HOSPITAL SOLID WASTE MANAGEMENT AT NEW YANGON GENERAL HOSPITAL (2019)

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M.B., B.S

Dip.Med.Sc (Hospital Administration)

for the Degree of Master of Hospital Administration (MHA)

University of Public Health, Yangon

2019

HOSPITAL SOLID WASTE MANAGEMENTAT NEW YANGON GENERAL HOSPITAL, YANGON, 2019

Thesis submitted to
the Postgraduate Academic Board of Studies
University of Public Health, Yangon
as the partial fulfillment of the requirements
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This thesis has been approved by the Board of Examiners.

Chief Examiner

Examiner (1) **Examiner (2)**

ACKNOWLEDGEMENT

There are many respectful and honorable personnel to give my sincere gratitude in doing this thesis for the fulfillment of Master degree. Firstly, I would like to express my heartfelt thanks to Professor Dr. Hla Hla Win, Rector, University of Public Health, Yangon and to the members of the Institutional Technical and Ethical Review Board, University of Public Health for giving an opportunity to conduct this study.

I also acknowledge Senior Medical Superintendent Dr. Nyunt Nyunt Wai, New Yangon General Hospital, Yangon Region for allowing me to conduct this study in the hospital and for her kindness.

I would like to honor and express my deepest gratitude to Professor Dr. Ko Ko Zaw, Head of Department of Epidemiology, University of Public Health for allowing me to do this study and for his expert opinion, precious suggestions and guidance for my study as well as his kind teaching throughout this academic year.

I also would like to express my deep gratitude towards the inspiration of my supervisor, Dr. Su Su Hlaing, Lecturer, Department of Epidemiology, University of Public Health, for her kind teaching and supports throughout the whole academic year, and her kind suggestions and helpful guidance.

I also express my sincere thanks to all the health care workers who had cooperated and participated in the study. Without their support and contribution, this study would not be able to be conducted and would not come to shape. I also appreciate all who make it possible for us in preparation, implementation and completion of this study.

I owe many thanks to Dr. Yin Mar Hlaing , Medical Superintendent, New Yangon General Hospital, and Dr. Myat Lay Pan, Medical Superintendent, New Yangon General Hospital, for their expert opinion, helpful guidance and allowing to conduct this study.

Finally, I would like to thank and express my love to my parents and wife, for helping me to do this study and for their support not to worry for my family.

My special thanks finally go to my colleagues, my senior colleagues and all personnel who encouraged and assisted me to complete this thesis in time.

ABSTRACT

A cross sectional descriptive study was conducted with the objective of assessing the current situation of hospital waste management (HWM) in 24 departments of the New Yangon General Hospital, from September to December, 2019.There were 24 providers participating in quantitative study including ward sisters and admin officers. Assessment of current situation of HWM in all departments was done with observational check lists. Key informant interviews were also carried out with ten participants who are responsible for HWM. In quantitative study, half of respondents had not received training on the HWM. Among 24 departments , types of hospital waste generated were general waste (100%), sharps waste (42%), infectious waste (50%), chemical & pharmaceutical waste (38%),and other hazardous waste (8%) and radioactive waste was not produced. For color coding system assessment, all of general waste was collected according to guideline. For the type of containers, general waste was collected with plastic bin and plastic bags (96%). Sharps waste was collected with used safety boxes mostly (45.8%) and water bottle (8.3 %). Hospital waste was transported with plastic bin with wheel (41.7%) and trolley (33.3%) in the hospital. Transportation for waste outside the hospital was municipal only. Final disposal method was only municipal (100%). Regarding the health education about HWM, (50 %) of the respondents received training. Supervision for HWM was fair and got supervision from administrators weekly. Regarding the quantification of waste, selected units under study produced a total of 307.71 kg/day of general waste and 29.14kg/day of hazardous waste i.e., general waste was 95 % and 5% was hazardous waste. The average waste generation of the study hospital was 1.69 kg/bed/day. Based on the findings, there should be proper and intensive training programs regarding the HWM process. Ministry of Health and Sport should support financial, advanced technical adequately. Ministry of Health and Sport should effectively implement hospital waste management guideline to all hospitals and strengthen the principle of patients and patients' attendants.

CONTENTS

LIST OF ABBREVIATIONS

DMS	Deputy Medical Superintendent
EENT	Eye, Ear, Nose, Throat Hospital
HBV	Hepatitis B Virus
HCW	Healthcare waste
HW	Hospital Waste
HWM	Hospital Waste Management
ICU	Intensive Care Unit
IGH	Insein General Hospital
KII	Key Informant Interview
KMC	Kantharyar Medical Center
MS	Medical Superintendent
NYGH	New Yangon General Hospital
OT	Operating Theatre
PPE	Personal Protective Equipment
WHO	World Health Organization
YGH	Yangon General Hospital

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CHAPTER (1)
INTRODUCTION

1.1 Background Information

Because of its content of hazardous substances, medical waste give rise to serious threats to environmental health. The hazardous waste consists pathological and infectious material, sharps, and chemical wastes. In hospitals, different kinds of therapeutic procedures (i.e. cobalt therapy, chemotherapy, dialysis, surgery, delivery, resection of gangrenous organs, autopsy, biopsy, para- clinical test, injections etc.) are performed and result in the production of infectious wastes, sharp objects, radioactive wastes and chemical materials. Medical waste may convey germs of diseases such as hepatitis B and AIDS. In developing countries, medical waste has not been much attention and it is disposed of together with domestic waste (Hassan et al., 2008).

Bio-medical waste is defined as "any waste which is generated during diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in production or testing of biological" (ORGANIZATION, (NACP-III) and INDIA, n.d.).

National policies are to give waste disposal as first priority. At each level of district and each health care facility—to identify sustainable resources for safe and practical medical waste collection, handling, and transport. The prepared medical waste management plans include:

1. Reduction of waste: Minimize unnecessary injection to prevent health care providers and the public from unnecessary health care risks.

2. Segregation of waste: waste at the site of source divide into

- sharps waste;
- infectious waste;
- non-infectious waste.

3. Safe handling of sharps: Use puncture-proof safety boxes or needle removal for disposal of all needles and plastic syringes. Discard all medical sharps safely.

4. Safe collection of medical waste: Apply waste segregation and handling procedures to all health care areas. Waste handlers must be protected by personal protection equipment and carry on a routine collection and transport schedule.

5. Safe final disposal: Use best available destruction option for final disposal (PATH, 2005).

New Yangon General Hospital is a 200 bedded teaching hospital and situated at the corner of Pyay Road and Bogyoke Aung San Road, Lanmadaw Township, Yangon Region and constructed since 1982. The hospital was opened at 1984 and included Medical Unit, Surgical Unit and Uro-surgical Unit. The hospital was updated to 220 bedded since1986 and then was changed to the 200 bedded hospital at 2011. Poison Treatment Center was opened at 2.6.2003. The area is 5.14 arcs wide and can supply 24 hours running water supply and electricity. As the hospital is a tertiary teaching hospital, there are many patients coming for care and treatment. There are seven Clinical departments and 13 Allied Health Professionals departments (NYGH, 2018).

1.2 Problem statement

Hospital wastes are reservoir of infection and extensive list of infections and diseases such as HIV can be infected through hospital wastes. Hospital wastes contain blood, body fluids and secretions that harbor most viruses, bacteria and parasites. This passes via a number of human contacts, they are potential 'recipients' of the infection e.g. the workers at laundry through blood soaked linen, or everyone in both the hospital and community, through contaminating the water supply from badly maintained toilet outflow (Kerae, 1992).

Improper healthcare waste management can cause environmental pollution, and infectious waste may cause the transmission of more than 30 significant pathogens such as typhoid, hepatitis B, hepatitis C, HIV, Escherichia coli, Staphylococcus aureus and Pseudomonas aeruginosa (Soares et al., 2013). When the healthcare waste is disposed by landfill or buried, contamination of ground water may occur, which may arise in the spread of E. coli. Pathogens in the waste can also enter and remain in the air for a long period, in the form of spores or pathogens.

Healthcare establishments should improve the practice of waste segregation, sorting and resource recycling and recovery (Cheng et al., 2009). Furthermore, proper waste treatment methods not only diminish the weight, and the volume of the waste but also the infectivity and organic compounds in the waste (Press, 1998).

Another problem is unsanitary dumping ground or stagnant water often become breeding grounds for flies, mosquitoes, insects and rodents. These vectors are main factors for many serious infectious diseases (Press, 1998).

Excessive solid waste can cause problem at sewage treatment plant. Feces and urine from infected patients should be made disinfection before disposal in the sewer. If it is not disposed safely and properly, there will be an epidemic of particular infectious diseases.

Improper handling of various biomedical wastes of waste management can cause the physical injury to handlers. Especially the sharp waste can cause physical injury and improper segregation of sharp wastes such as needles, blades etc.

The relationship between hospital and community can be damaged as a result of inadequate waste disposal. Community cannot accept unpleasant smells, views such as blood stained pieces, body parts from hospital wastes. Inadequate waste management can also affect the patient dissatisfaction and total quality management (certification of accreditation) (Kerae, 1992).

1.3.Justification

Healthcare waste management is the most considerable issue in those days. Healthcare wastes are major source of infection to the patients and healthcare providers and potential environmental pollution. Healthcare providers should aware the hospital waste management process because improper waste management may result the occupational hazard and hospital acquired infections.

In many countries, knowledge about the potential for harm from health-care wastes has now become more noticeable to governments, medical practitioners and civil society. Managers and medical staff are increasingly expected to take more responsibility for the wastes they produce from their medical care related activities. The indiscriminate and erratic handling and disposal of waste within health-care facilities is now widely known as a source of avoidable infection, and is similar to public perception of poor standards of health care (Emmanuel et al., 1999).

Healthcare waste is a special category of waste which uses special precautions while handling. Inadequate handling of hospital waste may have the public health problem and environmental impact. Safe and proper steps of hospital waste management are essential in every steps of waste management.

Large quantities of hazardous wastes are produced by the hospitals and other health care facilities in countries throughout South-East Asia. Most of the countries are faced by resources insufficiency (financial, competency of manpower). Menial workers

who handle the hospital wastes are weakness of education and they need proper training and closed supervision.

Healthcare providers and administrators should have proper knowledge about the rules and regulations of healthcare waste management and should perceive the roles and responsibilities in handling of healthcare wastes.

There is limited well-designed, waste policy, legislative framework and plans for achieving local implementation in Myanmar. Healthcare wastes are challenges to the hospitals, community and inter sectorial collaboration.

There were little previous studies on measurement of hospital waste quantities in different hospitals in Myanmar. It is hoped that this study might gain base line information and future planning of proper waste management system in hospitals and healthcare.

CHAPTER (2)
LITERATURE REVIEW

2.1 Health care waste

All the waste generated by healthcare establishments, research facilities, and laboratories are healthcare waste. In addition, it contains the waste originating from "minor" or "scattered" sources such as that generated in the course of health care undertaken in the home (dialysis, insulin injections, etc.). Non-risk or "general" health-care waste, comparable to domestic waste is between 75% and 90% of the waste produced by health-care providers. It comes mostly from the administrative and housekeeping functions of health-care establishments and may include waste generated during maintenance of health-care premises. The remaining 10–25% of health-care waste is hazardous and a variety of health risks may be created (Emmanuel et al., 1999).

A hospital generates many types of waste material. Housekeeping activity produces considerable amount of trash, and the visitors and others bring with them food and other materials which must be disposed. In addition, the waste is generated all residential buildings, hospitals generate pathological waste, blood-soaked dressings, carcasses and similar waste. These waste materials must be disposed of immediately lest they purify, produce foul smells, act as a source of infection and disease, and strike as a public health hazard. In developing countries, many of the public health problems are also associated with defective sewage and waste disposal (Sakharkar, 2009).

During handling of wastes, the medical and ancillary staff, the sanitary laborers can be harmful if the waste has not been packed safely. For the purpose, sharps are considered as one of the most dangerous categories of waste. Many injuries cause because syringe needles or other sharps have not been discarded in safety boxes or because these have been overfilled. On dumpsites, scavengers during their recycling activities may also come in contact with infectious waste if waste has not been properly treated or disposed.

The general public can be caused infection to HCW either directly or indirectly through several ways of contamination. Dumping HCW in open areas is a fact that can have major adverse effects on the population. The reuse of syringes is certainly the most serious problem in some of the developing countries is the "recycling" practices. The

WHO estimates that there are annually over 20 million infections of hepatitis B, C and HIV due to unsafe injection practices (reuse of syringes and needles in the absence of sterilization). Public health have a risk that the sale of recovered drugs in the informal sector and the lack of controls (WHO, 2002).

2.2 Classification of health care waste

Hospital wastes are categorized according to their weight, density and constituents. The World Health Organization (WHO) has classified medical waste into different categories.

2.2.1. Infectious waste

Infectious waste is material which contain pathogens (bacteria, viruses, parasites or fungi) in sufficient concentration or quantity to infect to susceptible hosts. This category includes:

- waste contaminated with blood or other body fluids
- cultures and stocks of infections from laboratory work
- waste from infected patients in isolation wards.

Waste that has been in contact with blood or other body fluids include free-flowing blood, blood products and other body fluids; dressings, bandages, swabs, gloves, masks, gowns, drapes and other material contaminated with blood or other body fluids; and waste that contaminated with the blood of patients undergoing haemo-dialysis (e.g. dialysis equipment such as tubing and filters, disposable towels, gowns, aprons, gloves and laboratory coats).

Highly infectious waste are laboratory cultures and stocks. Waste from autopsies, animal bodies, and other waste items that have been inoculated, infected, or contaminated with highly infectious agents are highly infectious waste. Infectious waste are discarded instruments or materials that have been contaminated with persons or animals infected with highly infectious agents (Emmanuel et al., 1999).

2.2.2. Pathological wastes

Pathological waste is a subcategory of infectious wastes but is often classified separately especially when special methods of handling, treatment and disposal are

used. Pathological waste includes tissues, organs, body parts, blood, body fluids and other waste from surgery and autopsies on patients with infectious diseases. It also consists of human fetuses and infected animal carcasses. Human or animal body parts are sometimes called anatomical waste. Pathological waste may include healthy body parts that have been removed during a medical procedure or produced during medical research (Emmanuel et al., 1999).

2.2.3. Sharp wastes

Sharp wastes are material which can make cuts or puncture wounds, including needles, syringes, scalpels, saws, blades, broken glass and nails. The used materials are infected or not, such items are usually considered as highly hazardous healthcare waste (WHO, 2009).

2.2.4. Pharmaceutical wastes

Pharmaceutical waste are the things which expired, unused, spilt and contaminated pharmaceutical products, prescribed and proprietary drugs, vaccines and sera that are no longer required, and, due to their chemical or biological nature, need to be disposed of carefully. The category contains discarded items heavily contaminated during the handling of pharmaceuticals, such as bottles, vials and boxes containing pharmaceutical residues, gloves, masks and connecting tubing (Emmanuel et al., 1999).

2.2.5. Genotoxic wastes

Genotoxic waste is highly hazard and may have mutagenic (capable of causing a genetic mutation), teratogenic (capable of inducing defects in an embryo or fetus) or carcinogenic (cancer-causing) properties. Serious safety problems, both inside hospitals and after disposal may rise from the disposal of genotoxic waste raises and should be taken special attention. Genotoxic waste consists of certain cytostatic drugs, vomit, urine or feces from patients treated with cytostatic drugs, chemicals and radioactive material (Emmanuel et al., 1999).

2.2.6. Chemical wastes

Chemical waste includes discarded solid, liquid and gaseous chemicals for example, from diagnostic and experimental work and from cleaning and disinfecting

procedures. Chemical waste from health care is hazard if it has at least one of the following properties. The natures of these risks are:

- toxic (harmful)
- corrosive (e.g. acids of pH <2 and bases of pH >12)
- flammable
- reactive (explosive, water reactive, shock sensitive)
- oxidizing.

