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ASSESSMENT OF HEALTH CARE WASTE MANAGEMENT AT A COMMUNITY HEALTH CENTRE IN NORTH KERALA

Community Medicine

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ABSTRACT

Waste generated from medical activities can be hazardous, toxic and even lethal because of their high potential for diseases transmission. Biomedical waste management is a legal necessity as well as social responsibility.

Aims & Objectives: To assess health care waste management at a Community Health centre in Kerala.

Materials and methods- this is a descriptive study conducted at Community Health centre Mukkam

Results - at the Community Health centre, waste management was done according to guidelines.

Conclusion- The study revealed that the biomedical waste management in the health care services has developed considerably as compared to the previous years. This is due to better education, awareness and improvised training programs given to the health care workers .

KEYWORDS

Biomedical Waste, Waste Segregation, Waste Collection

Introduction

Health care wastes (HCWs) are all wastes generated by health care and health research facilities and associated laboratories. They include both (a) communal waste such as paper and bottles that can be dealt with through the local solid waste management system and (b) potentially dangerous Biomedical waste (BMWs),such as sharps(needles, scalpels,knives, blades,broken glass) and wastes with infectious hazardous and with radioactive and genotoxic properties that endanger human health and the environment.(1)

India has made great progress in managing HCWs. The National Government has promulgated BioMedical waste rules , prepared National guidelines and implemented a National training programme.(2)

States have devised their own HCW strategies and guidelines.
Nongovernmental organizations (NGOs) have played a major role in bringing the HCW management agenda to the attention of government officials, creating public awareness of HCW management issues

Content of Health care waste(2)

Between 75% and 90% of the waste produced by health-care facilities is non-hazardous or general health-care waste, and only 10% to 25% of health-care waste has a hazard that requires careful management.

The distinct categories of health-care waste are sharps, infectious waste, pathological waste, pharmaceutical (including cytotoxic) waste, hazardous chemical waste, radioactive waste and non-hazardous general waste. Infectious waste can be further classified as wastes contaminated with blood or other body fluids, cultures and stocks, and waste from isolation wards. Hazardous chemical waste includes halogenated and non-halogenated solvents, disinfectants, toxic metals such as mercury, and other organic and inorganic chemicals.

Health-care waste comes from many sources, including major sources such as hospitals, clinics and laboratories, as well as minor sources such as doctors' offices, dental clinics and convalescent homes.

A significant portion of non-hazardous, general waste is recyclable or compostable.

Waste generation rates vary widely and are best estimated by local measurements.

Types of hazards

The hazardous nature of health-care waste is due to one or more of the following characteristics:

presence of infectious agents
a genotoxic or cytotoxic chemical composition
presence of toxic or hazardous chemicals or biologically aggressive pharmaceuticals
presence of radioactivity
presence of used sharps

Assessment of health care waste Health-care waste-generation data are best obtained from quantitative waste assessments. An assessment entails defining goals, planning, enlisting the cooperation of staff, procurement of equipment (e.g. weighing scales, personal protective equipment), data collection, analysis and recommendations. The process of waste assessment provides an opportunity to improve current practices, sensitize health workers about waste, and determine the potential for waste minimization.

Impacts of infectious waste and sharps (3)

In the year 2000, sharps injuries to health-care workers were estimated to have caused about 66 000 hepatitis B (HBV), 16 000 hepatitis C (HCV) and 200–5000 HIV infections among health-care workers (Prüss-Ustun et al., 2005)(3) For health-care workers, the fractions of these infections that are due to percutaneous occupational exposure to HBV, HCV and HIV are 37%, 39% and 4%, respectively. It is estimated that more than two million health-care workers are exposed to percutaneous injuries with infected sharps every year (Prüss-Üstün et al., 2005). In certain facilities and countries, health-care workers may have several percutaneous sharps injuries per year, although this could be avoided by training on the safe management of sharps

The waste-management hierarchy

The waste-management hierarchy is largely based on the concept of the "3Rs", namely reduce, reuse and recycle, and broadly relates to the sustainable use of resources. Best practice waste management will aim to avoid or recover as much of the waste as possible in or around a health-care facility, rather than disposing of it by burning or burial. This is sometimes described as tackling waste "at source".

