highest level of education in nursing

Degree of education	Frequency	Percentage (%)
GNM	0	0
BSc	3	60
MSc	1	20
PhD and others	1	20



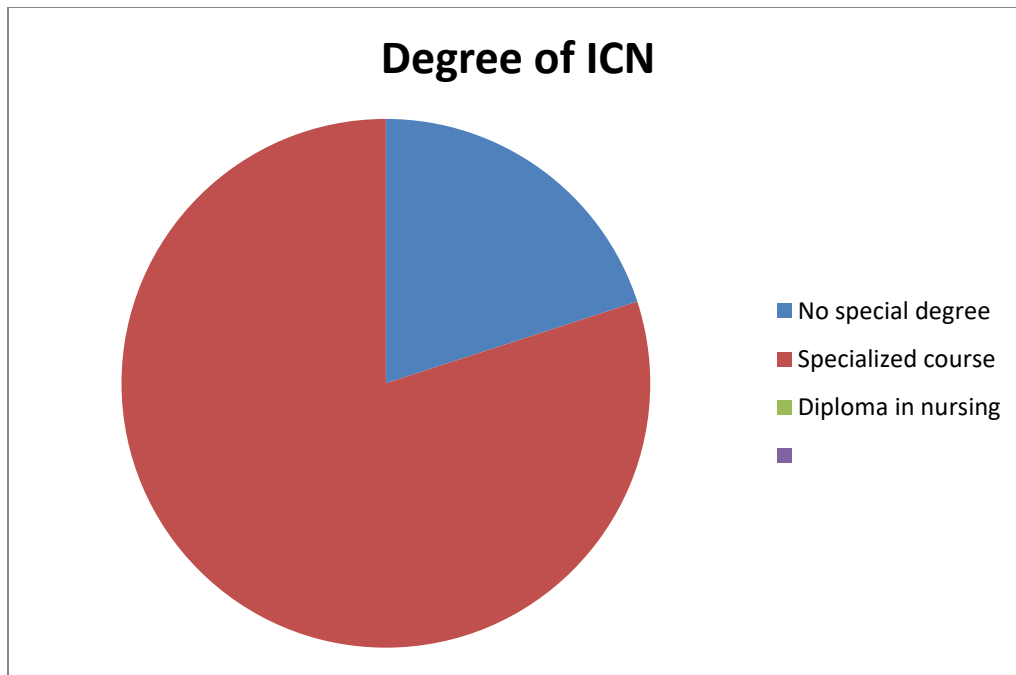
5. distribution of participants based upon their years of experience working as an infection control nurse.

Years of experience	Frequency	Percentage(%)
1-4 years	3	60
5-8 years	0	0
9-12 years	2	40
13 years and above	0	0



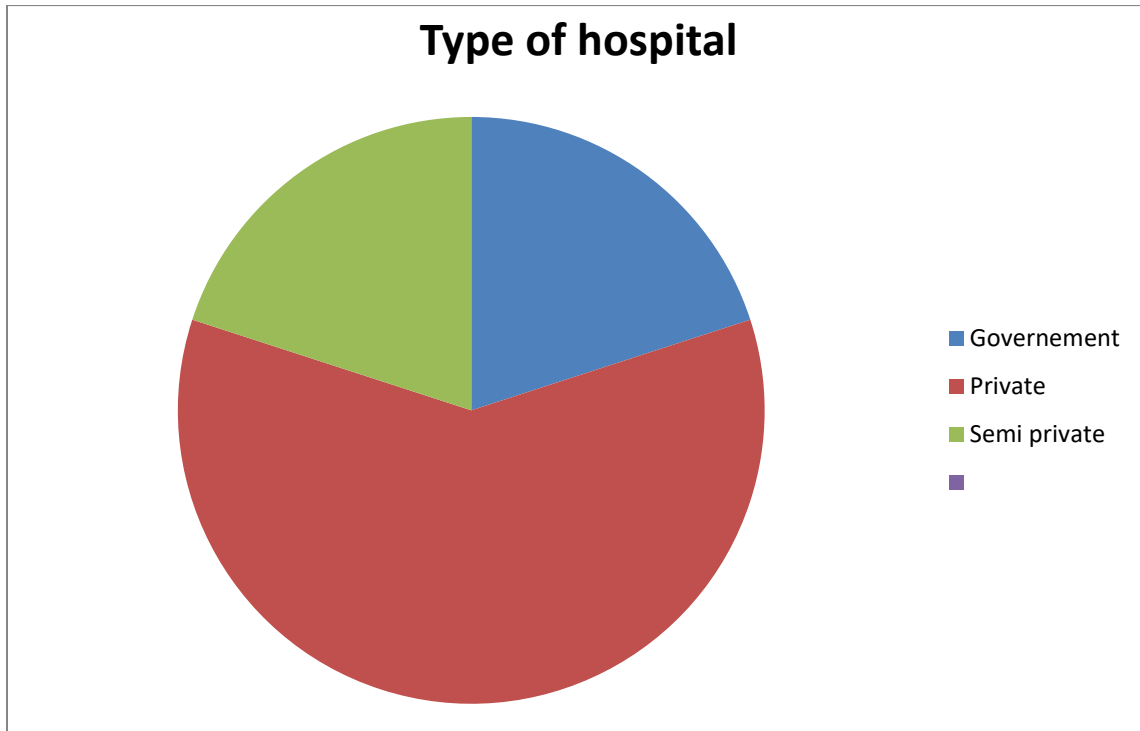
Degree for ICN	Frequency	Percentage(%)
No any special degree for ICN other than nursing degree	1	20
Specialized course on ICN	4	80
Diploma in nursing	0	0