2.2.7. Pressurized containers

Pressurized containers include full or empty containers with pressurized liquids, gas or powdered materials, consisting gas containers and aerosol. Most of the gas used in healthcare is anesthetic gas, ethylene oxide, oxygen, compressed air. They are often stored in pressurized cylinders, cartridges, and aerosol cans (WHO, 2009).

2.2.8. Radioactive wastes

Radioactive waste consists of liquids, gases and solids contaminated with radionuclides whose ionizing radiations have genotoxic effects. The type of radioactive material used in health-care facilities produces in low level radioactive waste. It deals mainly with therapeutic and imaging investigation activities where Cobalt (60Co), Technetium (99mTc), iodine (131I) and iridium (192Ir) are most commonly used.

2.3 Sources of health care waste

Sources of health care waste divided into major source and minor source. Hospitals of all categories and its departments, other healthcare establishments, related laboratories research centers, mortuary and autopsy centers, animal research and testing, blood bank and blood collection services, nursing homes, geriatric homes, central sterile supply department, and laundry are major source of healthcare waste

Minor source of healthcare waste are small healthcare establishments, specialized healthcare establishments and institution with low waste generation, non-health activities involving intravenous or subcutaneous interventions, funeral services, ambulances, home treatments.

2.4 Importance of health care waste

All individuals exposed to hazardous health care waste are potentially at risk of being injured or infected. They are:

- Medical staff: doctors, nurses, sanitary staff and hospital maintenance personnel.
- In and out-patients who are treated in health care facilities as well as their visitors;
- Workers who serve at health care facilities such as laundries, waste handling and transportation services;
- Workers in waste disposal facilities, including scavengers; (WHO, 2009)

High risk of group are all hospital staff and the health care workers are group of their profession have to work with sharps like needle, blades and increase transmission of infectious diseases (D.C. Joshi, 2009).

2.5 The hospital waste management program

The management of the health care waste in hospital needs to do the following parameters.

1. Generation and segregation of waste
2. Collection and storage of waste
3. Transportation of waste
4. Treatment of waste
5. Disposal of waste
6. Managerial and ethical issues related with the waste management program

2.5.1 Segregation, color coding and storage of waste

Separation of different types of health care wastes by sorting; the methodology is to be designed for identification of the different types of wastes, categorization of waste into different categories and segregating the waste into different types right at the point of origin is defined as waste segregation. Segregation is the essence of waste management and should be done at the source of generation of Bio-medical waste e.g. all patient care activity areas, diagnostic services areas, operation theatres, labor rooms, treatment rooms etc. The generator of biomedical waste is responsible to segregation i.e. doctors, nurses, technicians etc. (medical and paramedical personnel) (WHO, 2009).

According to WHO recommended color-coding for hospital waste in developing countries, highly infectious waste, pathological and anatomical waste need to be disposed into yellowed colored, leak proof plastic bag or container and sharp wastes must be placed into yellowed colored puncture proof containers. Chemical and pharmaceutical waste should be discarded into red colored plastic bag or containers. Radioactive waste must be disposed into lead box labeled with radioactive symbol. Remaining general waste can be disposed into black colored plastic bag or containers (D.C. Joshi, 2009)

Segregation of hospital waste is the most important stage for proper management of hospital waste management as waste segregated into various color-coded container is finally taken to different sites for disposal. The implementation of standards varies from one place to another. pertinent issues contains lack of proper source segregation (Abdulla F, 2008), lack of color coding and lack of records pertaining to waste composition and quantity (Bdour et al., 2007). lack of segregation, lack of color coding, lack of record keeping, and carelessness of the staff are lead to poor segregation practices across hospitals in the developing countries. Lack of source segregation may cause accidental stick injuries to hospital waste management staff and scavengers (Wilburn and Eijkemans, 2013).

2.5.2 Transportation of hospital waste

The types of transportation for hospital waste can be divided into intramural and extramural. The intramural transportation, transportation within hospital, is done with the help of the pushcart, waste trolleys and wheelbarrow. Transportation of the wastes outside the hospital is extramural transportation and is done with the help of rickshaw, van, and lorry. handling the biomedical wastes to segregate it prior to its storage, transport, treatment and disposal is the duty of the authorized persons (D.C. Joshi, 2009).

2.5.3 Treatment and disposal technologies for hospital waste

In developed countries, different technologies are applied for medical disposal. There are mechanical, thermal, irradiative, biological and chemical methods such as incineration autoclaving, landfilling, recycling, electron beam technology, bioconversion (Ali M, Wang W, Chaudhry N, 2017). If the incinerator was well function (his continuous temperature, filtration of particular emission), it would be not

more excessive risks (Hassan MM, 2008). However, after incineration, combustible components of the wastes would be changed into the gaseous by products (Carbon dioxide, carbon monoxide, dioxin, and furan) and the non-combustible components would be still as solid byproduct, namely ash(Diaz, Savage and Eggerth, 2005). The incinerator ash would be hazard due to the presence of needles and sharps, non-destroyed pathogens, and the hazardous substances, Canada, USA, and Greece prohibited the incineration for hospital waste due to risk of air pollution, and encourage the alternative waste disposal techniques, such as autoclaving and microware sterilization (Soares et al., 2013).

The most widely used method of hospital waste disposal is incineration. However, it causes environmental pollution thus requiring additional expenditure on emission control devices. Novel techniques such as pyrolysis have been as relatively inexpensive waste disposal technologies which significantly reduce waste by volume and also result in energy recovery.

Incineration is the method of choice for most hazardous health care waste and is still widely used. However, recently developed alternative treatment methods are more popular. Treatment system should be choose carefully, on the basis of various factors, many of which depend on local conditions (Park, 2015).

a. Incineration process

A high-temperature dry oxidation process that reduces organic and combustible waste to inorganic, incombustible matter is incineration and results in a very significant reduction of waste volume and weight. The selected process is to treat wastes that cannot be recycled, reused, or disposed of in a landfill site. There are three basic kinds of incineration technology for treating health care waste such as double chamber pyrolytic incinerators, single-chamber furnaces with static grate and rotary kilns operating at high temperature (Park, 2015).

b. Chemical method

In this method, the main method of waste treatment is disinfection, the process by which most of the pathogens are destroyed from any inanimate object, surface of materials. When this process is done by the chemicals, it is called chemical disinfection.

c. Wet and dry thermal treatment

Wet Thermal Treatment

Wet thermal or steam disinfection is depended on exposure of shredded infectious waste to high temperature, high-pressure steam, and is similar to the autoclave sterilization process. The process is unsuitable for the treatment of anatomical waste and animal carcasses, and will not efficiently treat chemical or pharmaceutical wastes (Park, 2015).

Screw-feed technology

Screw-feed technology is the base on a non-burn, dry thermal disinfection process in which waste is shredded and heated in a rotating auger. The waste is minimized by 80% in volume and by 20–35% in weight. This process is appropriate for treating infectious waste and sharps, but it should not be used to process pathological, cytotoxic, or radioactive waste (Park, 2015).

Microwave irradiation method

Most microorganisms are made into inert by the action of microwaves of a frequency of about 2450 MHz and a wavelength of 12.24cm. The water which contained within the wastes is rapidly heated by the microwaves and the infectious components are destroyed by heat conduction (Park, 2015).

Land disposal

There are two types of disposal which are land-open dumps and sanitary landfills. Health care waste should not be discarded on or around open dumps. The risk is obvious of either people or animals coming into contact with infectious pathogens. Sanitary landfills need to be designed to have at least four advantages over open dumps: geological isolation of waste from the environment, appropriate engineering preparation before the site is ready to accept waste, staff present on site to control operations and organized deposit and daily coverage of waste (Park, 2015).

2.5. 4 Managerial and policy and procedures in waste management program

National legislation is the base on improving health care waste disposal practices in any country. Legal control and permits the national agency responsible for

the disposal of health care waste, usually the Ministry of Health to apply pressure for their implementation is established (Park, 2015).

All staff in hospitals is to be trained in the field of waste management, they are to be properly trained, maintained and utilized. The hospital administrator is expected to pay special attention to waste management teams and committees is one of the important things in waste management. The hospitals should prepare a biomedical waste management manual for the hospital. The manual would act like a reference document for all the concerned staff members. Standard operative procedures for all the activities related to waste management is essential (D.C. Joshi, 2009).

Table (2.1) Bio-medical Waste Management Rules

Bio-medical Waste Management Rules		
Category	**Waste Category**	**Treatment and disposal**
1	Human Anatomical Waste (human tissues, organs, body parts)	Incineration / deep burial
2	Animal Waste (animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospitals, animal houses)	Incineration / deep burial
3	Microbiology & Biotechnology Waste (wastes from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures)	Local autoclaving / microwaving / incineration
4	Waste sharps (needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps)	Disinfection (chemical treatment/autoclaving /microwaving

		and mutilation/shredding)
5	Discarded Medicines and Cytotoxic drugs (wastes comprising of outdated, contaminated and discarded medicines)	Incineration, destruction and drugs disposal in secured landfills
6	Solid Waste (Items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, beddings, other material contaminated with blood)	Incineration / autoclaving / microwaving
7	Solid Waste (wastes generated from disposable items other than the waste sharps such as tubings, catheters, intravenous sets etc).	Disinfection by chemical treatment / autoclaving / microwaving and mutilation shredding
8	Liquid Waste (waste generated from laboratory and washing, cleaning, house-keeping and disinfecting activities)	Disinfection by chemical treatment and discharge into drains
9	Incineration Ash (ash from incineration of any bio-medical waste)	Disposal in municipal landfill
10	Chemical Waste (chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc.)	Chemical treatment and discharge into drains for liquids and secured landfill for solids

Notes: (1) Chemicals treatment using at least 1% hypochlorite solution or any other equivalent chemical reagent. It must be ensured that chemical treatment ensures disinfection.

(2) Mutilation/shredding must be such so as to prevent unauthorized reuse.

(3) There will be no chemical pretreatment before incineration. Chlorinated plastics shall not be incinerated.

(4) Deep burial shall be an option available only in towns with population less than five lakhs and in rural areas.

2.6 Studies relating to the assessment of health care waste management in Myanmar

In July 2003, a cross sectional study to describe the assessment of health care waste management in Defense Services Orthopedic hospital, Mingalardon was done. All categories of wastes are produced, and total quantity of solid waste generated in a hospital was 0.41kg/bed/day and could be assumed that studied hospital would produce 71.51tones of solid wastes in a year. Average distribution of waste is general waste (90%) and hazardous waste (10%). There is no standard color-coding system, but all the units collect the wastes into more than one category. There are four different type of containers are used in collection of various types of waste: namely, municipal plastic bin with lid, plastic bin without lid, metal bin and plastic bottles. Containers used for general waste in all units are plastic bin with lid but unlined with polythene bags. Some units collect the sharps waste into used bottles and majority of the units collect the infections waste into plastic bin without lid.

Most of the units supply the protective facilities like gloves for waste handlers but most handlers do not wear any protective clothing and gloves during collecting, handling, transporting and disposing. Using the transport system of waste within hospital is only manual method. Outside the hospital, wastes are transported by municipal transport system, and it is not regular and not daily. The problem in hospital is the lack of policy and guidelines concerning HWM, moreover, priority of management of hospital waste is lower than other services. (Myint-Thein-Thun, 2003).

Regarding to study carried out at North Okkalapa General hospital in Yangon both quantitative results and interviews; inadequate knowledge, improper practices on segregation and disposal techniques of health care waste and insufficient supply of adequate resources were the major problems encountered on health care waste management. From the qualitative finding, it explored that training and education programs for all health care staff to improve knowledge on disposal of waste and their effect on health and environment. By giving training programs, the health care providers operating in disposal of waste could handle hazardous waste with caution and can prevent cross infection through the waste. Another finding was money, materials,

manpower, supportive supervision and monitoring plan for the waste disposal system (Kaung-Myat-Wyuun, 2015).

Another study at Yangon General Hospital, 2017, all respondents (100%) did not give past history of attending training program on health care waste management. General wastes were generated from all selected units of Yangon general hospital. Sharps waste was also generated from all wards except the medical store. Chemical and pathological wastes were generated from laboratory. Radioactive waste was generated from radiology unit and nuclear medicine unit. All respondents (100%) answered that transportation of all types of waste at the outside and final disposal methods of wastes for general, sharp, infectious, chemical, pathological waste were municipal (100%) (Zin-Zin-Wai-Min, 2017).

From selected units under study produced general waste was a total of 997.588 kg/day and hazardous waste was 172.297 kg/day which quantities were collected five consecutive days. General (non-hazardous) waste generated in under studied hospital was 0.77kg/bed/day. Hazardous waste generated in under study was 0.032 kg/bed/day. Both general and hazardous wastes were 0.8 kg/bed/day (Zin-Zin-Wai-Min, 2017).

2.7 Studies relating to the assessment of health care waste management among in other countries

The study was done for the Assessment of Medical Waste Management in Khartoum State Hospitals on 2010. From the results, the current healthcare waste management practices observed in Khartoum state are not fully safe and cause harmful environmental effects mainly due to the absence of disposal facilities and the poor financial resources. The financial is the key issues for successful and long-term implementation of national health-care waste management plan. The standardization of the health-care waste management practices, through the establishment of clear protocols, the equipment of the health-care facilities as well as managerial measures are basic to secure the whole health-care waste stream. The procedures need to be in accordance with the prescription contained in the national legislations and in the internal hospital rooms. The equipment and finance will provide to the administration and medical staff. The necessary tools to apply the standardized procedures in their establishments and medical services (Elsidig, 2010).

Strengthening of the institutional capacities of the main stakeholders participating in the healthcare waste management process through the development of

in-service training programs and adequate curricula will remain important issues. Finally, the elaboration of the sustainable monitoring plan, including inspection and backstopping measures should help the Health Authorities in reinforcing the implementation of safe HCWM practices (Elsidig, 2010).

Conceptual framework

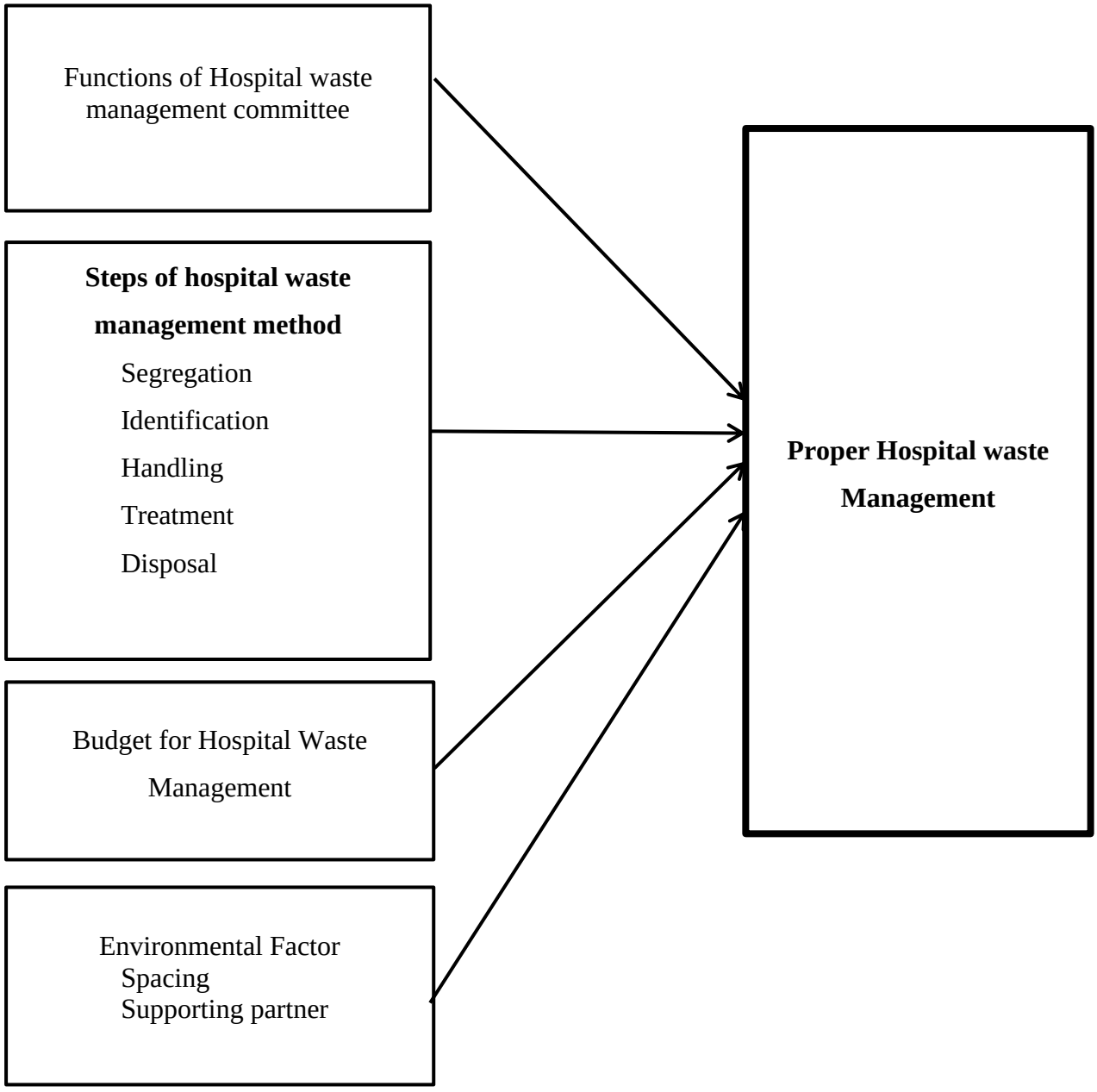

Fig (2.1) Conceptual framework of Hospital Waste Management

CHAPTER (3)

OBJECTIVES

3.1 General objective

To assess the hospital waste management at the New Yangon General Hospital

3.2 Specific objectives

1. To describe the organization structure and functions of hospital waste management committee at NYGH
2. To describe the process of hospital waste management
3. To assess the waste generated from all departments of NYGH
4. To explore the challenges of hospital waste management process at NYGH

CHAPTER (4)
RESEARCH METHODOLOGY

4.1.Study design

Hospital based cross-sectional descriptive study was conducted.