Region 1: Alappuzha, Kollam, Pathanamthitta, and Thiruvanant hapuram.There are a total of 38,474 beds in 873 health care facilities in this region.

Region 2: Ernakulam, Idukki, and Kottayam.There are a total of 34,171 beds in 788 health care facilities in this region.

Region 3: Malappuram, Palakkad, and Thissur. There are a total of 20,604 beds in 557 health care facilities in this region.

Region 4: Kannur, Kassargod, Kozhikode, and Wayanad.There are a total of 21,536 beds in 599 health care facilities

AIM of the study

-To assess the health care waste management at Community Health Centre Mukkam

Objectives

1 To assess the duties of the Waste Management team
2 To assess the methods of health care waste collection
3 To assess the methods of waste segregation
4 To assess the methods of waste minimisation
5 To assess the methods of waste storage
6 To assess the methods of waste transport
7 To assess the methods of waste disposal.

MATERIALS AND METHODS

STUDY DESIGN

Observational study

Study settings - Community Health centre Mukkam

Study duration

3 weeks in June 2017

Procedure

Data was collected through questionnaires.

Ethical considerations

Institutional Ethics committee clearance was obtained.

Consent

Consent was obtained from the Medical Officer CHC Mukkam

Profile of the study unit

Our health policy envisages a three-tier structure comprising the primary, secondary and tertiary health care facilities to bring health care services within the reach of the people. The primary tier is designed to have three types of health care institutions, namely, a Sub-Centre (SC) for a population of 3000-5000, a Primary Health Centre (PHC) for 20000 to 30000 people and a Community Health Centre (CHC) as referral Centre for every four PHCs covering a population of 80,000 to 1.2 lakh. The district hospitals function as the secondary tier for the rural health care, and as the primary tier for the urban population. The tertiary health care is provided by health care institutions in urban areas which are well equipped with sophisticated diagnostic and investigative facilities.

In this framework, the Community Health Centre (CHC), the third tier of the network of rural health care units, was required to act primarily as a referral Centre (for the neighboring PHCs, usually 4 in number) for the patients requiring specialized treatment in the areas of medicine, surgery, pediatrics and gynecology. The objective was two-fold; to make modern health care services accessible to the rural people and to ease the overcrowding of the district hospitals. To enable the CHCs to contribute towards meeting the intended objectives, these were designed to be equipped with: four specialists in the areas of medicine, surgery, pediatrics and gynecology; 30 beds for indoor patients; operation theatre, labour room, X-ray machine, pathological laboratory, standby generator etc. along with the complementary medical and para medical staff. [4]

Profile of the study Unit- Community Health centre Mukkam is situated in Kozhikode District Kerala. The CHC caters to a population of more than one lakh. The CHC has a daily Outpatient attendance of 600- 700 patients. There are seven doctors, 2 Head nurses, 10 staff nurses, 2 pharmacists, 2 laboratiry technicians, 6 ward boys and 9 sweepers

Office staff- there is a head clerk, 4 lower division clerks, and 2 peons.

Methods of Data Collection

In the CHC the students were guided by the Head nurse. A set of questionnaires were prepared to collect the information. It comprised of questions on health care facility, waste segregation, general waste collection, waste storage, waste transport, treatment and management. The questions were asked in local language by interacting with the head nurse personally.

The data regarding different types of waste generation and their mode of disposal have been collected from the hospital workers including the housekeeping services, nurses, ward attenders and the laboratory workers. An interview has been made with each worker regarding the various waste generation and its disposal methods. Various places in the hospital have been visited like the waste segregation area, dumping area and the waste collection units of the hospital. The hospital strictly follows the WHO criteria in segregating the hospital wastes and its disposal.