6. distribution of participants based upon any special degree for infection control nurses



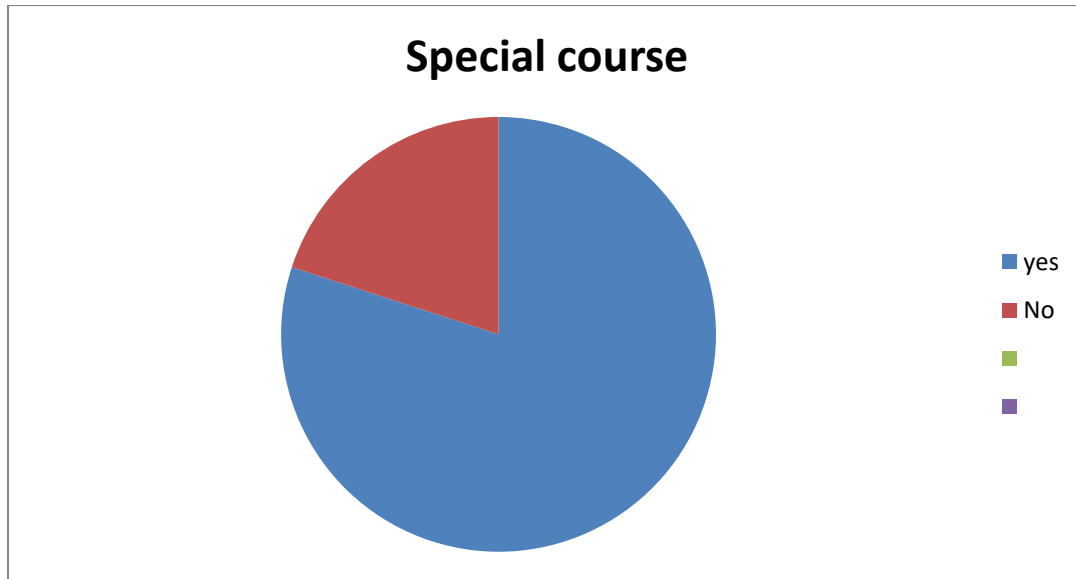
7. distribution of participants based upon the hospital they work as an ICN

Type of hospital	Frequency	Percentage(%)
Government	1	20
Private	3	60
Semi private	1	20



8. distribution of participants based upon any special course they had taken to become an ICN

Special course	Frequency	Percentage (%)
Yes	4	80
No	1	20



Theme categories	Theme clusters	Verbatims
Guidelines in Handling Biomedical Waste	<p>CPCB(central population control board)</p> <p>MPCB (Maharashtra pollution control board)</p> <p>BMC</p>	<p>The central pollution control board which is in Delhi issued guidelines for covid-19 bio medical waste management in hospitals all over the country. We do follow the same as per the hospital policy</p> <p>The Maharashtra pollution control board issued special guidelines for all the health care facilities and hospitals all over Maharashtra. We do follow the rules and regulations as per instructed by the Organization</p> <p>BMC gave rules for COVID-19 waste management for all the hospitals. We also abide with the rules given by BMC during this pandemic on Biomedical waste management.</p>
Hospital Infection control Committee	HICC that is the hospital infection control committee	<p>The hospital infection control committee consists of chairman and members like the surgeons, the intensivists, Nurses, supervisors and the microbiologists.</p> <p>When we have any issue related to BMW management we discuss those issues in the meeting with HICC. The meeting is conducted every quarterly. Every day we do have surveillance in checking the BMW segregation and disposal. If any lacunae or not as per the rules, immediately a meeting will be taken to sort out the issues.</p>
Segregation of Biomedical Waste	<p>The segregation of bio medical waste was done according to the color coded bins in zones namely green and red.</p> <p>The green zone(color coded bins,</p>	The green zone is the zone where non covid

