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Waste Disposal Management and Intensive Care Unit- A Review.

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ABSTRACT: *Biomedical waste is any waste generate during the diagnosis, testing, treatment, research or production of biological products for humans or animal.According to who estimates 85% of hospital waste is non hazardous10% is infectious, 5% is non infectious. Bmw generated from a number units, is imparted necessary treatment to reduce adverse effect that this waste may pose. Installation of individual treatment facilities by small healthcare units requieres comparatively high capital investment. In addition, it requires seperate manpower and infrastructure development for proper operation and maintenance of treatment systems. A common biomedical waste treatment facility (cbwtf) is used for treatment and disposal of bmw. Due to increase in the population the amount of biomedical waste genenration also increased it requires attention. Within the domain of municipal solid waste, biomedical waste acquires aspecial dimensions, since it is infectious and hazardous.The amount of infectious waste is around 25% and non–infectious wastes constitutes nearly 75%. In the abscence of proper segregation, the non-infectious waste becomes infectious and poses environmental threat to the society. An inappropriate treatment and disposal can spread infectious disease like tuberculosis, hepatitis, enteric fever, hiv infection etc. This review is helpful in understanding the proper way to perform the disposal of waste and it also recommends the ways for waste disposal management.*

Keywords: *Waste disposal, intensive care unit, Cssd, Management.*

I. INTRODUCTION

There are various goals of biomedical waste managenment like understanding the definition of medical waste and infectious waste, understanding why medical complaince is important, understanding the components of infectious waste mnaagement plan, be familiar with the facilities exposure control program, understanding the steps to take if exposure to infectious waste, be familiar with records to maintain[1]. The sources of biomedical waste are divide into major and minor sources. Major includes hospitals, labs, research centers, animal research, blood banks, nursing homes, mortuaries and autopsy centers. Minor includes, clinics, dental clinics, home care, cosmetic clinics, paramedics and funeral services.[2]

The cssd is the service responsible for receiving, storing, processing, distribution and controlling the professional supplies and equipment's (both sterile and non-sterile) for all user unit of hospital for the care and safety of patient under strict quality control. [3]

The intensive care unit is not merely a room or series of room filled with patients attached to interventional technology; it is the home of an organization: the intensive care team requiresdoctor, nurses, therapists, nutritionists, chaplains and other support staff, builds an environment for healing or dying.Critical care nursing is that specialty within nursing that deals specifically with human responses to life-threatening problems.A critical care nurse is a licensed professional nurse who is responsible for ensuring that acutely and critically ill patients and their families receive optimal care. Critical care unit is a specially designed and equipped facility staffed by skilled personnel to provide effective and safe care for dependent patients with a life threatening problem. There are two types of icu open and closed. In open type, physicians admit, treat and discharge and in closed type, the admission, discharge and referral policies are under the control of intensivists. [4]

II. WASTE DISPOSAL AND RECOMMONDATIONS

Waste can be defined as any discarded, unwanted residual matter arising from the hospital or activities related to the hospital. "Disposal" covers the total process of collecting, handling, packing, storage, transportation and final treatment of wastes. Disposal by deep burial is permitted only in rural or remote areas where there is no access to common bio-medical waste treatment facility. This will be carried out with prior approval from the prescribed authority and as per the standards specified in schedule-iii. The deep burial facility shall be located as per the provisions and guidelines issued by central pollution control board from time to time. [5]

Recommendations for the way of seggregation of waste by generator of wastepacking of infectious waste. plastic bags can be usedfor many types of solid or semisolid infectious waste, bottles, flasks, or tanks can be used for liquid, use of packaging that maintains its integrity during storage and transport, closing the top of each bag by folding or tying as appropriate for the treatment or transport, placing liquid wastes in capped/ tightly stopped bottles, do not compact infectious wastes before treatment. The ways for handling sharps are protecting against needle stick injuries,we can take the following precautions by avoiding the use of needles where safe and effective alternatives are available, helping our employees to select and evaluate devices with safety features that reduces the risk of needle stick injury, avoid recapping of needles, training for safe handling and disposal of needles before using them, promptly disposing of used needles in appropriate sharps disposal containers, reporting all needle stick and sharps-related injuries promptly to ensure that our staffs received,and appropriate followup care, telling our staffs about any needle stick hazards that we observed, motivating the staffs to participate in training related to infection prevention, hepatitis b vaccination provided by the hospital to staffs, packaging of sharps, containers should be rigid puncture–resistant containers that when sealed, are leak resistant and cannot be reopened without great difficulty.[6]