Materials And Method:

The methodology for this study includes empirical field observation and field level data collection through questionnaire, survey and interviews in formal and non-formal ways. The present study was carried out for a period of 3 weeks in JUNE 2017.

The work was divided into several sections to achieve precise result Field observations: Field observations were made at each location, using a checklist that focused on potential problems posed by disposal of Medical waste. Waste generation sites (ward,), laboratory (sample collection site, place of analysis, wash basin), and waste disposal sites (dustbin, dumping site, drainage system, wastewater flow) were observed. Current waste management system and the safety measures taken in the pathological laboratory and clinics were also observed.

Interview: Interviews were conducted with people involved in providing medical services and handling and disposing medical waste. Supervisors of different wards, doctors and nurses, laboratory technicians, cleaners, and garbage dwellers were interviewed. Generally questions were geared towards the basic understanding of the respondents.

Analysis of observations and data collected.

Waste Management Team - At the Community Health Centre Mukkom there was an efficient waste management team.

Management structure, liaison arrangements and duties of waste management team

Head of the hospital had formed a waste management team. The team consisted of members from all sections of the hospital, including those who were involved in the removal of waste. There was a written waste management plan for the hospital.

The plan clearly define the duties and responsibilities of all members of staff, in respect to handling health-care waste and to establishing lines of accountability.

A waste management officer was designated to supervise and implement the waste-management plan.

The waste-management plan is updated by setting regular (e.g. annual) review dates.

Financial and personnel resources are allotted to ensure efficient operation of the plan.

Treatment and disposal system are monitored so that the system can be updated and improved when necessary. Any changes are eventually incorporated into a revised management plan.

All the staff members had received adequate training

Character of biomedical waste generated at the CHC .The biomedical waste generated in a Community Health Centre mainly depends on the number of wards, beds, number of OP and IP. There are 2 wards consisting of 30 beds. It has an average of 600 OP cases and 20 IP cases daily. There are around 50 medical staff working in this community health Centre. Around 4 bags of hazardous health-care waste are generated in about 3 days. They practice active segregation by color coded bins and also maintains a waste tracking record.

The waste collection and handling procedure is proper. There is proper labelling of bins and posters are also kept for the information and knowledge about segregation. There are separate containers with the color coding in immunization room, laboratory, wards, OT and casualty.

MEASURES FOR WASTE MINIMIZATION

- As far as possible, purchase of reusable items made of glass and metal should be encouraged.
- Select non-PVC plastic items.
- Adopt procedures and policies for proper management of waste generated, the mainstay of which is segregation to reduce the quantity of waste to be treated.

Analysis relating to Waste collection : To assess the waste collection practice. Health care workers collect the medical wastes in separate colour coded plastic bags placed in particular colour coded containers. All wards, laboratories, operation theatres,outpatient departments have four colour coded plastic containers .Wastes are collected in these containers. Then these wastes are segregated ,packed ,labeled and disposed off. Four colour coded bins are used for disposal of medical wastes here.

They are, Yellow bags- Human tissues, organs, body parts,items contaminated with blood and body fluids,soiled cotton and dressing, soiled plaster casts,etc .

Red bags- Catheters,tubes,cannula,syringes,plastic IV bottles and sets,used gloves,infected plastics, specimen containers, lab waste, microbiology cultures, used or discarded bags of blood / blood products,vaccines,etc.