	<p>labeling of the bags)</p> <p>The red zone (color coded bags , labeling of the bags)</p>	<p>waste was collected. It consisted of yellow bag where all anatomical waste was discarded; the red bag where all the plastic waste, articles were discarded; the sharps were collected in white container and pathological waste is laboratory waste which is autoclaved in lab for decontamination. Then after collection the bags were labeled as non covid waste.</p> <p>The red zone is the zone where the waste infected with covid was collected. The waste was collected in color coded bins as mentioned earlier. The difference in green and red zone was that they disinfect the waste with hypochlorite spray. So before the bag is taken by someone it will be sprayed on the inside with hypochlorite and sealed and then it is covered with another bag and sprayed and then sealed and labeled as covid-19 waste.</p>
<p>Storage of Biomedical Waste</p>	<p>For storage separate cubicles, rooms, areas were established to keep the covid-19 waste away from the non covid waste.</p>	<p>After segregation the waste labeled non covid contaminated and covid contaminated were stored separately or in isolated cubicles, rooms and areas in the hospital premises but at a significant distance from the main hospital building.</p> <p>The storage facility for covid 19 wastes was monitored continuously and was guarded at all times. Only a few members of the health care team had access to the storage facility.</p> <p>The waste was stored separately to avoid cross contamination which may lead to spread of infections.</p>
<p>Transport of Biomedical Waste</p>	<p>Designated workers handled the bio medical waste for transportation.</p> <p>Specific transport facility only assigned to carry covid 19 contaminated bio medical waste.</p> <p>Checklists</p>	<p>For transport there were designated workers who will only handle BMW transportation. The workers handling the transport of this covid associated bio medical waste were given PPE's, masks, gloves in order to protect them from cross contamination and infection.</p> <p>The transport facility which was responsible for taking the covid contaminated waste from the storage to the disposal site had specific timings which were allotted to them and then the pickup vehicle coming for taking the waste was only designated for transporting the waste generated from covid areas and the non covid waste was taken by different transport facility.</p> <p>There were checklists made to ensure all the waste is properly loaded and weighed by the health care facility as well as the transport vendor. The vendors also had proper protective equipment's to avoid coming in contact with the covid waste.</p>

Disposal of Biomedical Waste	Waste disposed off at disposal areas depending upon the type of method needed i.e., autoclaving in pathological and incineration for most of the wastes collected.	From the hospitals the waste was transported safely to the disposal area where the waste was disposed of depending upon the bins they were in. the waste was disposed accordingly as some of the waste is autoclaved and the other maybe incinerated as needed.
Challenges Faced By Infection Control Nurse	<p>Segregation</p> <p>Improper discarding of PPE's.</p> <p>Increased waste generation</p> <p>Transport and monitoring</p> <p>Less manpower and little facilities</p> <p>Costly and increased financial burden</p>	<p>The biggest challenge and a matter of worry was the segregation part. If any doctor has discarded the PPE kit in black bag, then segregating that again in the yellow bag was worrisome like who is going to segregate that ,how much the black bag of general waste would be contaminated.</p> <p>There was improper discarding of PPE's by the professionals of health care team where the PPE would be found lying in washrooms or outside the designated bins. The PPE's were not folded properly and to educate and teach the health care teams about proper discarding was an issue altogether.</p> <p>Sudden increase in bio medical waste in bulk was one of the major issues. Smaller bins were replaced by larger bins for discarding of hazmet suits , other wastes generated.</p> <p>The transport of covid-19 contaminated waste was done in a separately including it's packaging and transport from the hospital to the disposal area was monitored constantly in order to avoid mixing of other wastes to the covid-19 waste.</p> <p>There was less manpower and facilities were little at the beginning of covid-19 which caused a significant amount of burden on the infection control teams who were constantly monitoring every step of the waste generated which was infected by covid-19 for safe transport and storage to the disposal area.</p> <p>The transport and disposal of the waste was costly as mentioned by one of the participant. The use of PPE for every person that would be coming in contact with the covid-19 waste and other articles was expensive. The vendors were also trained and it was a challenge as vendors were not ready to transport and the also increase the cost of BMW which increased the financial burden.</p>

DISCUSSION:

Current objectives: The current objectives of this study are to find out the common interactions and discussions on management of increase in biomedical waste during covid-19 among infection control nurses. The main Scope of

the study was to assess the awareness among infection control nurses on increase in BMW during covid-19 and to understand the measures to reduce the BMW waste using proper waste disposal guidelines.