Storage temperature and near by area and duration are important consideration. Warmer temperature cause higher rates of microbial growth and putrefaction, resulting in odor problems. The recommendations are, minimizing the storage time, limited access to storage areas, prominently displaying the universal biological hazard symbol on storage area door, waste containers, etc. The decontamination process is that all surfaces, tools, and other objects in contact with potentially infectious materials must be decontaminated and as soon as possible, equipment and tools must be cleaned and decontaminated before servicing or being put back to use.Decontamination should be accomplished by using a solution of 5.25% sodium hypochlorite (household bleach/clorox) diluted between 1:10 and 1:100 with water To cleaning of spilled blood, we should carefully cover the spill with paper towels or rags, then gently pouring 10% solution of bleach over the towels or rags, and leaving it for at least 10 minutes.To decontaminate equipment or either objects (be it scalpels, microscope slides, broken glass, saw blades, tweezers, mechanical equipment upon which someone has been cut, first aid boxes ,or whatever) we should leave our disinfectant in place for leat 10 minutes before continuing the cleaning process.[7]

The steps for cleaning of spill of human blood is wearing gloves and lab coat for cleaning the spill.If broken glass is present , using forceps to pick up and placing in sharps container, absorb blood with paper towels and discarding in biohazard waste container, using a detergent solution, cleaning the spill site of all visible blood, wiping the spill site with paper towels soaked in a disinfectant, discarding all contaminated material into biohazard waste container, washing hands with soap and water.[8]

III. EXPOSURE CONTROLL

Exposure control planwhen staffs may be exposed to blood borne pathogens includes determination of staff who is exposed, implementation of methods of exposure control, including pesonal protective equipment, Hepatitis b vaccination, post exposure evaluation and follow-up, communication of hazards to staffs and trainning and record keeping.Despite the best precautions, exposure can still occur. If a person is exposed to potetially infectious materials trying to minimize the exposure to that person and others.If a person is exposed, they should: wash the exposed area thoroughly with soap and running water use non-abrasive, antibacterial soap if possible).If blood is splashed in the eye or mucous membrane, flush the affected area with running water for at least 15 minutes.Reporting the incident- staff should report the exposure incident to the in-chage to permit timely medical follow-up.Preparing a report of the exposure incident of a blood borne pathogens, inluding the circumstances under which the exposure incident occurred, and the identifying the source.[9]

Staff training should include an explanation of the infectious waste management plan and assignment of roles and responsibilities for implementation of the plan.Traning programs should be implemented:- when the infectious waste mangement plan are first developed and instituted.When new employees are hire, first they must be undergone a period of training.Continuous education is also important part of staff training. The elements of successful medical waste program includes detailed written medical waste inspection guidelines, detailed written medical best management practices, extensive employee training programs, periodic reinforcement of training, sufficient discipline regarding implementation and periodic follow-up. The procedure of bio medical waste disposal includes generation of waste, segerration of waste, collection of waste, transportation, treatement – autoclaving and shredding, inceneration.[10]

IV. STREAMLINING OF CENTRAL STERILE STORAGE DEPARTMENT

It is important facility of hospital that supplies sterile instruments and materials for dressing and procedures carried out in wards and others departments of hospital.Cssd has a great role in reducing hospital acquired infection (HAI).

Normally the articles are entertained by cssd are diagnostic sets like l.p set, sterna punctures set etc., treatment sets like cut down sets, aspiration set etc, dressing materials, ot linen& instruments, rubber gloves, catheters, Iv sets& infusion sets.[11]

The aim of cssd is to provide the safe and sterile supplies to all user unit of hospital and to study the planning, organizational structure, management, evaluation and give recommendations if any of central sterile supply department. Objectives include to provide efficient, economic and source of sterile supply for the care and treatment of sick, to assist purchase department for decision making and selection of goods, to assist management of hospital in standardization of goods, to leaning packing labelling and dating of material, to supply equipment's to highly specialized units, to educate students, nurse and ancillary persons, to save nursing time at nursing station, to participate effectively in hospital infection control committee and for applied research for improvement techniques.[12]

The functions of cssd are receiving and sorting soiled materials used in the hospital, determining whether the item should be reused or discarded, carry out the process of decontamination or disinfection prior to sterilization, carry out specialized cleaning of equipment's and supplies, inspecting and testing instruments, equipment's and linen, assembling treatments trays, instrument sets, linen packs, etc, packing all materials for sterilization, sterilizing, labelling and dating materials, storing and controlling inventory, issuing and distributing.[13]