Blue bags- Glass items, needles, syringes, scalpels, blades, used and unused sharps,etc.**Black bags-**Discarded medicines, discarded cytotoxic drugs,etc. Medical waste containers help healthcare workers correctly dispose of waste by labeling and can Gloves are used as personal safety devices. The cleaning devices used included brooms, mops and vacuum cleaners. The waste is collected every 3 days Trolleys are not available

Guiding principles in waste segregation(5)
health-care waste generated in a medical area and should be segregated into different fractions, based on their potential hazard and disposal route, by the person who produces each waste item;

- separate containers should be available in each medical area for each segregated waste fraction;
- waste containers when filled should be labelled to help managers control waste production;
- closed local storage inside or near to a medical area may be needed if wastes are not collected frequently;
- hazardous and non-hazardous wastes should not be mixed during collection, transport or storage;
- collected waste is often taken to central storage sites before onsite or offsite treatment and disposal;
- staff should understand the risks and safety procedures for the wastes they are handling

All the above guiding principles were being followed at the Community Health Centre for waste segregation
Segregation should be carried out by the producer of the waste as close as possible to its place of generation, which means segregation should take place in a medical area, at a bedside, in an operating theatre or laboratory by nurses, physicians and technicians. If classification of a waste item is uncertain, as a precaution it should be placed into a container used for hazardous health-care waste.

The simplest waste-segregation system is to separate all hazardous waste from the larger quantity of non-hazardous general waste. However, to provide a minimum level of safety to staff and patients, the hazardous waste portion is commonly separated into two parts: used sharps and potentially infectious items. In the latter, the largest components are typically tubing, bandages, disposable medical items, swabs and tissues. Consequently, the segregation of general, non-hazardous waste, potentially infectious waste and used sharps into separate containers is often referred to as the "three-bin system". Further types of containers can be used for other categories of wastes, such as chemical and pharmaceutical wastes, or to separate out pathological waste, where it is to be handled and disposed of in different ways from the other portions of the waste flow. (5)

Waste containers, colour codes and labels
WHO-recommended segregation scheme was being practiced at the Community Health centre

Type of waste	Colour of container and markingsa	Type of container
Highly infectious waste	Yellow, marked "HIGHLY INFECTIOUS", with biohazard symbol	Strong, leak-proof plastic bag, or container capable of being autoclaved
Other infectious waste, pathological and anatomical waste	Yellow with biohazard symbol	Leak-proof plastic bag or container
Sharps	Yellow, marked "SHARPS", with biohazard symbol	Puncture-proof container
Chemical and pharmaceutical waste	Brown, labelled with appropriate hazard symbol	Plastic bag or rigid container
Radioactive wasteb	Labelled with radiation symbol	Lead box
General health-care waste	Black	Plastic bag

Labelling of waste containers is used to identify the source, record the type and quantities of waste produced in each area, and allow problems with waste segregation to be traced back to a medical area. A simple approach is to attach a label to each filled container with the details of the medical area, date and time of closure of the container, and the name of the person filling out the label. Using an international hazard symbol on each waste container is also recommended. Several symbols are relevant to the different kinds of hazardous waste produced in a health-care facility.

All these instructions were being followed strictly at the Community Health Centre.

Gloves are used as personal safety devices. The cleaning devices used included brooms, mops and vacuum cleaners. The waste is collected every 3 days. Trolleys are not available and the offsite transport of hazardous waste is handled by IMAGE (Indian Medical Association Goes Ecofriendly)a Common Biomedical Waste Treatment Facility (CBWTF). A small central storage area is available and a separate storage area for hazardous waste is also present. The storage location is outside and is maintained well with an average cleanliness. The security measures undertaken for the storage area is average.

Analysis of waste collection-Collection within the health-care facility

Collection times should be fixed and appropriate to the quantity of waste produced in each area of the health-care facility. General waste should not be collected at the same time or in the same trolley as infectious or other hazardous wastes.

All these principles are followed at the CHC
Waste bags and sharps containers should be filled to no more than three quarters full. Once this level is reached, they should be sealed ready for collection. Plastic bags should never be stapled but may be tied or sealed with a plastic tag or tie. Replacement bags or containers should be available at each waste-collection location so that full ones can immediately be replaced.