Findings: In this study we conducted interviews with 5 infection control nurses from various hospitals. We collected the demographic data using multiple choice questions from which we found that 40 % of infection control nurses were in 30-34 years of age group, 40% in 35-39 years of age group and rest 20% were 45 years and above in age. 100% infection control nurses were female in this study, 80% infection control nurses studied from English medium schools and 20% from Marathi/Hindi medium schools. When asked about highest level of education completed out of which 60% did BSc , 20% did MSc and other 20% did post basic BSc . Based upon their years of experience 60% infection control nurses had 1-4 years of experience whereas 40% infection control nurses had 9-12 years of experience. 20% infection control nurses did not do any special degree to become an ICN whereas 80% did specialized courses to become infection control nurses. The type of hospital which these infection control nurses worked were 20% in government, 20% in semi-private and 60% in private hospitals.

After conducting and analyzing the information given to us during the interviews we came across various problems faced during the covid -19 pandemic to manage the bio medical waste and solutions that were implemented to solve these problems effectively. Guidelines were issued by pollution control board from Delhi and Maharashtra to handle the increase in bio medical waste due to covid-19. There is a hospital infection control committee which monitored, assessed and provided solutions to problems faced while managing the bio medical waste generated.

Segregation of the waste was important hence there were zones such as red and green zones where in green zone non covid contaminated waste was collected and in red zone covid contaminated waste was collected. There were color coded bins such as yellow, white, red, black to collect anatomical, sharps, plastic wastes. The segregated waste was stored in an isolated room, cubicles which were specifically for covid contaminated waste which was packed in double layered bags and labeled to avoid mixing of wastes. The storage facility was monitored closely and was accessible to few members of the health care team.

The transport of waste was essential and the transport vehicles were specifically assigned to collect covid contaminated waste, they were given a specific timing and the transport workers were given proper PPE's to avoid infections. The waste was transported from the hospital to the disposal areas where the waste was incinerated depending upon the need. All this was closely monitored by the infection control nurses and to make sure the guidelines were followed as indicated.

Strength of the study:

- The study had a small sample which was only 5 infection control nurses.
- Collection of data required less timing
- The interview was conducted via online video call and few offline which was convenient and cost effective.

Limitations of the study:

- The study was conducted with a small sample of 5 infection control nurses because of which the results cannot be generalized.
- Some of the hospitals were not able to follow all the guidelines given due to lack of resources and facilities as well as less working staff.

CONCLUSION

This qualitative study was done to assess the management of increase in bio medical waste due to covid-19 among infection control nurses. They were interviewed where they asked questions to assess their perception on the management of covid-19 bio medical waste which was generated in large quantities. Based upon the interviews conducted with these infection control nurses it was found that not only the management of bio medical waste is important but also necessary in controlling the pandemic.

The management of bio medical waste was an important issue and these infection control nurses had an immense knowledge and experience with handling of this waste. They highlighted the problems faced by them and the facilities as well as the solutions which they implemented in order to manage this rise in covid-19 associated bio medical waste.

There were many problems faced by the infection control department from segregation to the disposal of the bio medical waste. There were problems faced while segregating the waste in correct bins which was monitored to avoid discarding of waste in wrong bins. The transport facility was sometimes full and the expenses increased causing a financial burden on the health care facility, the storage was important to avoid any cross contamination and the disposal of the waste was important to be done on time.

The problems were faced initially at the beginning of the pandemic but were resolved after proper guidelines that were issued by pollution control department from Delhi and Maharashtra. There were certain protocols which were issued to all the hospitals to handle the increase in the bio medical waste due to covid-19.

The participants informed us about the solutions which they implemented to handle the waste. The use of color coded bins, segregating waste from green and red zone with proper labeling on the bags, using double layered bags helped in managing the issues.

There were separate isolated rooms for storage of covid-19 waste from non covid waste which helped in avoiding contamination and infections. The storage facilities were also monitored and assessable to a few members of the health care team.

The transport of waste contaminated with covid-19 was an important step in bio medical waste management as the proper transportation of waste from the generation to the point of disposal is necessary. The covid-19 waste was transported separately and with the designated transport to differ it from non covid waste. Followed by proper disposal of the waste at the disposal facility to help reduce the bio medical waste quantity and adequate management.

RECOMMENDATION

- ✦ The Study can be done on larger scale with all the health professionals
- ✦ The study can be focused on other aspects like BMW management during pandemic
- ✦ The study can be done on quantitative design with proper methodology.
- ✦ The study can be done as a case study in broader aspect.
- ✦ The study can be conducted to modify biomedical waste management processes at various levels of its management.
- ✦ The study can be done to spread awareness about the importance of bio medical waste management to control spread of infections among populations

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