The location in hospitals with well-utilized surgical services, the operation theaters (OT) requires huge supplies of sterile surgical instruments and sterile linen and they are the major users of cssd. The other users of cssd include wards, icus, emergency and labor room etc. Therefore the location of cssd should preferably be in proximity to OT and should have easy access to other user departments.The staff in cssd comprise of technicians who operate the autoclave and ETO machines. Assistants who perform the cleaning and packing, gauge cutting and cotton ball making assist them. There may be clerks or storekeepers to manage the inventory and sterile stores. One or more housekeeping staffs may be required. A manager supervises them all.Six sigma is a tool that uses statistics and brainstorming to reach the root cause of a problem and then find solutions to optimize the output.The idea of six sigma is to improve quality so that the number of defects becomes so few that they are statistically insignificant. It allows for only 3.4 defects per million opportunities for each product or service transaction. [14]

V. INTENSIVE CARE UNIT

ICU classification is divided into three levels: Level i: this can be referred as high dependency is where close monitoring, resuscitation, and short term ventilation <24hrs has to be performed.Level ii: can be located in general hospital, undertake more prolonged ventilation. Must have resident doctors, nurses, access to pathology, radiology, etc.Level iii: located in a major tertiary hospital, which is a referral hospital. It should provide all aspects of intensive care required.Large hospital requires bigger team like medical staff, nursing staff, unit director, nurse manager[15]

. A variety of other personnel may contribute significantly to the efficient operation of the ICU like unit clerks, physical therapists, and occupational therapists, advanced practice nurses, physician assistants, dietary specialists, and biomedical engineers. A clinical laboratory should be available on a 24-hr basis to provide basic hematologic, chemistry, blood gas, and toxicology analysis. Laboratory tests must be obtained in a timely manner, immediately in some instances. Stat or bedside laboratories adjacent to the ICU or rapid transport systems. The diagnostic and therapeutic radiologic procedures should be immediately available to ICU patients, 24 hrs. per day. Portable chest radiographs affect decision making in critically ill patients.

The organization of ICUrequires intelligent planning.One must keep the need of the hospital and its location, it may not cater to all needs.An institute may plan beds into multiple units under separate management by single discipline specialist viz. Medical ICU, surgical ICU, CCU, burns ICU, trauma ICU, etc. The number of ICU beds in a hospital ranges from 1 to 10 per 100 total hospital beds. Multidisciplinary requires more beds than single speciality. ICU with fewer than 4 beds are not cost effective and over 20 beds are unmanageable. ICU should be sited in close proximity to relevant areas viz. Operating rooms, image logy, acute wards, emergency department. There should be sufficient number of lifts available to carry these critically ill patients to different areas. The open model allows many different members of the medical staff to manage patients in the ICU.The closed model is limited to icu-certified physicians managing the care of all patients; andthehybrid model, which combines aspects of open and closed models by staffing the ICU with an attending physician and/or team to work in tandem with primary physicians.[16]

VI. THERAPEUTIC ELEMENT IN ICU

The therapeutic elements in ICU environment is also very important. The window and art that provides natural views; views of nature can reduce stress, hasten recovery, lower blood pressure and lower pain medication needs.Family participation, including facilities for overnight stay and comfortable waiting

rooms.Providing a measure of privacy and personal control through adjustable curtains and blinds, accessible bed controls, and TV, VCR and cd players.Noise reduction through computerized pagers and silent alarms.Medical team continuity that allows one team to follow the patient through his or her entire stay.The chief architect-he must be experienced in hospital space programming and hospital functional planning.Engineer should be experienced in the design of mechanical and electrical systems for hospitals, especially critical care unit. For a proper floor plan and design.[9]

There are recommended noise ranges in ICU. The signals from patient call systems, alarms from monitoring equipment, and telephones add to the sensory overload in critical care units.The international noise council has recommended that noise levels in hospital acute care areas.Not exceed 45 db (a) in the daytime,40 db (a) in the evening,20 db (a) at night.Notably, noise levels in most hospitals are between 50-70 db (a) with occasional episodes above this range. A central nursing station should provide a comfortable area of sufficient size to accommodate all necessary staff functions.When an ICU is of a modular design, each nursing substation should be capable of providing most if not all functions of a central station.There must be adequate overhead and task lighting, and a wall mounted clock should be present.Adequate space for computer terminals and printers is essential when automated systems are in use.Patient records should be readily accessible.Adequate surface space and seating for medical record charting by both physicians and nurses should be provided.Shelving, file cabinets and other storage for medical record forms must be located so that they are readily accessible by all personnel requiring their use.Although a secretarial area may be located separately from the central station, it should be easily accessible as well[9].