Waste bags and containers should be labelled with the date, type of waste and point of generation to allow them to be tracked through to disposal. Where possible, weight should also be routinely recorded. Anomalies between departments with similar medical services or over time at one location can show up differences in recycling opportunities, or problems such as poor segregation and diversion of waste for unauthorized reuse.

Collection should be daily for most wastes, with collection timed to match the pattern of waste generation during the day. For example, in a medical area where the morning routine begins with the changing of dressings, infectious waste could be collected mid-morning to prevent soiled bandages remaining in the medical area for longer than necessary. Visitors arriving later in the day will bring with them an increase in general waste, such as newspapers and food wrappings; therefore, the optimum time for general and recyclable waste collection would be after visitors have departed.

In comparison with this general type of medical area, a theatre would generate a high proportion of potentially infectious waste and could have several collections during the day to fit in with the schedule of operations. A child and maternal health clinic might generate primarily sharps waste from injections, which would be collected at the end of each working day.

Interim storage in medical departments
Where possible, hazardous waste generated in medical areas should be stored in utility rooms, which are designated for cleaning equipment, dirty linen and waste. From here, the waste can be kept away from patients before removal, then collected conveniently and transported to a central storage facility. This is known as interim or short-term storage

Recommendations for storage facilities for health-care waste
The storage area should:
have an impermeable, hard-standing floor with good drainage (away from watercourses); the floor should be easy to clean and disinfect;

include the facility to keep general waste separated from infectious and other hazardous waste;

have a water supply for cleaning purposes;
have easy access for staff in charge of handling the waste;
be lockable to prevent access by unauthorized persons;
have easy access for waste-collection vehicles;
have protection from the sun;
be inaccessible to animals, insects and birds;
have good lighting and at least passive ventilation;
not be situated in the proximity of fresh food stores and food preparation areas;
have a supply of cleaning equipment, protective clothing and waste bags or containers located conveniently close to the storage area;
have a washing basin with running tap water and soap that is readily available for the staff;
be cleaned regularly (at least once per week);
have spillage containment equipment;
be appropriate to the volumes of waste generated from each health-care facility.

General requirements - a storage location for health care facility should be inside the facility

A storage location for health-care waste should be designated inside the health facility.

At the Community Health Centre the off site transport of hazardous waste is handled by IMAGE (Indian Medical Association Goes Ecofriendly)a Common Biomedical Waste Treatment Facility (CBWTF). A small central storage area is available and a separate storage area for hazardous waste is also present. The storage location is outside and is maintained well with an average cleanliness. The security measures undertaken for the storage area is average.

Every 3 days collecting truck of IMAGE comes-by and collects the waste materials. The method of waste management within the CHC is mainly by autoclave and food waste by landfill. The liquid waste generated is not disinfected and is drained into soak pit. Other methods like microwaving and mutilation, incineration, chemical treatment or deep burial are not in practice. A Proper waste management training is given by the IMAGE to the medical staff.

Analysis of transport of waste--Onsite transport of waste
General requirements
Onsite transport should take place during less busy times whenever possible. Set routes should be used to prevent exposure to staff and patients and to minimize the passage of loaded carts through patient care and other clean areas. Depending on the design of the health-care facility, the internal transport of waste should use separate floors, stairways or elevators as far as possible. Regular transport routes and collection times should be fixed and reliable. Transport staff should wear adequate personal protective equipment, gloves, strong and closed shoes, overalls and masks.

Hazardous and non-hazardous waste should always be transported separately. In general, there are three different transport systems:

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Hazardous and non-hazardous waste should always be transported separately. In general, there are three different transport systems:

Waste transportation trolleys for general waste should be painted black, only be used for non-hazardous waste types and labelled clearly "General waste" or "Non-hazardous waste".

Infectious waste can be transported together with used sharps waste. Infectious waste should not be transported together with other hazardous waste, to prevent the possible spread of infectious agents. Trolleys should be coloured in the appropriate colour code for infectious waste (yellow) and should be labelled with an "Infectious waste" sign.