4.2.Study period

The study was done from August to November 2019.

4.3.Study area

The study was conducted at New Yangon General Hospital

4.4.Study population

Study population consists all units of NYGH. For qualitative data collection, health care providers were included medical superintendent, admin officer, and staff nurse at NYGH. All waste generated from NYGH for seven constitutive days (included weekend) were quantified and hospital waste management were observed during study period.

4.5.Sampling procedures

From 24 departments of NYGH, daily weight of waste according to category were quantified from Day 1 to Day 7. Routine procedure of waste management process were checked with check list.

Key informant interviews were done with one deputy medical superintendent, two admin officers and seven ward sisters from different wards and all departments after observational check list done. Total of 10 interviewees participated in KII.

4.6. Data collection methods and tools

(1). Data collection method

1. Reviews of record
2. Observation of the process of waste disposal from selected units with the use of check list
3. Key informant interviews with Deputy Medical Superintendent, ward sisters and administrative officers

(2). Data collection tools

1. Observational check list
2. Records, reports
3. Weighing machine
4. Key informant interviews question guide

(3). Quantitative data collection

Data collection were done through reviewing records hospital waste management after getting authority from Senior Medical Superintendent of NYGH. NYGH has seven clinical departments and 17 medical supportive departments. Observational check list was used to observe the hospital waste management of all units of NYGH. At every 4:00 pm, waste from all departments of NYGH from day 1 to day 7 were quantified according to waste category by weighing machine.

(4). Qualitative data collection

For qualitative data collection, purposive sampling technique was used for participant selection. Regarding the strengths, weakness and challenges encountered in waste management, key informant interviews were carried out with one DMS, two administrative officers who are from laboratory unit and administrative office and seven nurses were selected from general ward. Interviews was done at private area of hospital. Audio recording was done with permission.

4.7. Data management and analysis

After data collection, data checking, entry and analysis of quantitative data was done by Microsoft Excel and SPSS software version 16. Categorical data was presented

as frequency and percentage. Audio recordings was transcribed verbatim. Thematic analysis was carried out manually.

4.8 . Ethical consideration

This study was conducted through the permission of ethical board of University of Public Health, Yangon (UPH-IRB (2019/ MHA/2)). The permission for using the secondary data of waste management was officially obtained from Senior Medical Superintendent of NYGH. The objectives of the study, procedure and benefits of data was explained to each respondent and those who give written informed consent to participate willingly were included in the study. All the information was kept as confidential and was used only for research purposes.

CHAPTER (5)

FINDINGS

5.1 Organization structure and functions of hospital waste management committee at NYGH

Hospital waste is all the waste generated from hospital, research centers and laboratories related to medical procedures. There is no proper specific hospital waste guideline. The hospital waste management guideline is followed hospital infection control guideline. At this hospital, hospital waste management is guided according to Hospital management Manual (2011). There is hospital waste management committee including-

(1)	Deputy Medical Superintendent	Chairman
(2)	Associate Professor of Medicine Department	Member
(3)	Associate Professor of Surgery Department	Member
(4)	Consultant of Anesthesiology Department	Member
(5)	Consultant of Radiology Department	Member
(6)	Consultant of Microbiology Department	Member
(7)	Staff officer (Pharmacy)	Member
(8)	Matron (Chief Nurse)	Member
(9)	Civil Engineer	Member
(10)	Water Supply Engineer	Member
(11)	Electrical Engineer	Member
(12)	Consultant of Pathology	Secretary
(13)	Assistant Medical Superintendent	Co-secretary

The duties of this committee are to check the hospital waste process of each ward by checklist. There are two hospital infection control teams which are leaded by DMS (1) and DMS (2). Hospital waste management round is done once a week. The hospital waste management checklist is contained checklist of hospital infection control including colour coding, uses of puncture proved container, how to collect general waste, etc. And also, the teams are done supervision at compound including checking waste house, cleaning of waste house, how to separate the types of waste, regular collection of municipal truck including time and on time, segregation of anatomy

wastes from mortuary, etc. There is included in infection control round. The supervision of compound and inter- building is done alternate week.

At the supervision of intra- hospital building, each and every departments are checked the usage of colour begs, segregation of waste, storage of waste, collection of waste, etc.

There is no temporary storage of waste in all departments. Therefore, wastes are transported to waste storage area twice a day at 6:00 AM (only general waste) and 3:00 to 4:00 PM (both general waste and infectious waste).

At each department, ward sister or ward-in-charge must check all process of waste management according to guideline. All facilities for hospital waste management process are supplied from hospital infection control budget. If not supply, hospital waste management cannot operate well. Now a day budget for hospital infection control is increasing and all materials are supplied enough.

There are 24 departments in NYGH and they are as follow;

1.Administrative Department
2.Catering service
3.Central Sterile Supply Department
4.Department of pathology and histology
5.DOTS corner
6.Engineering department
7.Female medical ward
8.Female surgical ward
9.Intensive Care Unit
10.Laundry service
11.Male medical ward
12.Male surgical ward
13.Medical record
14.Medical store
15.Mortuary
16.Operation Theater
17.Out-Patient Department and Emergency
18.Oxygen supply department
19.Poison ward
20.Private ward

21.Radiology department

22.Receptionist department

23.Rehabilitation department

24.Transportation service

5.2 Process of hospital waste management

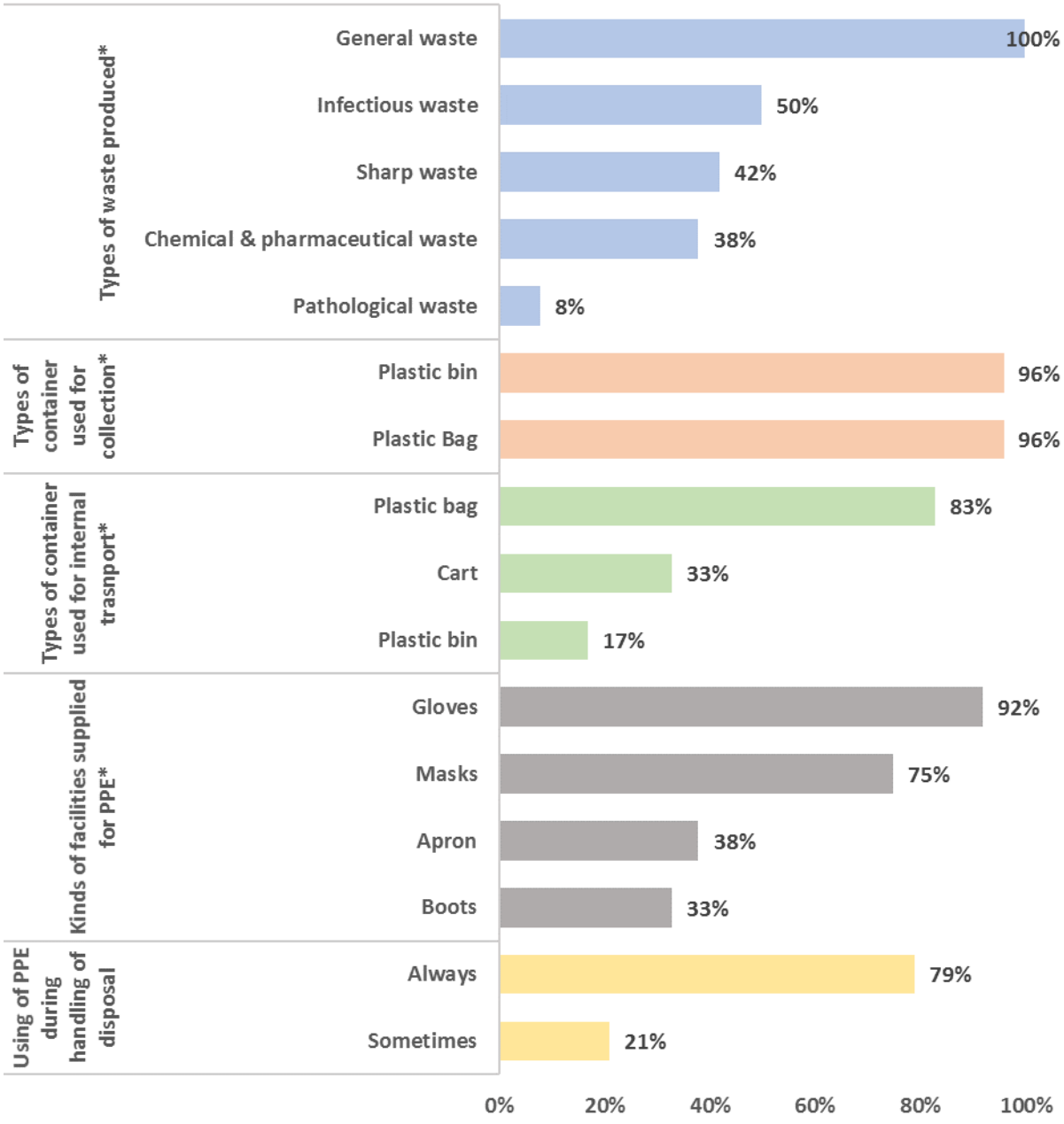

Figure (5.1) Hospital waste management at New Yangon General Hospital (N=24)

* means multiple response

According to checklist, all categories of wastes were generated. General waste, infectious waste, sharp waste, chemical & pharmaceutical waste and pathological waste were 100%, 50%, 42%, 38% and 8% respectively. Types of containers used for collection were plastic bags (96%) and plastic bin (96%).

Types of containers used for internal transport were plastic bag (83%), cart (33%) and plastic bin (17%). Kinds of facilities supplied for PPE were gloves (92%),

marks (75%), boots (33 %) and apron (38 %). There were ‘always’ (79%) and ‘sometimes’ (21%) in using of PPE during handling of disposal.

All the storage areas of hospital waste were clean and containers for general waste (non-hazardous waste) of 23 departments were sufficient. All the hospital waste has been transported and final disposal is made by municipal.

5.3 Waste generated in New Yangon General Hospital

5.3.1 Categories of types of generated waste

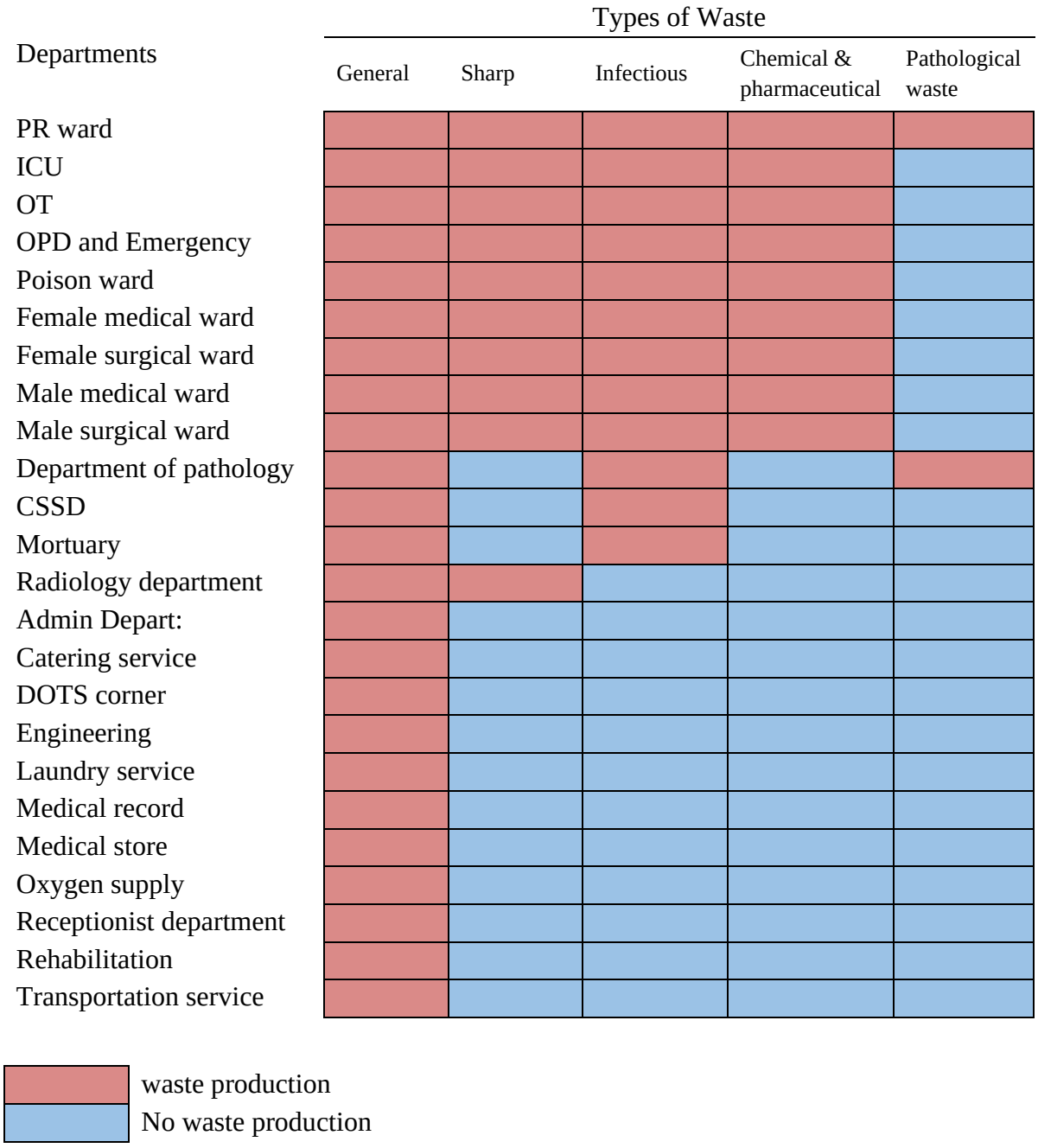

Figure (5.2) Categories of waste according to departments

At New Yangon General Hospital, total 24 units were generated general waste. Sharp waste, infectious waste, chemical & pharmaceutical waste and pathological waste was 10, 12,9 and 2 units respectively. No radioactive waste was generated. These findings were obtained from checklist of each department of the studied hospital.