VII. WORK & STORAGE IN ICU

Work areas and storage for critical supplies should be located within or immediately adjacent to each ICU. There should be a separate medication area of at least 50 square feet containing a refrigerator for pharmaceuticals, a double locking safe for controlled substances, and a sink with hot and cold running water.Countertops must be provided for medication preparation, and cabinets should be available for the storage of medications and supplies. There must be a receptionist area to control visitor access, a special procedures room.[16]

Clean and dirty utility rooms must be separate rooms that lack interconnection.They must be adequately temperature controlled, and the air supply from the dirty utility room must be exhausted.An area must be provided for the storage and securing of large patient care equipment items not in active use.A patient nourishment preparation area should be identified and equipped with food preparation surfaces, an ice-making machine, a sink with hot and cold running water, a countertop stove and/or microwave oven, and a refrigerator. A staff lounge must be available on or near each ICU or ICU cluster to provide a private, comfortable, and relaxing environment.A conference room should be conveniently located for ICU physician and staff use.This room must be linked to each relevant ICU by telephone or other intercommunication system, and emergency cardiac arrest alarms should be audible in the room.A visitors' lounge or waiting area should be provided near each ICU or ICU cluster.Visitor access should be controlled from the receptionist area. One and one-half to two seats per critical care bed are recommended.A separate family consultation room is strongly recommended. Patients transported to and from an ICU should be transported through corridors separate from those used by the visiting public.Patient privacy should be preserved and patient transportation should be rapid and unobstructed.The supply and service corridor should be at least 8 feet in width.Doorways, openings, and passages into each ICU must be a minimum of 36 inches in width to allow easy and unobstructed movement of equipment and supplies.Floor coverings should be chosen to withstand heavy use and allow heavy wheeled equipment to be moved without difficulty.[11]

VIII. WARD TYPE ICU

Ward-type ICU should allow at least 225 square feet of clear floor area per bed.ICU with individual patient modules should allow at least 250 square feet per room (assuming one patient per room). Provide a minimum width of 15 feet, excluding ancillary spaces (anteroom, toilet, storage).Isolation rooms should each contain at least 250 square feet of floor space plus an anteroom.Each anteroom should contain at least 20 square feet to accommodate hand-washing, gowning, and storage.Additional approaches to improving sensory orientation for patients may include provision of a clock, calendar, bulletin board,pillow speaker connected to radio and television.[14]

Each intensive care unit must have electrical power, water, oxygen, compressed air, vacuum, lighting, and environmental control systems that support the needs of the patients and critical care team under normal and emergency situations, and these must meet or exceed regulatory and accreditation agency codes and standards.A minimum of six total air changes per room per hour are required, with two air changes per hour composed of outside air.For rooms having toilets, the required toilet exhaust of 75 cubic feet per minute should be composed of outside air. Central air-conditioning systems and re circulated air must pass through appropriate filters.Air-

conditioning and heating should be provided with an emphasis on patient comfort.For critical care units having enclosed patient modules, the temperature should be adjustable within each module.[17]

Computerized charting systems provide for "paperless" data management, order entry, and nurse and physician charting. If and when a decision is made to utilize this technology, it is important to integrate such a system fully with all ICU activities.Bedside terminals facilitate patient management by permitting nurses and physicians to remain at the bedside during the charting process. [18]

IX. CONCLUSION

Individual as well as group health has evolved as a product of human biology, environment, ways of living, economic status, and health services. The physical and mental traits of a person are also determined among others, by his or her genetic endowment, as evidenced by the discovery of many disorders being of genetic origin. The health status and disease status are, thus, a result of the process of a continuous adjustment between the internal and external environment.Timely and efficient management by doctors combined with concerted nursing efforts have revolutionised the management of critically-ill patients and brought down preventable mortality. During the last two decades critical care medicine has undergone rapid changes and has emerged as a discipline by itself.A hospital produces many types of waste material. Housekeeping activity generates considerable amount of trash, and the visitors and others bring with them food and other materials which must in some way be disposed off. Considering all these facts it is very impotant for us to hae a thorough and deep knowledge about these systems to have a healthy life and healthy environment.

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