Other hazardous waste, such as chemical and pharmaceutical wastes, should be transported separately in boxes to central storage sites.

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Transport trolleys
Health-care waste can be bulky and heavy and should be transported using wheeled trolleys or carts that are not used for any other purpose To avoid injuries and infection transmission, trolleys and carts should:

be easy to load and unload
have no sharp edges that could damage waste bags or containers during loading and unloading

Coordination Between Hospital And Outside Agencies

Municipal authority:
As quite a large percentage of waste (in India up to 85%), generated in Indian hospitals, belong to general category **(non-toxic and non-hazardous)**, hospital should have constant interaction with municipal authorities so that this category of waste is regularly taken out of the hospital premises for land fill or other treatment.

- **Co-ordination with Pollution Control Boards:**
- To search for better methods in technology, provision of facilities for testing, approval of certain models for hospital use in conformity with standards laid down.
- To search for cost effective and environmental friendly technology for treatment of bio-medical and hazardous waste.
- To search for suitable materials to be used as containers for bio-medical waste requiring incineration/autoclaving/ microw aving.

Protection of the health of staff, patients and the general public is the fundamental reason for implementing a system of health-care waste management. It is important to know the current status of biomedical management in the CHC to know about improvements needed in the policies (methods) of the health centers. Such studies have not been done in our locality so far.

Discussion
In the **study by U JagadeeshChandra boss. (6) On Evaluation of biomedical waste management in the primary** and community health centres in Puducherry , India The BMW management practices observed in all PHC's and CHCs (based on questionnaire , direct interview, visual inspection, and field investigations revealed that they were not in line with government recommended practices. It was observed that in almost all the PHC'S and CHC's chief doctors and head nurses did not pay any attention to the BMW, both because of their insufficient knowledge about the significance of the subject and their apparent lack of interest.Additionally in most of the CHC's and PHC's no person was assigned the responsibility of managing theBMW.

At the CHC Mukkom where we had conducted our study, The Medical Officer was a responsible person who had excellent knowledge of BMW management and he had assigned duties and responsibilities to each staff.

BMWM was alarming both at macro and micro levels across different parts of India in the study **Bio-medical waste management: situational analysis & predictors of performances in 25 districts across 20 Indian States INCLEN programme (7)**

in the 25 study districts 82 per cent of primary care health facilities, 60 per cent of secondary care and 54 per cent of tertiary care health facilities were in the RED category i.e. absence of a credible BMW

management system in place or one requiring major improvement. These findings have to be attributed to lack of system capacity, gaps in resources and processes. Interview with key stakeholders in municipality as well as pollution control board in each

district indicated the need for building system capacity and allocation of additional resources to improve the existing BMW systems.

A significant proportion of key stakeholders in the health facilities and district regulatory offices demonstrated apathy towards current status of BMWM in their environment. The study provided evidence for need of major policy shifts towards improving BMWM in primary care settings.

Macro level policies and implications need to penetrate into micro level settings through better governance and improved community awareness.

In the study by Manzurul-Hassan M, Ahmed SA, (8) - the **current scenario.of Medical waste management Improper procedures of medical waste management** were reported from many places(8). The status was worst in primary care settings especially in rural ares. Facilities within rural primary level settings in India is unknown , but almost all big villages have informally trained medical practitioners providing care in private settings . Many authors described the reasons for poor system in the primary health facilities as lack of sensitivity and awareness, concerning health risks of biomedical waste and economic constraints. Tertiary and secondary level hospitals performed better; perhaps on account of better resources and having responded to theregulations.

In the study by Kalaivani(9) on Biomedical Waste Disposal System In A Hospital

Health care workers collect the medical wastes in a separate colour coded plastic bags placed in particular colour coded containers.