5.3.2 Quantities of hazardous and non-hazardous wastes in New Yangon General Hospital (Kg/ day)

Table (5.1) Quantities of hazardous wastes in New Yangon General Hospital in seven consecutive days

	No: of departments	Median (IQR)	Minimum	Maximum
Monday	4	5.5 (5.5)	1	8
Tuesday	3	9.0 (8.0)	4	12
Wednesday	3	10.0 (12.0)	2	14
Thursday	4	13.0 (25.0)	3	33
Friday	2	12.0 (4.0)	10	14
Saturday	1	9.0 (9.0)	9	9
Sunday	4	9.0 (8.0)	5	15

Table (5.2) Quantities of non-hazardous wastes in New Yangon General Hospital in seven consecutive days

	No: of departments	Median (IQR)	Minimum	Maximum
Monday	13	15.0(38.00)	4	56
Tuesday	12	36.5(41.25)	7	63
Wednesday	11	16.0(46.00)	6	63
Thursday	12	12.0(38.75)	2	59
Friday	10	19.0(43.00)	2	58
Saturday	11	16.0(34.00)	7	61
Sunday	10	31.0(42.75)	2	70

Quantities of hazardous waste produced in each day were shown in table (5.1) and table (5.2). It was found that hazardous waste produced was a total of 204 kg during study period. The median (IQR) of study period (from Monday to Sunday) for generated hazardous waste were 5.50 (5.50), 9.00 (8.00), 10.00 (12.00), 13.00 (25.00), 12.00 (4.00), 9.00 (9.00) and 9.00 (8.00) kg respectively. It was found that non-hazardous waste produced was a total of 2154 kg during study period. The median (IQR) of study period (from Monday to Sunday) for generated non-hazardous waste

were 15.00(38.00), 36.50(41.25), 16.00(46.00), 12.00(38.75), 19.00(43.00), 16.00(34.00) and 31.00(42.75) kg respectively.

Departments of disposed hazardous wastes to waste storage were listed according to days by days as followed;

On Monday	1) OT, 2) ICU, 3) Female surgical ward, 4) Mortuary
On Tuesday	1) OT, 2) ICU, 3) Female surgical ward
On Wednesday	1) OT, 2) Female medical ward, 3) Female surgical ward
On Thursday	1) OT, 2) PR ward, 3) Department of pathology and histology, 4) Female surgical ward
On Friday	1) ICU, 2) Male surgical ward
On Saturday	1) Female surgical ward
On Sunday	1) OT, 2) ICU, 3) Female surgical ward, 4) Male surgical ward

Departments of disposed non-hazardous wastes to waste storage house at all seven days of study periods were PR, OT (not Saturday), ICU, OPD and emergency, Male medical ward, Female medical ward, Female surgical ward, Female surgical ward, Administrative department, Catering services (not Thursday).

Department of pathology and histology disposed non-hazardous waste on Monday and Thursday. The day of disposed waste from Poison ward is Monday, Tuesday and Thursday. Receptionist department disposed waste on Tuesday and Saturday. Transportation services also disposed waste on Wednesday, Thursday and Saturday. Mortuary is disposed non-hazardous waste on Monday.

Department of radiology, medical store, rehabilitation department, DOTS corner, medical record, engineering department, CSSD, oxygen supply department and laundry department did not dispose waste to waste house during the study period. OPD, receptionist department, engineering department, medical record department and DOTS corner are disposed into same waste bin of OPD and emergency according to qualitative data.

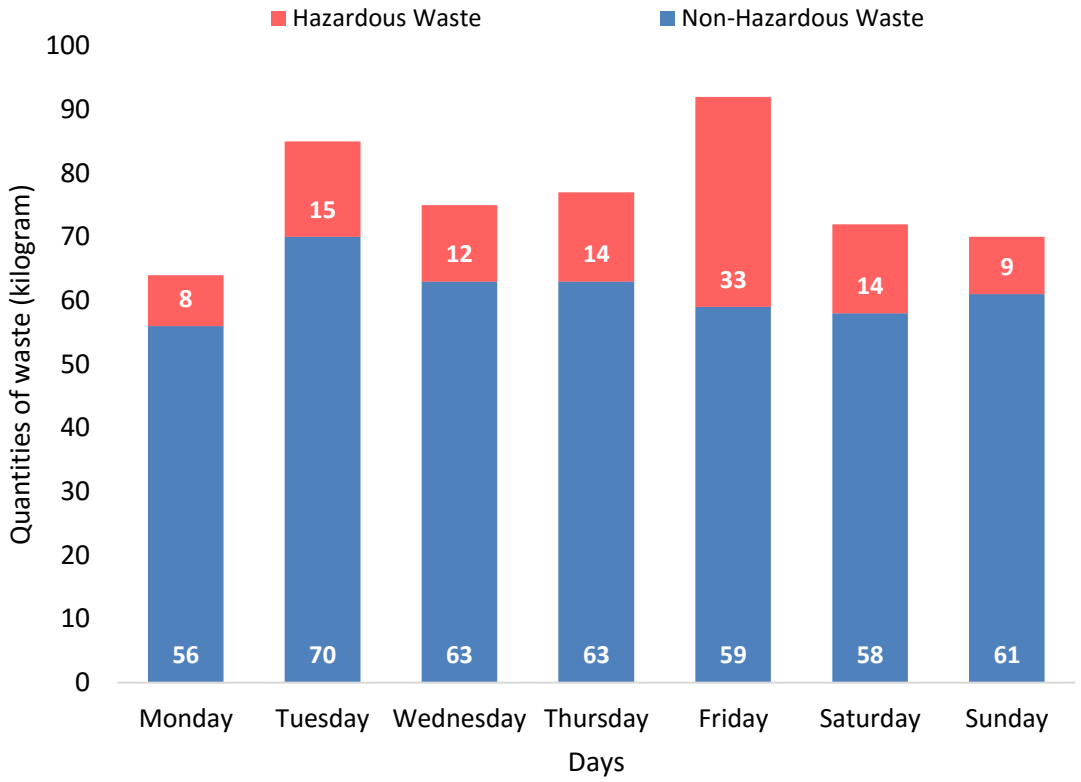

Figure (5.3) Quantities of hazardous and non-hazardous waste generated within seven consecutive days (Kg in weight)

Quantities of wastes produced in studied hospital were measured 7 consecutive days in data collecting period.

General waste and hazardous waste were generated every day at NYGH. General waste was more generated than hazardous waste. For hazardous waste, minimum was at Monday (8 kg) and maximum was at Friday (33 kg). And also, general waste was minimum at Monday (56 kg) and maximum at Tuesday (70 kg).

Table (5.3) Total quantities of hazardous and non-hazardous waste generated according to departments during seven consecutive days from New Yangon General Hospital

Name of departments	Non-hazardous (Kg)	Hazardous (Kg)
OT	56	60
Dep; of pathology	12	33
Male surgical ward	256	29
Female surgical ward	294	28
ICU	46	20
Female medical ward	406	20
PR ward	136	13
Mortuary	7	1
Male medical ward	364	0
Catering service	337	0
Admin Depart:	72	0
OPD and Emergency	61	0
Poison ward	60	0
Transportation service	32	0
Receptionist department	15	0
Radiology department	0	0
Medical store	0	0
Rehabilitation	0	0
DOTS corner	0	0
Medical record	0	0
Engineering	0	0
CSSD	0	0
Oxygen supply department	0	0
Laundry service	0	0
Total	2154	204

It was found that total non-hazardous waste generated was 2154 kg and hazardous waste generated was 204 kg during study period. OT, department of pathology, male surgical unit, female surgical unit, ICU, female medical unit, PR ward and mortuary generated hazardous waste.

Large quantities of 60 kg, 33kg, 29kg, 28kg, 20kg, 20kg, 13kg of hazardous wastes generated from OT, department of pathology, male surgical unit, female surgical

unit, ICU, female medical unit, PR ward and mortuary generated hazardous waste respectively. About 1 kg of hazardous waste was generated only from mortuary. The units except from above have no hazardous waste production. Most of the units have disposal for hazardous wastes and disposal time is routinely and workers transported that wastes twice a day.

After each operation at OT, anatomical parts were needed to dispose, they were collected into polythene bags and sent to NYGH mortuary and then disposed by municipal. Radiology department, medical store, rehabilitation department, DOTS corner, medical record, engineering department, CSSD and laundry service were not disposed waste during the study period.

Table (5.4) Quantities of waste generated according to types of waste from NYGH (200 sanction beds)

Types of waste	Kg/bed/ day
General (Non-hazardous)	1.54
Hazardous	0.15
Total	1.69

General (non-hazardous) waste generated in under studied hospital was 1.54 kg/bed/day. Hazardous waste generated in under study was 0.15 kg/bed/ day.

5.4 Findings from Key Informant Interview

The key informant interview was done to know more information about hospital waste management at New Yangon General Hospital. KII was done with ten participants.

All participants were participating at hospital waste management of New Yangon General Hospital. All participants had more than one year service at the current hospital. Half of participants had training for hospital waste management as a sub-title of hospital infection control program. All participants answered that financial support and facilities were more supply than last two to three years. Hospital waste management team regularly supervised the processes of hospital waste management once a week. All respondents answered that the financial support and facilities should be sustained and need to be enough. Some participants answered that training for all health care provider must be present.

5.4.1 Socio-demographic characteristics of the study population

Table (5.5) Background characteristics of the study population

No	Age (year)	Sex	Education	Designation	Service years in NYGH
1	39	F	HAHM	DMS (I)	1 year 6 month
2	48	F	MSc (Physis)medical lab: techanology	Laboratory officer	5 year
3	52	F	B.A (history), Dip: (Nursing)	Sister	9 year
4	36	F	B. Med (Tech)	Radiographer	13 year
5	53	F	Dip in General Nursing	Sister	10 year
6	49	F	BSc (Botany) Dip: in General Nursing	Sister	21 year
7	48	F	B.A(History) Dip: in General Nursing	Sister	3 year
8	43	F	B.N.Sc (Nursing)	Sister	4 year 7 month
9	52	F	B.N.Sc (Nursing) Dip: in General Nursing	Sister	4 year
10	54	F	BSc (Zoology) B.N.Sc (Nursing)	Sister	7 year

Working experience of the health care providers was less than 15 years (90%) and (10%) of respondents had working experience more than 15 years. For the past history of the receiving training, half of the respondents (50%) give past history of attending training program on hospital waste management.

5.4.2 Knowledge on hospital waste management

Concerning knowledge about the importance of hospital waste management, all respondents answered they have known hospital waste and they also accepted that it is important for health care personals and public. They have known that hazardous hospital waste or transmit the infectious disease and sharp waste or obtain injuries to anyone.

"အန္တရာယ်တွေက အများကြီး ရှိနိုင်တယ်၊ ဟိုအပြင်ကို ထွက်သွားရင် public ကိုလည်း Infection ကူးနိုင်တာပေါ့ ပြီးသွားရင် ကိုယ့်ဝန်ထမ်းတွေ အတွက်လည်း အန္တရာယ် ရှိနိုင်တယ် needle prick ရတာတွေ ရှိနိုင်တယ် ။Radiation ပါတဲ့ waste တွေဆိုလည်း radiation hazard ဖြစ်နိုင်တယ်။"

"There may be many dangers. If the waste spread out of the hospital, infection can be transmitted to public and also harm our health care providers. Needle prick injuries can be occurred. And radiation waste can lead to radiation hazard"

Deputy Medical superintendent I (39years, female, New Yangon General Hospital)

"အန္တရာယ်ရှိတယ်၊ ဘာတွေရှိလဲဆိုရင် ဒီဥစ္စာတွေကို စနစ်တကျ မစွန့်ပစ်ထားဘူးဆိုရင် ဝန်ထမ်းတွေမှာလည်း အန္တရာယ်ရှိတယ်၊ အမှိုက်က အမှိုက်ပုံးကို ရောက်ထားပြီးပြီ ဆိုရင်လည်း အမှိုက်လာသိမ်းသည့် စည်ပင်ဝန်ထမ်းတွေမှာလည်း အန္တရာယ်ရှိတယ် ဒီကပစ္စည်းတွေက အပြင် ဘက်ကိုထွက်သွားမယ်ဆိုရင် ပြည်သူပြည်သားတွေကို အန္တရာယ်ရှိတယ်"

" There will be dangerous. If they are not properly disposed, healthcare provider can be hazardous. And waste from waste bin can also cause danger to municipal worker. If they are disposed in the public area, it can be dangerous to public"

Sister (52, female, New Yangon General Hospital)

"waste အတွက် protocol guideline က သပ်သပ်တော့ မရှိဘူး၊ ဆေးရုံအုပ်ချုပ်မှု လက်စွဲစာအုပ် အဲ့အထဲက အတိုင်း လုပ်တယ်ပေါ့နော် ကျန်တဲ့ဟာကတော့ infection control guideline ပေါ့"

"There is no special guideline for waste control. We have to follow Hospital management manual and practice infection control guideline for other necessary issues"

Deputy Medical superintendent I (39years, female, New Yangon General Hospital)

"Guideline ရယ်လို့ waste management ဆိုပြီး ပေးထားတာတော့ မရှိပါဘူး၊ Hospital waste management committee ရယ်လို့ ဖွဲ့စည်းတယ်၊ control team လေးတော့ ရှိတယ်၊ checklist နဲ့လိုက်ပြီး check လုပ်ပါတယ်။"

" There is no separate guideline for waste management. There is only hospital waste management committee and control teams. The teams make regular check-up according to checklists"

Sister (49, female, New Yangon General Hospital)

5.4.3 Current practice of hospital waste management

According to interviewee, all respondents said they disposed hospital waste from their respective units at least two times a day, at 6:00-7:00 am and at 3:00-4:00 pm daily. At 6:00-7:00 am, only general waste was disposed and at evening, both general and hazardous waste were disposed.

"မနက်တခါ ညတခါ ပစ်ခိုင်းတယ် မနက် ၆ နာရီတခါ ညနေ ၃၊ ၄နာရီခြား တခါပစ် ၆နာရီ ၇နာရီက general waste ပဲ၊ ၃ နာရီ ၄ နာရီက general နဲ့ infection ပေါ့ infection က သိပ်မရှိတော့ တစ်ကြိမ်ပဲ ပစ်ခိုင်းတယ် general waste ကများတော့လေ"

"Waste are disposed a time in the morning and the next time at evening. At 6:00am and at 3:00-4:00 pm, only general waste is disposed at 6:00-7:00 am whereas both General and infectious waste are disposed at 3:00- 4:00 pm. Infectious waste is disposed once a day. General waste is collected too much a day"

Deputy Medical superintendent I (39years, female, New Yangon General Hospital)

" ခွဲစိတ်တဲ့ Caseတခုပြီးတိုင်း တစ်ခါ သိမ်းရတယ်လေ။ ပြီးတော့မှ major operation ကြီး သိမ်းတာကတော့ ဥပမာ များလွန်းအားကြီးရင်တော့ တစ်ခါတည်း

မသိမ်း နိုင်ဘူး၊ တစ်နိုင်တစ်ပိုင်ဆိုရင် soil ကနေ တစ်ခါတည်း ထုတ်သွားတယ်၊ ညနေ ၃ နာရီမှာ တစ်ခါထုတ်ပါတယ်၊ Night သုံးသွားတာတွေကို မနက်မှာ တစ်ခါ ထုတ် တယ်။ နှစ်ခါပေါ့။"

"we collect waste immediately after each case. After last case, final collection of waste is done. For example, we cannot collect in one time if there are too many wastes. If one can remove waste in one time by oneself, waste is disposed through soil corridor. At 3:00 pm, collection is done once at morning, waste generated from night is collected. We did collection of waste two times a day."