The successful implementation of the formulated rules would be possible if the community is involved. A Bottom-Top approach would ensure the active participation of the people living in close proximity of the hospitals. Residents can be encouraged to take the responsibility of managing certain key areas of hospital management. The study concludes that healthcare waste management should go beyond data compilation, enforcement of regulations and acquisition of better equipment. It should be supported through appropriate education, training and the commitment of the healthcare staff, management and healthcare managers within an effective policy and legislative framework."

K. V. Radha (10) and others (2009) in their study reveals that:The premier hospital is severely lacking in actions to dispose of its waste and uphold its statutory responsibilities. This is due to the lack of education, awareness and trained personnel to manage the waste in the hospital, as well as the paucity of the funds available to proper waste management system. The results of the study demonstrate the need for strict enforcement of legal provisions and a better environmental management system for the disposal of biomedical waste in hospitals as well as other healthcare establishments. A policy needs to be formulated based on 'reduce, recover, reuse and dispose'. The study concludes that healthcare waste management should go beyond data compilation, enforcement of regulations and acquisition of better equipment. It should be supported through appropriate education, training and the commitment of the healthcare staff, management and healthcare managers within an effective policy and legislative framework. [4]

A study from Gujarat (India) by Pandit et al,(11) Management of biomedical waste: awareness and practices in a district of Gujarat involving 30 hospitals (including 15 private hospitals) showed that 74 per cent were not following segregation guidelines. and all the private hospitals were defaulting on important steps of BMWM. This indicated the need to have a comprehensive national strategy covering both urban and rural areasincluding private as well as public sectors.

The providers in primary level health settings had minimal capacity for optimal biomedical waste management; one quarter of the health facilities scored 'zero'. More than half of primary settings had no guidelines or designated person for handling BMWM; staff was poorly trained and without adequate protective equipment.

A quarter of health facilities in secondary and tertiary care settings were also in the Red category. More than 50 per cent of all health facilities had problems in resources for segregation, sharps management, in-house transport, storage and record keeping. . Colour bags, a basic pre-requisite to initiate proper segregation, were not available at many health facilities.

Other studies from India have reported similar situations. Hanumantha Rao et al (12) reported non compliance to BMWM guidelines by smaller hospitals but it was not clear whether the problem came up due to non availability of resources

Similar situation existed in several other developing countries . Askarin et al (13) reported poor state of collection, transportation, disposal, training and personal protective equipments in Iran.

A report from Karachi, Pakistan, highlighted issues of resource constraint leading to shortage of supplies and mixing of BMW with domestic wastes (14)

A study from Senegal(15) indicated the non-availability of infrastructure and lack of awareness as key contributors for poor quality of BMWM systems.

This study adapted a scoring system with traffic colour codes (red, yellow and green) to categorize health care facilities and assess the system capacity Col AK Jindal(16) and his team (2012) on their article "Biomedical waste disposal, A system analysis" concluded that: Outsourcing should be explored as a viable method of BMW disposal, where there are government approved local agencies. Facilities authorized by the Prescribed Authority should be continued and maintained where outsourcing is not feasible.

CONCLUSION

The study revealed that the biomedical waste management in the health care services has developed considerably as compared to the previous years. This is due to better education, awareness and improvised training programs given to the health care workers for proper management of biomedical waste.

A hospital cannot operate in isolation but works in close relationship with not only the Government (Central and State) but is strongly influenced by the policy and legal provisions framed by the international apex bodies like WHO and World Bank. The successful implementation of the formulated rules would be possible if the community is involved. A Bottom-Top approach would ensure the active participation of the people living in close proximity of the hospitals. Residents can be encouraged to take the responsibility of managing certain key areas of hospital waste management.

The study concludes that healthcare waste management should go beyond data compilation, enforcement of regulations and acquisition of better equipment. It should be supported through appropriate education, training and the commitment of the healthcare staff, management and healthcare managers within an effective policy and legislative framework.

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