Sister (49, female, New Yangon General Hospital)

"ပုံမှန်အမှိုက်တွေကျတော့ အနက်နဲ့ထည့်တယ် syringe, needle တို့ဆိုရင် puncture proof container နဲ့ထည့်တယ် dis-infection တွေကို လုပ်ပြီးမှ ပစ်တယ် slide ကိုကျတော့ ligesol ,5% fenol နဲ့ overnight စိမ်တာ မရှိရင် 0.5% HCL ရှိတယ်၊ အဲ့တာမရှိရင် Bleaching မှာပဲ overnight ထားပြီး နောက်ရက်ကျ ပစ်တယ်၊ အသေးစားလေးတွေပေါ့ Blood issue and blood bank ကထွက်တဲ့ Positive ထွက်တဲ့ဟာတွေကျတော့ autoclave လုပ်ပြီးမှ ပစ်တာပေါ့"

"General waste is disposed in black color bin, syringe and needle are disposed into puncture proof containers after disinfection has been done. Glass slide are treated with ligesol, 5% fenol overnight. If these disinfectants are not available, glass slide are treated 0.5% HCL or bleaching powder are treated overnight and dispose. For blood and blood product which show positive, disposed them only after autoclaving"

Laboratory officer (48, female, Department of pathology and histology)

5.4.4 Facilities support and plan for injuries

With regard to facilities support and plan for injuries, all the participants answered that they used protective equipment such as glove and mask.

"နှစ်စဉ်ကုန်ကျငွေက အရင်တုန်းက သပ်သပ် Budget ချမပေးဘူး Infection control အတွက် ရတာက မနှစ်ကမှ ရတာ ၊ ၂နှစ်ပဲ ရှိသေးတယ် ရတာမှ

Infection control ဆိုတာ တခါတည်း အမှိုက်အိတ်တွေ ဝယ်သုံးတာပေါ့ အရင်က အဲ့အတွက် ချပေးတာမရှိဘူးတဲ့။ မနှစ်ကနဲ့ ဒီနှစ် ရတယ် ။အမှိုက်အိတ်တွေ ဝယ်တယ် ပြီးတော့ Boot စီးဖို့ glove တွေ ဝယ်ပေးတယ်”

“Regarding annual expenses was no budget for waste management. Last years ago, budget for infection control was allotted. With that budget, waste bags were bought in these years. Also boots and glove were bought”

Deputy Medical superintendent I (39years, female, New Yangon General Hospital)

“ဆေးရုံကနေ ထောက်ပံ့ပေးထားတာတွေ ရှိပါတယ်။ လိုအပ်ချက်တော့ အမှိုက်တွေနဲ့ပတ်သက်ပြီးမရှိပါဘူး၊ဟိုအရင်ကတော့ အပ်ချက်တွေရှိပါတယ်။ အခုနောက်ပိုင်း ၂၀၁၈၊ ၂၀၁၉ မှာ လုံးဝ လိုအပ်ချက်မရှိတော့ပါဘူး။”

“There is support from hospital. There is no need for waste management. There had been needs before 2018-2019. After 2018-2019, there is no need “

Sister (52, female, New Yangon General Hospital)

5.4.5 Training and education for hospital waste management

With regard to the training and education for hospital waste management, half of respondents have received at least one-time training for hospital waste management.

“Waste management အတွက်သီးသန့်တော့မဟုတ်ဘူးပေါ့ဆရာရယ်၊ Infection control ခေါင်းစဉ်အောက်မှာ ပါသွားတယ်၊ ကျွန်မတို့ လယ်ဝေးမှာ သွားတက်တော့ နေပြည်တော်မှ ဆရာကြီး တွေ လာသင်ပါတယ်”

“Training for waste management is not done separately. It was taught under the topic of infection control. I attended at Lae-way where the trainers from nay-pyi-daw come and taught lectures”

Sister (54, female, New Yangon General Hospital)

“waste management အတွက်ကတော့ workshop တွေ တက်ဖူးတယ် ဒီဆေးရုံမှာပဲ လေးငါးလလောက် ကြာပြီထင်တယ်၊ ၂ခါ တက်ဖူးပါတယ်၊ ပြည်တွင်းက ဆရာဝန်နှင့် ဆေးရုံအုပ်တို့က ပြောပေးတာပါ။”

“I attended some workshops for waste management at this hospital last four to five months ago. I attended two training courses which taught local doctors and medical superintendent.”

Sister (52, female, New Yangon General Hospital)

5.4.6 Strengths and weaknesses of current hospital waste management practice

The followings are strengths and weaknesses about hospital waste management given by the respondents.

“လိုအပ်တာက သူတို့ကို အန္တရာယ်မဖြစ်အောင်ပစ္စည်းတွေ ထောက်ပံ့ပေးရမယ် plastic bag တွေကလည်း အဓိကအားသာချက်က အခုလောလောဆယ် budget ထောက်ပံ့ပေးနေလို့လေ၊ငွေသာမလိုက်နိုင်ဘူးဆိုရင် ဒီfinancial support မလုပ်နိုင်ရင် ဒီmanagement က ရပ်သွားမယ် ဘယ်လိုမှ လုပ်လို့ရမှာမဟုတ်ဘူး”

“The essential point is to support them the personal protective equipment including plastic bag. The main strength is the supporting budget for hospital waste management. If there will not be financial support, hospital waste management will be stopped and nothing could be carried on.”

Deputy Medical superintendent I (39years, female, New Yangon General Hospital)

“လိုအပ်တာကတော့ Fund တွေ အမှိုက်အိတ်တွေ လုံလုံလောက်လောက် ရချင်တာပေါ့ ခဏခဏ ပစ်ရတာ အရမ်းများရင် အထုပ်ထုပ်ပစ်ရတာ နေ့စဉ် တစ်အိတ်လို့ တွက်လို့မရဘူးလေ”

“The need is to get waste bags and fund enough. It cannot estimate as one bag a day because of too many wastes.”

Laboratory officer (48years, female, Department of pathology and histology)

"အားသာချက်ကလုပ်နိုင်တယ်ပေါ့၊ တော်တော်လေး လုပ်နိုင်ကြတယ်။ အားနည်းချက်ကတော့ရေးထားတဲ့အတိုင်း သေသေချာချာ တိတိကျကျ ထည့်ပေးကြဖို့လေ၊ ထည့်ချင်သလို ထည့်နေတာကတော့ House surgeon တွေ ထည့်နေကြတာ၊ အဲ့ဒီစာရေးထားတာ မြင်ရဲ့သားနဲ့ အနက်ရောင်ပုံးက စားကြွင်းစားကျန်တွေ ထည့်ဖို့ ပေးထားတာ ကျမကြည့်လိုက်တဲ့အချိန်မှာ အပ်လည်းပါတယ်။ စားကြွင်းစားကျန်လည်း ပါတယ်၊ အနက်ရောင်ဆိုတာ General waste ပဲထည့်၊Dangerous ဆိုရင် စက္ကူပုံးမှာ စာရေးပေးထားတဲ့ အတိုင်းထည့်ပါလို့ ပြောရင် လက်ခံတဲ့သူက နည်းတယ်၊"

"Strength is that doing more than before. Weaknesses is that waste need to be disposed exactly into correct bin. House surgeon disposed the waste in mixture. although they see the warning signs, they dispose needle into black color bin. I said that general waste must be disposed into black color bin and dangerous waste must be disposed into dangerous signed bin. But few accept my advice"

Sister (53years, female, New Yangon General Hospital)

"အားနည်းချက်၊ လိုအပ်ချက်၊ အားသာချက်တွေက နေရာတိုင်းမှာ ရှိနိုင်ပါတယ်။ အခုအခါ မှာ ပံ့ပိုးမှုတွေ၊ နည်းပညာတွေ ပြည့်စုံသွားပြီလို့ ပြောလို့ရပေမယ့် တချို့တွေက စည်းကမ်းမရှိတဲ့ သူတွေရှိတယ်၊ အားနည်းချက်တွေက ဒီစည်းကမ်းကို မလိုက်နာဘူး တွေ့တဲ့နေရာမှာပဲ ထည့်တယ်၊ အဲ့လိုမျိုးတွေလုပ်တဲ့ ဝန်ထမ်းတွေရှိတယ်၊"

"Weakness and strength co-exist everywhere. Today there are enough technical and financial support. But Some do not obey guideline. The weak point is that some health workers are disobedient and dispose waste anywhere"

Sister (52, female, New Yangon General Hospital)

5.4.7 Suggestions to improve the current hospital waste management

Concerning the suggestions to improve the current hospital waste management, most of respondents suggested that strengthening the current hospital waste

management system by adequate resources and facilities, training to health care providers are the key factors for the better implementation for hospital waste management.

> “management ကအရေးကြီးတယ်။ အုပ်ချုပ်မှုအရေးပိုင်းက မကြည့်နိုင်ရင် ဒါကြီးက ပရမ်းပတာ ဖြစ်နေမယ်။ အပေါ်က တခုတည်းမဟုတ်ဘူး၊ ward ထဲကလည်း management လုပ်ရမှာပေါ့ ၊ အဆင့်ဆင့် sister မှတဆင့် worker တွေ၊ patient တွေ patient attendance တွေ ပါရမယ်”
>
> *“Management is important. Function will not work properly when administration do not supervise. It is needed to be managed by participation of the ward, sister, worker, patient and their attendants”*

Deputy Medical superintendent I (39years, female, New Yangon General Hospital)

> “အပေါ်ပိုင်းက support လုပ်ပေးမယ် overall supervision လုပ်ပေးတာပဲရမယ်။ အောက်ကနေ တိုက်ရိုက် management ကတော့ ward ထဲက sister တွေက လုပ်ရမယ်။ ward sister တွေက အနီးကပ်ကြည့်ရမယ်။ House surgeon ကိုတော့ ward in-charge တွေက ကြည့်ရမယ်။အဆင့်ဆင့် supervision လုပ်ရမှာ ဖြစ်တယ်။ အားလုံးပေါင်းပြီးမှ လုပ်မှသာ အဆင်ပြေမှာပါ ။ ပြီးရင် အပေါ်က ဝန်ကြီးဌာန ကုသရေးကလည်း financial support ပေးရမယ်။ ပြီးရင် နည်းပညာ အသစ်တွေ ထွက်လာတဲ့ ဟာမျိုးကို training များများပေး နိုင်ရင် ပိုပြီးလုပ်နိုင်တာပေါ့။”
>
> *“Hospital administration will give support and over all supervision. Direct supervision in ward must be done by sister. And House surgeon need to be supervised by ward-in-charge. When all level unite together, hospital waste management will be improved. And then Ministry of Health and Sports especially department of medical care shall provide financial support and more training which include new advance techniques”*

Deputy Medical superintendent I (39years, female, New Yangon General Hospital)

“ပစ္စည်းတွေ အမှိုက်တွေ Hospital waste တွေ ၂ခုလုံးအတွက် ဆိုရင် သန့်ရှင်းရေးသုံး ပစ္စည်းတွေကို လုံလုံလောက်လောက်ထုတ်ပေးဖို့လိုတယ် အမြဲတမ်းလည်းရချင်တယ် အခုကတော့ ရနေတယ် နောက်ကျတော့ မရတာ မရှိစေချင်ဘူး အဲ့လိုပြတ်သွားရင် ကျမတို့ ဘက်က အခက်အခဲရှိတယ်”

“I want to get budget and facilities for hospital waste management forever. All are supplied nowadays, and lack of supply should not happen in future. If lack of supply occurs, we can meet with difficulty”

Sister (52, female, New Yangon General Hospital)

“တကယ်စီမံခန့်ခွဲရတဲ့ sister ကြီးတွေ Blue staff တွေပြီးတော့၊ ကိုင်တွယ်ရတဲ့ General worker တွေက အဲ့ knowledge အပြည့် ရှိသင့်ပါတယ်။”

“At the real management field, all sister, all staff nurses and general workers who are handling waste must have good knowledge of hospital waste management”

Radiographer (36, female, Department of radiology)

CHAPTER (6)
DISCUSSION

A cross sectional descriptive study was conducted to assess the current situation of hospital waste management in all 24 departments of NYGH.

Medical department, surgical department, operation theater, radiology department, medical store and laboratory are key areas due to nature of their work. There are no nuclear medicine department in NYGH.

6.1 Waste categories

All departments in the studied hospital produced general wastes mostly. Sharps and infectious waste were produced more less than general waste.

6.2 Hospital waste management methods

6.2.1 Segregation

All departments under current study, separate their waste into one category only. Comparing with the other hospital based study of Myint-Thein-Htun, all department separated into more than one category (i.e. they used partial segregation) because all the staff were not aware of potential danger of hazardous hospital waste (Myint-Thein-Thun, 2003). In another hospital-based study of Zin -Zin- Wai- Min, all departments separate their waste into one category (Zin-Zin-Wai-Min, 2017).

In a study of in 1300 bedded Government College and hospital and 50 bedded private hospital of a south Indian city, it was found that waste segregation was not proper (Rao,2009). In another study in 1800 bedded tertiary care hospital in Mumbai, it was found that waste segregation was less than satisfactory in 40.3% of areas with continuous monitoring and informal counseling of health care waste managements (Nataraj et al.,2008).

It is main point that wastes are segregated prior to treatment and disposal whatever the final strategy for treatment disposal of waste is selected.

6.2.2 Identification

All department under studied hospital used plastic bin with lid and plastic bags for collection of general wastes and infectious waste. Color coding system is followed the Hospital Management Manual.

Appropriate containers were placed in all departments where particular categories of waste may be generated at all department of NYGH. Suitable containers and bags should be made of combustible, non-halogenated plastic.

Color coding or any other coding system was not used for collection of hospital waste in Defense Service Orthopedic hospital (Myint-Thein-Thun, 2003). It may be due to time gaps, and also different ministry. The situations may change nowadays.

In another hospital based study of Zin -Zin- Wai- Min at YGH, all selected units of studied hospital used plastic bin without lid for the collection of general waste. Color coding system for plastic bags were standard color-coding system, as red for sharps, yellow for infectious and black for general waste. Sharp wastes were collected with used drinking water bottle (5L amount) mostly. Although the respondents answered that sharp waste was collected with red color, actually they used vacant water bottles for sharp waste collection (Zin-Zin-Wai-Min, 2017). In current study, sharp wastes were collected with yellow color punctured proof box which is supplied sufficiently. Actually, containers for sharp waste should be punctures proof and fitted with cover. They should be rigid and impermeable so that they safety retain not only sharps but also any residual liquids from syringes.

6.2.3 Waste handling

In current study, internal transport of waste from all departments was plastic bags, second card and third plastic bins. Waste handlers used bin without lid for carriage. Hospital waste from all department was transported to final disposal two times a day for general waste and one time per day for hazardous waste.

The storage area for waste should be appropriate labeled with warning signs and should have restricted access limited to workers only. In developed countries, waste is segregated at source and stored temporally in properly labeled store rooms. There exist legal provisions for site decontamination and spillage control (Townend et al., 2009). In most of other cases, hospitals lack properly labeled waste containers and store rooms (Yong et al., 2009).

Some hospitals lack internal storage areas (Al-Khatib, 2015)and waste is stored in open dumps or fallow lands in the vicinity of the hospital (Manga, 2011). In some instances, the containers are without lids and are not emptied until they are completely full which can result in onsite waste spillage (Longe, 2006).

In studied hospital, waste from point of generation, collection, storage in all departments in or around open dumps was deposited within hospital premise. It was away from wards but it was near food preparation areas (shops) and has general workers to monitor and help the waste collection. There are two separated one-story building houses, one for hazardous waste and next for the non-hazardous waste. One worker has assigned to watch, count and weigh all generated hazardous and general waste.

In current study, all wastes were collected in clean storage area behind the hospital. These wastes were covered by building and so it was suitable for aesthetic aspect. Hospital waste transported outside from disposal site was collected by municipally daily. Regarding the result of another studied hospital was done at YGH (Zin-Zin-Wai-Min, 2017), all wastes from YGH were collected with bigger plastic municipal bins at the two corners of the hospital. These wastes were not covered by lids and so it was unsuitable for aesthetic aspect.

6.2.4 Waste treatment

There was incinerator but not well functioning in the current study. Infectious waste (such as pathological wastes from studied hospital) were disposed in mortuary of hospital and then transported by municipal. Sharp wastes were also disposed by municipal. It is also similar with the study done at Yangon General Hospital (Zin-Zin-Wai-Min, 2017).

In laboratory of current study, pathological wastes were treated with autoclave first and then disposed to mortuary.

6.2.5 Waste disposal

In the current study, final disposal method was found by municipally according to observational check lists and qualitative finding. All sharp and infectious wastes have disposed by municipally.

In some cases, waste disposal is considered to be the responsibility of the municipality (Farzadkia et al., 2009). In the another study of biomedical waste treatment at some selected hospitals in Bayelsa state, South-South, Nigeria, the

municipal dumping site along Tombia-Amassoma road revealed nothing more than open dumping and burning of these wastes, without considering the health implications of their actions (Yelebe et al., 2015). If a municipality or medical authority lack of facility to treat waste before disposal, land fill method has to be regarded as an acceptable disposal route. The primary objection to landfill disposal of hazardous hospital waste may be cultural or religious or base on a perceived risk of the release of pathogen to air and water.

6.3 Requirement of support for the facilities

According to the results in this study, the most type of requirement of support for facilities was plastic bags for proper color-coding system. Although containers were enough to categorize systematically, respondents tried to categorize with colored plastic bags for standardized color-coding system. Adequate provision of materials for waste disposal ensures proper segregation, handling and disposal of waste because it helps to reduce the incidence of nosocomial infections in the hospitals.

6.4 Personal protective equipment and injuries

In the current study, majority of the department answered that they always wore the personal protective equipment especially glove and mask. It was also found that latex gloves and masks were supplied adequately to all departments of the hospital. In a study done at Yangon General Hospital on hospital waste management, all of the respondents answered that they always wore the personal protective equipment especially glove and mask. It was also found that latex gloves and masks were supplied adequately to all units of the hospital (Zin-Zin-Wai-Min, 2017).

In the another study done at tertiary care governmental hospital of Nepal on impact of intervention on health care waste management practices, it was found full set of personal protective equipment, with glove, mask, shoes and apron was provided to the waste handlers (Sapkota, Gupta and Mainali, 2014). Because lack of inefficient PPE, knowledge regarding correct usage and benefits of using PPE, might exposes them to infections and benefits of using PPE, might exposes them to infections and injuries (World Health Organization (WHO)- Europe, 2007).

6.5 Training and health education on hospital waste Management

Regarding the hospital waste management training at current study, all respondents (50%) had no specific training on hospital waste management. This percentage was different with the other study done at Yangon General Hospital, in which the all staff of that study also had no specific training on hospital waste management (Zin-Zin-Wai-Min, 2017). In the previous study done at North Okkalapa General Hospital, (5.4%) of health care providers had received training on hospital waste management (Kaung-Myat-Wyuun, 2015).

Health education and training programs on hospital waste are needed for all healthcare staff including general workers.

6.6 Committee, guidelines and policy for hospital waste management

It was found that hospital waste management policy and committee in the current study. Hospital waste management team had developed in the current study, chaired by deputy medical superintendent, all in charges of clinical wards and in charge of nursing services as team members. Although the manual guidelines for hospital waste management were allocated to all departments of hospital, guideline for hospital waste management was placed at the wall near the waste disposal areas. In the study of carried by (Zin-Zin-Wai-Min, 2017), hospital waste management policy and committee were found. In the other studies carried by (Myint-Thein-Thun, 2003) and (Win-Win-Myint, 1996), policy and committee were not found. It may be due to time gaps and nowadays there may be present. In another study conducted in selected hospital of Yenagoa, South-south of Nigeria, it was observed that majority of the hospitals investigated had no hospital waste management committees or plans (Zekieni R.Yelebe, Revelation J.Samuel, 2015).

Another study done at tertiary care governmental hospital at Nepal showed that the hospital did not have hospital waste management committee, policy, standard guideline procedures and proper color coding system for waste segregation, collection, transportation and storage as well as the specific well–trained waste handlers(Sapkota, Gupta and Mainali, 2014).

6.7 Quantification of waste

Quantities of general (non-hazardous) wastes were produced 2154 kg (307.7 kg/day) from all departments in seven consecutive days of measuring the wastes.

Female medical, male medical, catering service, female surgical, male surgical, PR and administrative department produced large quantities of wastes as 58.00 kg/day, 52.00 kg/day, 48.14 kg/day, 42.00 kg/day, 36.57 kg/day, 19.43 kg/day and 10.29kg/day respectively. There was no record from radiology department, medical store, rehabilitation department, DOTS corner, medical record department, engineering department, CSSD, Oxygen supply department and Laundry service.

Both medical wards produced the largest quantities of non-hazardous waste. Medical department produced large quantities because it depends on nature of chronic and prolong admitted patients.

Quantities of hazardous waste was produced 204 kg (29.14 kg/day) from all departments of NYGH. Large quantities 8.57 kg/day,4.71 kg/day,4.14 kg/day and 4.00 kg/day of hazardous wastes generated from OT, department of pathology and histology, male surgical ward and female surgical. Small quantities of hazardous waste 2.86 kg/day, 2.86 kg/day, 1.86 kg/day and 0.14 kg/day was produced from ICU, female medical ward, PR ward and mortuary.

Hospital waste generation is greater in developed countries as compared to the developing countries. High income countries generate on average up to 0.5 kg /bed/day of hazardous waste and low income countries generate on average 0.2kg/bed/day (WHO, 2011).

The American Hospital Association indicates that hazardous waste category should not be any more than 15% of the total hospital waste stream, and a number of U.S. Hospital has implemented good segregation programs that reduced this portion of waste stream to less than 6% (Smith et al., 2001).

Based on observations at a number of health care facilities in Non-US countries is evident that the average hospital waste stream may contain less than 10% of material that could be considered "potentially infectious waste " if properly segregated. Depending on local conditions and definitions, this could vary between 5-25 % (Callaghan, 2003). In the study of Myint-Thein-Thun at 2003, general waste was generated 707.9 kg/day (95 %of all wastes) and hazardous waste generated 34.45 k/day (5 % of all wastes). General (non-hazardous waste) was overloaded due to less compliance of patient and attendants' waste disposal and overcrowded population of admitted patients and their attendants (Myint-Thein-Thun, 2003). In the study of Yangon General Hospital, total solid waste generation was 742.35kg/day of general

waste 0.77kg/bed/day and hazardous waste 0.032 kg/bed/day. The average biomedical solid waste generation rate was 0.8 kg/bed/day (Zin-Zin-Wai-Min, 2017).

In the present study, total solid waste generation was 307.71 kg/day of general waste 1.54 kg/bed/day and hazardous waste 0.15 kg/bed/day. The average biomedical solid waste generation rate was 1.69 kg/bed/day in this study. In the study at Yangon General Hospital, total solid waste generation was 742.35 kg/day of general waste 0.77kg/bed/day and hazardous waste 0.032 kg/bed/day. The average biomedical solid waste generation rate was 0.8 kg/bed/day (Zin-Zin-Wai-Min, 2017). This percentage was relatively low compared with the 2kg/bed/day for similar hospitals in Mauritius (Bokhoree et al., 2014). A study hospital from Bangladesh generated 1.28kg/bed/day of solid waste (Ali M, Wang W, Chaudhry N, 2017). Another study hospital in Iran generated that 3.79kg/bed/day of solid waste(Hadipour et al., 2014). The average biomedical solid waste generation rate of current study was high relative to 0.18 kg for similar hospitals in Nigeria (Zekieni R.Yelebe, Revelation J.Samuel, 2015).

The amount of waste generated depends on factors such as hospital waste management techniques, the type of healthcare specializations, the quantities of reusable equipment available in the hospital and the number of patients treated daily.

According to national income level, annual waste generation of all health care waste from high income countries was 1.1 to 12.0 kg/head of population. Hazardous health care waste from those high-income countries was 0.4 to 5.5 kg/head of population. All health care waste (0.8 to 6.0 kg/head of population) and hazardous health care waste (0.3 to 0.4 kg/head of population) were generated from middle income countries. Low income countries produced 0.5 to 3.0 kg/head of population of all health care wastes (Press, 1998).

CHAPTER (7)
CONCLUSION

Health care waste is dangerous and harmful not only to health care worker but also to the community if they are not properly and systematically managed by health care workers. Hospital waste management become more important program because it is a initiator for potential health threats and damage to the environment. Proper management of medical waste may be benefit to the health personals, patients and environment. Improper methods of hospital waste management may lead to destruction of the natural environment and distortion in the balance of the ecological system. This study explored the current situation of the hospital waste management at all departments of New Yangon General Hospital.

In this study, all categories of wastes except from radiation hazardous waste are produced in all department of hospital. There was proper segregation of waste and standard color coding system is fair in general waste collection because of getting more financial supports from Ministry of Health and Sport. The main problem in studied hospital is the lack of temporary storage area in wards and lack of measuring and quantifying the amount of hospital waste generated in each department of hospital. Hospital administration's (including hospital infection control and hospital waste management) supervision, monitoring and standardizing the waste generation, quantification process is the essential in hospital waste management.

Regarding to the finding, there are instructions and clearly defined procedures at the waste disposal bin and areas. The current status of health care workers on health care waste management in this study can support hospital authorities to develop the standard operational procedure and guidelines for uplifting this situation in future, including plans for better training program, supporting money, materials and manpower for health care waste disposal and supervision and monitoring of health care waste management systems in the study hospital. Finally, all including line workers and staff, patients and patients' attendants need to follow the instruction and principle of hospital infection control guideline containing hospital waste management.

CHAPTER (8)
RECOMMENDATIONS

Regarding the study of hospital waste management at all department of New Yangon General Hospital, following recommendations are suggested.

1. All health care providers (including general workers) who involved in hospital waste management should be given technical training to ensure the standard guidelines, about the risk to their health and public and to know the classification of various types of wastes, handling, transport and treatment, disposal methods.
2. The support of financial, technical and equipment needs to be sustained.
3. The authorized person needs to estimate the future and current consumption of finance, equipment for hospital waste management regularly.
4. Health education on awareness of hospital wastes disposal should be improved among patient's attendants and patients.
5. Ministry of Health and Sport must support to strengthen proper hospital waste management guideline.

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ANNEXES

Annex (1) Variables and Operational Definition

No	Variable	Operational definition	Measurement
1	Health care worker	Working staff in health care services including doctors, nurses, other workers	Nominal
2	Hospital waste	All wastes coming out of hospital	Nominal
3	Hospital waste management	All the activities, administrative and operational, involved in the handling, treatment, conditioning, storage, transportation and disposal of wastes (including transportation)	Nominal
4	General or non-hazardous waste	Minimal or no risk to human health as it is largely composed of the domestic or household type of waste	Nominal
5	Hazardous waste	Unique form of solid and liquid waste generated in the diagnoses, treatment, prevention of research of human disease	Nominal
6	Sharps	Any item that could cause a cut or puncture	Nominal
7	Infectious waste	Contain pathogen in sufficient concentration or quantity that exposure to it could cause disease	Nominal
8	Pathological waste	Tissues, organs, body parts, human fetuses and animal	Nominal

		carcasses, most blood and body fluids	
9	Chemical waste	May be hazardous, toxic, corrosive, flammable, reactive, genotoxic, cytotoxic or non-hazardous from diagnostic and experimental work and cleaning household and disinfection procedure	Nominal
10	Pharmaceutical waste	Outdated medications, residuals of drugs and in chemotherapy	Nominal
11	Segregation	Separation of difference types od wastes by sorting	Nominal
12	Color coding	Designates the use of different colors for the storage of various categories of hospital wastes	Nominal
13	Storage	The placement of in a suitable location where isolation, environmental and health protection and human control (e.g. radiation control, limitation of access) are provided.	Nominal
14	Handling	The functions associated with the movement of waste materials	Nominal
15	Treatment	Any method, technique or process for altering the biological, chemical or physical characteristics of waste to reduce the hazardous it presents and facilitate or reduce the costs of, disposal	Nominal

16	Disposal	Intentional burial, deposit, discharge, dumping, placing or release of any waste materials into or any air, land or water	Nominal
17	Incineration	The controlled burning of solid, liquid or gaseous combustible waste to produce gaseous and residues containing little or no combustible materials	Nominal
18	Open dumps	Characterized by the uncontrolled and scattered deposit of wastes	Nominal
19	Recycling	A term embracing the recovery and reuse of scrap or waste material for manufacturing or others purposes	Nominal

Annex (2) Informed Consent Forms (Myanmar and English)

သုတေသနလုပ်ငန်းတွင် ဆောင်ရွက်ရန် သဘောတူညီချက် တောင်းခံခြင်း

ဤသဘောတူညီချက်ပုံစံသည် ရန်ကုန်ပြည်သူ့ဆေးရုံသစ်ကြီးရှိကျန်းမာရေးစောင့်ရှောက်မှု လုပ်ငန်းများမှ ထွက်ရှိသော စွန့်ပစ်ပစ္စည်းများအား စီမံခန့်ခွဲမှုကို လေ့လာသုံးသပ်သော သုတေသနပြုလုပ်ရာတွင် ပါဝင်ရန် ဖိတ်ခေါ်ခြင်းဖြစ်ပါသည်။

အဓိကသုတေသီ -ဒေါက်တာကျော်မောင်

အဖွဲ့အစည်း -ပြည်သူ့ကျန်းမာရေးတက္ကသိုလ်၊ ရန်ကုန်။

သုတေသနခေါင်းစဉ် -ရန်ကုန်ပြည်သူ့ဆေးရုံသစ်ကြီးရှိ ကျန်းမာရေး စောင့်ရှောက်မှု လုပ်ငန်းများမှထွက်ရှိသော စွန့်ပစ်ပစ္စည်းများအားစီမံခန့်ခွဲမှုကို လေ့လာသုံးသပ်သောသုတေသန။

အပိုင်း (က) သုတေသနဆိုရာအချက်အလက်များ

(၁) မိတ်ဆက်

ကျွန်တော်သည် ပြည်သူ့ကျန်းမာရေးတက္ကသိုလ်တွင် ဆေးပညာမဟာသိပ္ပံဘွဲ့ (ဆေးရုံအုပ်ချုပ်ရေးပညာ) တက်ရောက်သင်ကြားနေသောဒေါက်တာကျော်မောင် ဖြစ်ပါသည်။ ကျွန်တော်သည် ဆေးရုံကြီးရှိကျန်းမာရေးစောင့်ရှောက်မှု လုပ်ငန်းများမှ ထွက်သော စွန့်ပစ်ပစ္စည်းများအားစီမံခန့်ခွဲမှုကို လေ့လာသုံးသပ်သော သုတေသနကိုလုပ်ဆောင်နေပါသည်။ သင့်ကိုဤသုတေသနဆိုင်ရာ အချက်အလက်များကို ရှင်းလင်းပြပြီး၊ ဤသုတေသနလုပ်ငန်း တွင် ပါဝင်ရန်ဖိတ်ခေါ်မည်ဖြစ်ပါသည်။ သင့်အနေဖြင့် ဤသုတေသနလုပ်ငန်းတွင် ပါဝင်ရန်ကို ချက်ချင်းဆုံးဖြတ်ရန်မလိုပါ။

သင်မဆုံးဖြတ်မီသင်ဆွေးနွေးလိုသူ တစ်ဦးဦးနှင့်လည်း ဆွေးနွေးဆုံးဖြတ်ရန်မလိုပါ။ သင်မဆုံးဖြတ်မီ သင်ဆွေးနွေးလိုသူတစ်ဦးဦးနှင့်လည်း ဆွေးနွေးနိုင်ပါသည်။ ယခု သဘော တူညီချက်ပုံစံတွင် သင်နားမလည်သောစကားလုံးများ ပါဝင်နိုင်ပါသည်။ မရှင်းလင်းသည် များကိုမေးမြန်းလိုပါက ကျွန်တော်ပြောပြနေစဉ်အတွင်း ကြားဖြတ်၍ မေးမြန်းနိုင်ပါသည်။ ကျွန်တော်ကလည်းအချိန်ယူ၍ ပြန်လည်ရှင်းပြပါမည်။

၂။ ရည်ရွယ်ချက်

ဤသုတေသနရည်ရွယ်ချက်မှာ ရန်ကုန်ပြည်သူ့ဆေးရုံသစ်ကြီးတွင် တာဝန်ထမ်းဆောင်နေသော ကျန်းမာရေးဝန်ဆောင်မှုပေးသူများ ကျန်းမာရေးစောင့်ရှောက်မှု လုပ်ငန်း များမှ ထွက်သောစွန့်ပစ်ပစ္စည်းများအား စီမံခန့်ခွဲမှုကို လေ့လာရန်ဖြစ်ပါသည်။ ဤသုတေသန ရလဒ်များမှတစ်ဆင့် ကျန်းမာရေးလုပ်သားများအားလိုအပ်သော ကျန်းမာရေးဆိုင်ရာ စောင့်ရှောက်မှုလုပ်ငန်းများမှ ထွက်ရှိသောစွန့်ပစ်အညစ်အကြေးများထိန်းသိမ်းရေးနှင့် ပညာပေးလုပ်ငန်းများကိုဆောင်ရွက်ရာတွင် အထောက်အကူပေးနိုင်မည်ဖြစ်ပါသည်။

၃။ သုတေသနဆောင်ရွက်ပုံအမျိုးအစား

ဤသုတေသနတွင် သင်၏ကိုယ်ရေးအချက်အလက်များ၊ ကျန်းမာရေး၊ စောင့်ရှောက်မှု လုပ်ငန်းများမှ ထွက်သောစွန့်ပစ်ပစ္စည်းများအား စီမံခန့်ခွဲမှုနှင့် လက်တွေ့ကျင့်သုံးမှုများနှင့် ပတ်သက်သည့် အချက်အလက်များကို မေးခွန်းလွှာပုံစံဖြင့် နာရီဝက်ခန့် မေးမြန်းမည် ဖြစ်ပါ သည်။

၄။ သုတေသနတွင် ပါဝင်သူအဖြစ် ရွေးချယ်ခြင်း

သင့်ကိုဤသုတေသနလုပ်ငန်းတွင် ပါဝင်ရန်ဖိတ်ခေါ်ရခြင်းမှာ သင်၏ အတွေ့အကြုံများသည် ကျန်းမာရေးစောင့်ရှောက်မှု လုပ်ငန်းများမှ ထွက်သော စွန့်ပစ်ပစ္စည်းများအား စီမံခန့်ခွဲမှုနှင့် ပတ်သက်သောအသိပညာ၊ ဗဟုသုတ၊ လက်တွေ့ကျင့်သုံးမှုများကို လေ့လာရာတွင် ကောင်းမွန်စွာအထောက်အကူပြုနိုင်သည်ဟုယူဆ၍ ဖြစ်သည်။

၅။ ဆန္ဒအလျောက် သုတေသနတွင် ပါဝင်ခြင်း

သုတေသနတွင် ပါဝင်ရန်ဆုံးဖြတ်ရန်မှာ သင့်ဆန္ဒအလျောက်သာ ဖြစ်ပါသည်။ အကယ်၍ သင်သဘောမတူပါကလည်း သင့်ကိုမည်သို့မျှ ထိခိုက်စေမည်မဟုတ်ပါ။ သင့် အနေဖြင့် ဤသုတေသနတွင် ပါဝင်နေစဉ်အတွင်းတွင်လည်း ဆန္ဒမရှိလျှင် ပါဝင်ခြင်းမှ ရပ်စဲနိုင်ပါသည်။

၆။ ဆောင်ရွက်မည့်လုပ်ငန်းများ

ဤသုတေသနတွင် ပါဝင်ရန် ကျွန်ုပ်အနေဖြင့် သင့်အားဖိတ်ခေါ်လိုက်ပါသည်။ သင့် အနေဖြင့် ဖိတ်ကြားချက်ကိုလက်ခံပါက သင့်အားတွေ့ဆုံမေးမြန်းပါမည်။ ကျွန်ုပ်အနေဖြင့်

ကျန်းမာရေးစောင့်ရှောက်မှု လုပ်ငန်းများမှ ထွက်သော စွန့်ပစ်ပစ္စည်းများအား စီမံခန့်ခွဲမှုနှင့် ပတ်သက်သောအသိပညာ၊ ဗဟုသုတ၊ လက်တွေ့ခံယူကျင့်သုံးမှုများက ဤဆွေးနွေးမှုကို ကောင်းမွန်စွာအထောက်အကူပြုနိုင်မည်ဟုယုံကြည်၍ သင့်အားတစ်ဦးချင်းမေးမြန်းခြင်းတွင် ဖြေဆိုပေးပါရန် ဖိတ်ခေါ်ရခြင်းဖြစ်ပါသည်။ မဖြေဆိုလိုသောမေးခွန်းများပါရှိခဲ့လျှင် မဖြေဆိုဘဲ နောက်မေးခွန်းတစ်ခုသို့ ကျော်သွားနိုင်ပါသည်။ သုတေသနအချက်အလက်များကို လုံခြုံစွာ သိမ်းဆည်းထားမည် ဖြစ်ပြီး ကျွန်တော်မှအပအခြားသူများမသိရှိစေရပါ။

၇။ ဆိုးကျိုးဖြစ်စေခြင်း

မေးခွန်းများဖြေဆိုရာတွင် သင့်အနေဖြင့် လျှို့ဝှက်စွာထားလိုသောအကြောင်း အချက်အလက်များ အခါအားလျော်စွာပါရှိပါသည်။ သင့်အတွက်ဖြေဆိုရန် အခက်အခဲရှိသော အကြောင်းအရာများလည်း ပါဝင်နိုင်ပါသည်။ သို့သော် ကျွန်ုပ်တို့အနေဖြင့် သင့်အတွက် အခက်အခဲဖြစ်စေရန် မရည်ရွယ်ပါ။ သင့်အနေဖြင့် ဖြေဆိုရန် အခက်အခဲရှိပါက (သို့) မေးခွန်းများသည် ပုဂ္ဂိုလ်ရေးဆန် လွန်းပါကဤမေးခွန်းများကိုဖြေဆိုရန်မလိုပါ။

၈။ အကျိုးကျေးဇူး

ဤသုတေသနတွင် ပါဝင်ခြင်းဖြင့် သင့်အတွက် တိုက်ရိုက်အကျိုးကျေးဇူးမရှိနိုင်ပါ။ သို့သော် သင့်ပါဝင်မှုသည်၊ ကျန်းမာရေးစောင့်ရှောက်မှု လုပ်ငန်းများမှ ထွက်သော စွန့်ပစ်ပစ္စည်းများအားစီမံခန့်ခွဲမှုနှင့် ပတ်သက်သောအလေ့အကျင့်များကို ဆောင်ရွက်ရာတွင် အထောက်အကူ ဖြစ်စေပါသည်။

၉။ ကျေးဇူးတုန့်ပြန်မှု

သုတေသနလုပ်ငန်းတွင် သင်အချိန်ပေးပြောကြားမှုကိုအသိအမှတ်ပြုပါသည်။ သင့်ပူးပေါင်းပါဝင်မှုအတွက် ငွေသား (သို့) ပစ္စည်းများကို ကျေးဇူးတုန့်ပြန်မှုအနေဖြင့် ပေးအပ်မည် မဟုတ်ပါ။

၁၀။ လျှို့ဝှက်ခြင်း

သုတေသနဆောင်ရွက်ခြင်းကိုအခြားသူများကဂရုပြုမိပါလိမ့်မည်။ ဤသုသေတနတွင် သင်ပါဝင်ခြင်းကိုလည်း မေးမြန်းကြပါလိမ့်မည်။ သင့်အကြောင်းကို လျှို့ဝှက်ထားမည် ဖြစ်ပါ သည်။ အကြောင်းအရာ အချက်အလက်များကို သင့်အမည်ဖြင့် မမှတ်ဘဲ၊ ဂဏန်းအမှတ် အသားဖြင့်သာ

မှတ်ပါမည်။ ၎င်းဂဏန်းအမှတ်ကိုလည်း ကျွန်တော်ကသာ သိမှာဖြစ်ပြီး အကြောင်းအရာများကို လုံခြုံစွာသိမ်းဆည်းထားမှာ ဖြစ်ပါသည်။

၁၁။ သုတေသနရလဒ်များကို ဖြန့်ဝေခြင်း

ဤသုတေသနမှ ရလဒ်များကိုအခြားသူများအားမသိရှိစေမီသင့်အားသိရှိစေမည်ဖြစ် ပါသည်။ ၎င်းနောက် အခြားစိတ်ဝင်စားသူများ လေ့လာနိုင်ရန် စာတမ်းပြုစုထုတ်ဝေပါမည်။

၁၂။ သုတေသနတွင် ပါဝင်ရန် ငြင်းဆန်နုတ်ထွက်ခွင့်

သင့်ဆန္ဒမရှိပါကဤသုတေသနတွင် ပါဝင်ရန် ငြင်းဆိုနိုင်ပါသည်။ သင့်ကိုမည်သို့မျှ မထိခိုက်စေပါ။ ပါဝင်ပြီးမှ နှုတ်ထွက်လိုလျှင်လည်းအချိန်မရွေး နှုတ်ထွက်နိုင်ပါသည်။ သင့်ကို မည်သို့မျှ ထိခိုက်စေမည် မဟုတ်ပါ။

၁၃။ ဆက်သွယ်ရန်

သင့်အနေဖြင့် ဤသုတေသနနှင့် ပတ်သက်၍ နောင်ဖြစ်စေမေးမြန်းနိုင်ပါသည်။ အကယ်၍နောင်မှ မေးမြန်းလိုပါလျှင် မေးမြန်းရန်ရှိပါကကျွန်တော်ကိုယခုဖြစ်စေ၊ ဒေါက်တာ ကျော်မောင်၊ပြည်သူ့ကျန်းမာရေးတက္ကသိုလ်၊ ဆေးပညာမဟာသိပ္ပံဘွဲ့ (ဆေးရုံအုပ်ချုပ်မှု ပညာ) သင်တန်းသားဖုန်း- ၀၉ ၂၀၃၇၄၄၀ သို့ ဆက်သွယ်မေးမြန်းနိုင်ပါသည်။ ဤသုတေသန အဆိုပြုလွှာကို ပြည်သူ့ကျန်းမာရေးတက္ကသိုလ်၏ လူပုဂ္ဂိုလ်များအပေါ် သုတေသနပြုခြင်းဆိုင်ရာဘုတ်အဖွဲ့မှ ခွင့်ပြုချက်ရယူပြီးဖြစ်ပါသည်။ အကယ်၍ သင့်အနေဖြင့် မေးခွန်းမေးစရာ ရှိပါကလူပုဂ္ဂိုလ်များအပေါ် သုတေသနပြုခြင်းနှင့် ဖြစ်နိုင်သည့် အန္တရာယ်ကို ကာကွယ် ပေးရန်ဖွဲ့စည်းထားသည့် ပြည်သူ့ကျန်းမာရေးတက္ကသိုလ်ရှိ ပုဂ္ဂိုလ်များအပေါ် သုတေသနပြုခြင်းဆိုင်ရာဘုတ်အဖွဲ့သို့ ဆက်သွယ်မေးမြန်းနိုင်ပါသည်။

အပိုင်း (ခ) သုတေသနလုပ်ငန်းတွင် ပါဝင်ရန်ခွင့်ပြုချက်

ကျွန်ုပ်သည် ရန်ကုန်ပြည်သူ့ဆေးရုံသစ်ကြီးရှိကျန်းမာရေးစောင့်ရှောက်မှုလုပ်ငန်းများမှ ထွက်သောစွန့်ပစ်ပစ္စည်းများအားစီမံခန့်ခွဲမှုကိုလေ့လာသောသုတေသနတွင် ပါဝင်ရန် ဖိတ်ခေါ်ခြင်းခံရပါသည်။ ဤသုတေသနတွင် ပါဝင်ပါက ကျွန်ုပ်သည် သုတေသနနှင့် ပတ်သက်သော အချက်အလက်များကိုမေးခွန်းများသုံး၍ မေးမြန်းခြင်းအားဖြေဆိုရမည်ကိုသိရှိပြီး ဖြစ်ပါ သည်။ ကျွန်ုပ်သည် ဤသုတေသနတွင် ပါဝင်ခြင်းဖြင့် အချို့သောမေးခွန်းများမှာစိတ်ကသိကအောက် ဖြစ်စေနိုင်ကြောင်းသဘောပေါက်ပါသည်။ အခြားဆိုးကျိုးမရှိ ကြောင်းကိုလည်း နားလည် သဘောပေါက်ပါသည်။ ထို့အပြင် ဤသုတေသနတွင် ပါဝင်ခြင်းဖြင့် အချိန်ပေးဖြေကြားသည့် အတွက် ငွေသား (သို့) ပစ္စည်းကိုကျေးဇူးတုန့်ပြန်သည့်အနေဖြင့် ပေးအပ်မည် မဟုတ်ကြောင်း ကိုလည်းသိပါသည်။ ဤသုတေသနတွင် ကျွန်ုပ်သည် အထက်ဖော်ပြချက်များကို ဖတ်ရှုပြီး ဖြစ်ပါသည်။ မရှင်းလင်းသည့် မေးခွန်းများကိုလည်းမေးမြန်းနိုင်၍ ၎င်းတို့ကို ကျွန်ုပ်တတ်နိုင်စွမ်းသမျှ ဖြေဆိုပေးပါသည်။ ကျွန်ုပ်ဆန္ဒအလျောက် ဤသုတေသနလုပ်ငန်း တွင် ပါဝင်ပါသည်။ ဤသုတေသနတွင် ပါဝင်ဆောင်ရွက်ရန် ငြင်းပယ် (သို့) နုတ်ထွက်ခြင်းဖြင့် ကျွန်ုပ်ရရှိမည့် အခွင့်အရေးများဆုံးရှုံးစေခြင်းမရှိကြောင်းကိုလည်းနားလည်ထားပါသည်။

သုတေသနပါဝင်သူ၏အမည် ----------

သုတေသနတွင်ပါဝင်သူ၏လက်မှတ် ----------

ရက်စွဲ ----------

INFORMED CONSENT FORM (ENGLISH)

Informed consent form for the research about "Assessment of hospital waste management among health care providers at New Yangon General Hospital, Yangon in 2019"

This informed consent form is for involvement of health care providers (MS, Sisters, responsible persons) in the present study and who are inviting to participate in research, titled "Assessment of hospital waste management at Yangon General Hospital, Yangon in 2019".

Name of Principal Investigator	-	Dr Kyaw Maung
Name of Organization	-	University of Public Health, Yangon
Name of Proposal	-	Hospital waste management at New Yangon General Hospital, Yangon, 2019"

Part I: Information Sheet

1. Introduction

My name is Dr Kyaw Maung, and I am a candidate of Master of Medical Science in Hospital Administration, attending at University of Public Health, Yangon. This study is being conducted with health care providers who are working at New Yangon General hospital in Yangon to assess the hospital waste management. I am going to give you information and invite you to be part of this research. Before you decide, you can talk to anyone you feel comfortable with about the research. This consent form may contain words that you do not understand. Pleases ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask me.

2. Purpose of the research

In this study, we would like to gather assessment of hospital waste management at NYGH in Yangon. This information might help for future better planning of waste management system in tertiary hospitals.

3. Type of interview

This research will involve your participation with self-administered questionnaire about health-care waste management.

4. Involvement in the study

You are being invited to take part in this research because you are one member of health care providers who are working at New Yangon General hospital.

5. Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. You may change your mind later and stop participating even if you agreed earlier.

6. Procedures

We are inviting you to take part in this research study and are asking you to help us learn more about strength and weakness regarding health care waste management among health care providers. If you accept, you will answer questions for half an hour. If you do not wish to answer any of the questions included in the survey, you may skip them and move on to the next question.

7. Risks

You may feel uncomfortable to answer some questions. However, we do not wish for this to happen. You do not have to answer all questions. You can deny responding some questions that you feel the questions are too personal or if talking about them makes you uncomfortable.

8. Benefits

There will be no direct benefit to you, but your participation is likely to help us find out the current level of hospital waste management among health care providers at New Yangon General hospital.

9. Incentives

You will not be provided any incentive to take part in the research.

10. Confidentiality

The research being done in the community may draw attention and if you participate you may be asked questions by other people in the community. We will not be sharing information about you to anyone outside of the research team. The

information that we collect from this research project will be kept private. Any information about you will have a number on it instead of your name. Only the researchers will know what your number is and we will keep the number safely.

11. Sharing the Results

The results that we get from this study will be shared with you and your local community. Then, we will publish the results so that other interested people may learn from the research on condition that your name is not used.

12. Right to refuse or withdraw

You do not have to take part in this research if you do not wish to do so, and choosing not to participate will not affect your rights and advantages in any way. You may stop participating in the interview at any time that you wish without being affected.

13. Contact

If you have any questions, you can ask them to me now or later. If you wish to ask questions later, you may contact: Dr Kyaw Maung, candidate of Master of Medical Science in Hospital Administration, University of Public Health, Yangon; Contact number is 09-2037440.

Part II: Certificate of Consent

I understand the main purposes of this study previously stated. I have read the information above and I will answer. I agree to participate in the study and I have the right to withdraw from the study at the same time.

Respondent

Signature ……

Name ……

ID number ……

Date ……

Key Informant Interview Guideline to Explore

The Strength and Weakness of Hospital Care Waste Management

I. Background

Participant ID ⌊__⌋⌊__⌋

Age (Completed age in year) ⌊__⌋⌊__⌋ years

Gender Male ⌊__⌋ Female ⌊__⌋

Marital Status Married ⌊__⌋ Others ⌊__⌋

Designation _____

Highest Level of Education _____

Working duration at the current place ⌊__⌋⌊__⌋ years

II. Knowledge on Health care waste

Q1. How do you understand Health-care waste?

Q2. What are the risks associated with Health-care waste?

Q3. Please tell about the Health-care waste with public health impact?

Q4. In your practice, are there any available guidelines or protocols on proper hospital waste management?

If answer **Yes**, What is this guideline?
Where did he/she get?
Is there any training on that guideline?

If answer **No**, Where do you find that kind of guideline on proper hospital waste management?

III. Practice on Health-care Waste Management

Q5. Is there any Health-care waste management committee at your hospital?

If answer **Yes**, Who are the members of Health-care waste management committee?
Is there any liaison arrangement or assign duties?
Have you ever been assigned duties on any area of Health-care waste management?
Do you know that is there any activities on Health-care waste assessment or recycling of Health-care waste?

If answer **No**, Who should be the member of Health-care waste management committee?

How do you think for development of Health-care waste management plan in structure, liaison arrangement and duties assignment?

Q6. Do you know that what forms of treatment technologies are available for health-care waste?

If yes, Is there an annual budget for testing and preventive maintenance of the waste-treatment technology?

3.1 Segregation, storage and transport of Health-care waste

Q7. In your everyday practice, how do you segregate the health-care waste during your duty-period? (Prompt- what type of waste into which container?)

Q8. How do you/ your colleges store Health-care waste in your ward and/or hospital?

Q9. How many times is the Health-care waste collected in a day at your ward/ at the hospital central storage place?

Q10. Have you ever involved in any stage of segregation of Health-care waste?
If yes, how?

Q11. Is there any financial requirement for any stage of segregation of Health-care waste management?

Q12. Are there contingency plans available if external waste collection and transport is delayed?

Q13. Have you got any training on Health-care waste management?

If Yes, Where? (training workshop or lectures or hands on training, etc.,)

When?

Who were the trainers?

3.2 Needs for Health-care wastes management in

- Handling
- Collection
- Storage
- Transportation

o gloves/ containers/ trolleys/ place and others

Q14. In your experience what are the strengths and needs for Health-care waste management?

Q15. On your opinion, to get the proper Health-care waste management at your hospital, what will be the most important and necessary t

ကျန်းမာရေးဝန်ဆောင်မှုပေးသူများ၏ ဆေးရုံစွန့်ပစ်ပစ္စည်းများအားစီမံခန့်ခွဲမှုနှင့် ပတ်သက်၍ အားနည်းချက်၊ အားသာချက်များအား ဆန်းစစ်လေ့လာခြင်း

မေးခွန်းလွှာအမှတ်စဉ် ----------

၁။ ပုဂ္ဂိုလ်ရေးဆိုင်ရာ အချက်အလက်များ

အသက် (ပြည့်ပြီးအသက်) ----------နှစ်

ကျား/မ ----------

အိမ်ထောင်ရှိ/ မရှိ ----------

ရာထူး ----------

ပညာအရည်အချင်း (အမြင့်ဆုံးပညာအရည်အချင်းအားဖော်ပြရန်)----------

လက်ရှိဆေးရုံတွင်တာဝန်ထမ်းဆောင်နေသော လုပ်သက် ----------

၂။ နားလည်သဘောပေါက်မှု (အသိပညာ) ဆိုင်ရာမေးခွန်းများ

(က) ဆေးရုံစွန့်ပစ်ပစ္စည်းများအား သင်မည်ကဲ့သို့ နားလည်သနည်း။

(ခ) ဆေးရုံစွန့်ပစ်ပစ္စည်းများနှင့် ပတ်သက်၍ မည်သည့်အန္တရာယ်များ ရှိသနည်း။

(ဂ) ပြည်သူ့ကျန်းမာရေးအပေါ် ဆေးရုံစွန့်ပစ်ပစ္စည်းများ၏ သက်ရောက်မှုကို ပြောပြပါ။

(ဃ) သင်၏ဆေးရုံ၌ ဆေးရုံစွန့်ပစ်ပစ္စည်းများ စီမံခန့်ခွဲမှုနှင့် ပတ်သက်၍ စီမံခန့်ခွဲမှု လမ်းညွှန်ချက်များ ရှိပါ သလား။

ရှိပါက -စီမံခန့်ခွဲမှု လမ်းညွှန်ချက်မှာ မည်သို့သော စီမံချက်လဲ။

- စီမံခန့်ခွဲမှု လမ်းညွှန်ချက်ကို မည်သည့်နေရာမှ ရရှိသနည်း။

-အဆိုပါ စီမံခန့်ခွဲမှု လမ်းညွှန်ချက်နှင့် ပတ်သက်၍ သင်တန်းရှိပါသလား။

မရှိပါက -ဆေးရုံစွန့်ပစ်ပစ္စည်းများ စီမံခန့်ခွဲမှု လမ်းညွှန်ချက်အားရရှိရန် မည်ကဲ့သို့ ဆောင်ရွက် မည်နည်း။

၃။ လက်တွေ့လုပ်ဆောင်မှုဆိုင်ရာ မေးခွန်းများ

(င) သင်၏ဆေးရုံ၌ ဆေးရုံစွန့်ပစ်ပစ္စည်းများ စီမံခန့်ခွဲမှုနှင့်ပတ်သက်၍ ဆောင်ရွက်နေသော အဖွဲ့အစည်း ရှိပါသလား။

ရှိပါက -အဆိုပါအဖွဲ့အစည်း၌မည်သူများပါဝင်သနည်း။ အဆိုပါအဖွဲ့အစည်း၏ လုပ်ငန်းတာဝန်များမှာ မည်သို့ရှိသနည်း။သင်ကိုယ်တိုင်ရော ဆေးရုံစွန့်ပစ်ပစ္စည်းများစီမံခန့်ခွဲရာ၌တာဝန်ယူဆောင်ရွက် ရပါ သလား။ ဆေးရုံစွန့်ပစ်ပစ္စည်းများနှင့် ပတ်သက်၍ အမှိုက်များကို စစ်ဆေးခြင်း (သို့မဟုတ်) စွန့်ပစ်ပစ္စည်းများအား ပြန်လည်အသုံးပြု သော အစီအစဉ်တွေရှိပါသလား။

မရှိပါက - အဆိုပါအဖွဲ့အစည်း၌ မည်သူများပါဝင်သင့်သနည်း။ အဖွဲ့အစည်း၏ လုပ်ငန်းတာဝန် များ အကောင်အထည်ဖော် ဆောင်ရွက်ရန်နှင့် တာဝန်ခွဲဝေချထားမှုအား မည်သို့ဆောင် ရွက်သင့်ပါသနည်း။

(စ) ဆေးရုံစွန့်ပစ္စည်းများ စီမံခန့်ခွဲရာ၌ စနစ်တကျ ပိုးသန့်စင်ခြင်း လုပ်ငန်းအား ဆောင်ရွက်ရန်အတွက် မည်သို့သော နည်းလမ်းများကို သိရှိပါသနည်း။

ရှိပါက -စနစ်တကျ ပိုးသန့်စင်ခြင်းလုပ်ငန်းအတွက် ကုန်ကျမှုအား နှစ်စဉ်ငွေကြေး ထောက်ပံ့မှု ရရှိပါသလား။

၃.၁။ အမှိုက်များအား အမျိုးအစားခွဲခြားခြင်း၊ သိုလှောင်ခြင်းနှင့် ပို့ဆောင်ခြင်း

(ဆ)နေ့စဉ်အမှိုက်များအား သိမ်းဆည်းခြင်းဆောင်ရွက်ရာ၌ အမှိုက် အမျိုးအစားများအား ခွဲခြားခြင်း ပြုလုပ်ပါသလား။(မည်ကဲ့သို့သော အမှိုက်များကို မည်ကဲ့သို့သော ပုံးထဲသို့ထည့်၍ စွန့်ပစ်ပါသနည်း။

(ဇ)သင်၏ဆေးရုံ (သို့) ကုသဆောင်၌ ဆေးရုံစွန့်ပစ်ပစ္စည်းများအား သိုလှောင်ခြင်း အား မည်သို့ ဆောင်ရွက်နေသနည်း။

(စျ)သင်၏ဆေးရုံ/ကုသဆောင်ရှိ အမှိုက်များအား တစ်နေ့လျှင် ဘယ်နှစ်ကြိမ် သိမ်းဆည်းမှု ပြု လုပ်သနည်း။

(ည)သင်သည်အမှိုက်များအား အမျိုးအစားခွဲခြားစွန့်ပစ်ခြင်းအဆင့်တွင် မည်ကဲ့သို့ ပါဝင်ဆောင်ရွက်ရ သနည်း။

ရှိပါက -ဘယ်လိုဆောင်ရွက်သနည်း။

(ဋ)ဆေးရုံစွန့်ပစ်ပစ္စည်းများစီမံခန့်ခွဲမှုအဆင့်ဆင့်အတွက် ငွေကြေးလိုအပ်ချက် ရှိပါသလား။

(ဌ) ဆေးရုံပြင်ပသို့ စွန့်ပစ်ပစ္စည်းများအားပို့ဆောင်ရာ၌ နှောင့်နှေးမှုများရှိပါက မည်ကဲ့သို့ ဆောင်ရွက် မည်ဟုကြိုတင်ပြင်ဆင်ထားသော စီမံချက်များ ရှိပါသလား။

(ဍ)ဆေးရုံစွန့်ပစ်ပစ္စည်းများစီမံခန့်ခွဲမှုအတွက် သင်တန်းများ တက်ရောက်ဖူး ပါသလား။ တက်ရောက်ဖူး ပါက မည်သည့်နေရာ၊ မည်သည့်အချိန်တွင် မည်သူကသင်ကြားပေးပါသနည်း။

(ဎ) ဆေးရုံစွန့်ပစ်ပစ္စည်းများ စီမံခန့်ခွဲရာ၌ လိုအပ်ချက်များကို ပြောပြပါ။

(၁) အမှိုက်များကို ကိုင်တွယ်ခြင်း

(၂) အမှိုက်များကို သိမ်းဆည်းခြင်း

(၃) အမှိုက်များကို ယာယီသိုလှောင်ထားခြင်း

(၄) အမှိုက်များကို ပို့ဆောင်ခြင်း

(ဏ) ဆေးရုံစွန့်ပစ်ပစ္စည်းများ စီမံခန့်ခွဲမှုပြုလုပ်ရာ၌ သင်တွေ့ကြုံရသော အားသာချက်များနှင့် လိုအပ် ချက်များကို ပြောပြပါ။

(တ) သင်၏ဆေးရုံ၌ ဆေးရုံစွန့်ပစ်ပစ္စည်းများ ကောင်းမွန်စွာ စီမံခန့်ခွဲနိုင်ရန်အတွက် အရေးကြီးဆုံး ဘာတွေ လုပ်ဆောင်ရန် လိုအပ်သည်ဟု သင်ထင်မြင်ပါသနည်း။

Annex (5) Gantt chart

Month	**August**				**September**				**October**				**November**			
Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Protocol preparation	*	*														
Protocol defend			*													
Data collection				*	*	*										
Data analysis and thesis writing							*	*	*	*	*					
Thesis preparation												*	*			
Thesis submission to examiner														*		
Thesis defend															*	
Submission of thesis																*

Annex (3) Questionnaires

New YGH Hospital Profile

1. Name of hospital ----------
2. Type of hospital ----------
3. No. of outpatients per day ----------
4. No. of inpatients per day ----------
5. No. of bed per day ----------
6. Sanctioned no of bed per day ----------
7. Total number of wards/departments └__┘__┘
8. Organization set-up
9. Function of Health-care waste management committee

Checklist for Hospital Waste Management at New YGH

No	Description	Response	
1	Name of ward		
2	No. of inpatients per day		
3	No. of bed per day		
4	Sanctioned no of bed per day		
5	Type of waste produced is/are	General waste	1
		Sharp	2
		Infectious	3
		Chemical & Pharmaceutical	4
		Pathological	5
6	Waste from specific wards are segregated	into each category	1
		into more than one category	2
		not segregated at all	3
7	Type of color coding used for		

	Type of waste	**yellow**	**green**	**black**	**red**
	General waste				
	Sharps				
	Infectious waste				
	Chemical & pharmaceutical				
	Pathological				
	Radioactive				

8	Type of container used for collection	Plastic bag	1
		Plastic bin	2
		Metal bin	3
		Wooden box	4
		Others	5

9	Type of container used for internal transport	Plastic bag Plastic bin Cardboard box Trolley Cart Others	1 2 3 4 5 6
10	Outside hospital, hospital wastes are transported by	Self Municipal Department of health Others	1 2 3 4
11	Type of final disposal system within hospital premise	Open burned Incinerate Bury Dump Municipal	1 2 3 4 5
12	Kinds of facilities supplied for protection of hospital waste management	Gloves Masks Boots Clothing Others	1 2 3 4 5
13	Using of protective measure during handling of disposal:	Always Sometimes use never use	1 2 3

14. Quantity of Solid wastes generated (in Kg)

Waste category(specify)	**Quantity of solid waste generated per day (in Kg)**							
	Day1	Day2	Day3	Day4	Day 5	Day 6	Day7	Total
Non-hazardous/ General waste								
Hazardous waste								

15	Containers for sharp wastes	Safety boxes	1
		Used water bottle	2
		Others	3
16	Containers for general waste (non-hazardous waste)	Sufficient	1
		Insufficient	2
		No response	3
17	Storage area for hospital waste	Clean	1
		Unclean	2
		Adequate	3

Annex (7) Curriculum vitae

Name	- Dr. Kyaw Maung
Gender	- Male
Date of Birth	- 16.5.1983
Race	-Bamar
Religion	-Buddhist
Permanent address	-No (97), Corner of 26th & 75th streets, Chanayetharzan township, Mandalay.
Phone number	- 09 2037440
Email address	-dr.kyawmaung83@gmail.com
Academic qualification	1. Dip. Med.Sc (Hospital administration) (2017), University of Public Health, Yangon 2. M.B.,B.S (MDY) (2007)
Employment history	1. Assistant Director, Yangon General Hospital (12.4.2019 to now) 2. Officer, Department of Medical service, Mandalay Region (15.3.2016 to 11.4.2019) 3. Assistant Surgeon, Kyautsae General Hospital (8.12.2014 to 14.3.2016) 4. Store officer, Central Medical Sub Store Department, Mandalay (18.5.2012 to 8.12.2014) 5. Assistant Surgeon, Mandalay General Hospital (1.4.2009 to 18.5.2012)