A RAPID ASSESSMENT STUDY ON HEALTH CARE WASTE MANAGEMENT IN NEPAL

Conducted by

Nepal Health Research Council

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Study Team

ACRONYMS

APW	Agreement for Performance of Works
WHO	World Health Organization
NHRC	Nepal Health Research Council
HCWM	Health Care Waste Management
HCW	Health Care Waste
HIV	Human Immunodeficiency Virus
MOHP	Ministry of Health and Population
NHCWMG	National Health Care Waste Management Guideline
I/NGO	International/ Non Governmental Organization
HCI	Health Care Institution
SPSS	Statistical Package on Social Science
IEE	Initial Environmental Examination
EIA	Environmental Impact Assessment
SWMRMC	Solid Waste Management and Resource Mobilization Center
GoN	Government of Nepal
ENPHO	Environment and Public Health Organization
KMC	Kathmandu Metropolitan City

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Chapter I

INTRODUCTION

1.1 Introduction of the study

This report on the "Rapid assessment study on the status of Health Care Waste Management in Nepal SE ICP IVD 062 XC 062 and SE/07/249178" has been prepared as per the Agreement for Performance of Work (APW) between WHO and NHRC. This study is being conducted with an objective to assess the current status of the Health Care Waste Management activities and prepare a basis to enable medical establishments to comply with guidance and legislation on Health Care Waste management (HCWM) in Nepal.

1.2 Background of the study

Health Care Institutes generate large amounts of diverse wastes. With the steady increase in the number of health care institutions in Nepal, the amount of health care waste (HCW) generated is also increasing. It was estimated that total amounts of health care risk waste generated by health care facilities in Nepal in 2001 was 20,18,450 Kg per year (with 0.5 kg/patient/day) (MOH, 2003). In addition to increasing quantity, the composition of HCW is also rapidly changing affecting its sound management. However, the majority of the HCI in Nepal do not practice safe waste handling, storage and disposal methods. So far, there is no separate mechanism for the treatment of health care waste.

In context of Nepal, there still exist many problems and issues of HCWM. There is concern of socio-economic, cultural and attitudinal problems with the traditional habits of throwing waste anywhere. In traditional concept, only low caste people are responsible for the cleaning task and waste disposal. The socio-economic conditions of many of the HCI are below level attitudinally to afford the charges required. There is a lack of national policy for independent functioning of the waste management institutions and complicating the problem of waste management. Though few acts concerning the waste management exists, there is still lack of health care waste management rules failing to even define categorically various types of

waste and ignores the polluters pay principal. Infrastructure problems still exist for the safe collection, segregation, transportation, quality treatment and disposal of waste. In addition, financial problems in public as well as private hospitals restrict them to take any initiative and continue the sound management of health care waste in Nepal.

The improper management of HCWs generated in health care facilities can severely affect the health of health care providers, patients and individual members of the community. It also has adverse impacts on the environment. In addition, pollution from inadequate treatment of HCW can indirectly affect the health of the community.

Health Care waste includes large component of general waste and a smaller proportion of hazardous waste. Exposure to hazardous health care waste can result in disease or injury. The hazardous nature of health care waste is primarily because it contains infectious agents and sharps. All individuals exposed to hazardous health care waste are potentially at risk, within health care institutions and those outside these sources who either handle or are exposed due to careless management.

Infectious waste may contain any of a great variety of pathogenic microorganisms. Pathogens in infectious waste may enter human body through puncture, abrasion or cut in the skin; through mucous membranes, by inhalation or by ingestion resulting in number of infections. Medical sharp wastes (including syringes and needles) are infectious and pose the greatest risks to health-care workers, HCW handlers if not handled and disposed of properly. The sharps possess double risk of injury and disease transmission. There is particular concern about infection with Human Immunodeficiency Virus (HIV) and Hepatitis viruses B and C, for which there is strong evidence of transmission via health care waste.

The policies and strategies regarding waste management in Nepal recognized waste management system based on nature and volume of waste but failed to define the waste categories which require separate system of management at least in a broader perspective. These policies don't categorically mention health care waste management. Only under the National Health Care Technology Strategy of the Second Long Term Health Plan, a functional guideline to manage medical waste at all levels including private sectors has been envisioned. In recent years several efforts have been made by the Government of Nepal

through the Ministry of Health and Population (MOHP) to address this pressing issue of health care waste.

As a part of initiatives by the MOHP, Nepal Health Research Council (NHRC) developed National Health Care Waste Management Guidelines (NHCWMGs) in 2002. HCWMG defined health care waste as the waste generated by health care institutions, research facilities and laboratories. It means any waste, which is generated during diagnosis, treatment or immunization of human beings or animals or in research activities thereto in the production or testing of biological. The purpose of the guideline was to provide a framework of waste management strategies to assist in the long term management of health care waste.

In order to implement the guideline a training manual for medical professions on health care waste management was developed in 2002 by NHRC. NHRC conducted the trainings to Medical professionals for capacity buildings as well as carried out three researches for the impact assessment of provided trainings, adoption of NHCWMGs and Consensus building on applicability of HCWMGs. Several I/NGOs, Donors, private organization and individual professionals were involved in research and development, trainings related to health HCWM. Despites all these efforts, HCWM practice have not been improved satisfactorily. MOHP had also conducted a study on Health Care Waste Management for Assessment of Current State and Establishment of a Framework Strategy and Action Plan for Improvement in 2003 for implementing during 2005-2009. However, significant steps have not been taken till date for implementation. It is only by ensuring the commitment of environment and health policy makers in the Country, active participation of experts from key environment and health institutions and support from External Development Partners, that the current bottlenecks can be overcome and a sustainable strategies for the safe management of HCW can be initiated.

A follow up study was conducted in Kathmandu valley on adoption of National Health care waste management Guidelines. The follow up study concluded that despite the formulation of guideline and training for implementation, satisfactory hospital waste management system in hospitals was severely lacking. The waste is generally dumped together in a public place such as hospital surroundings, roadside, riverside or municipality container. The study indicated that there is a need to improve the handling and disposal methods of hospital waste for almost all the available medical facilities along with final treatment.

The risk of HCW to both public and environment is enormous. In Nepal, it is now well evident that the Health Care Waste is not safely managed resulting in potential threats to the public health. Despite certain efforts made by MoH, WHO and NHRC, review of HCWM across the country reveals that majority of the HCFs do not follow proper HCWM with exception of some cases of good practices. Several studies had been previously conducted assessing the current situation of Health Care Waste Management. Most of them concluded on unsatisfactory practice of Health Care Waste Management in Nepal. However, there is still knowledge gap in identifying the bottlenecks in the difference between the written policy and practice. Hence, this rapid assessment study on the status of Health Care Waste Management in Nepal has aimed to assess the current status of HCWM activities and find out the gap in the policy and practice. The findings of this study would be helpful in giving the specific action oriented recommendations to comply the HCI with the guidelines of HCWM in Nepal.

1.3 Objectives of the study:

General objective

- To assess the current status of the Health Care Waste Management activities and prepare a basis to enable medical establishments to comply with guidance and legislation on Health Care Waste management (HCWM)

Specific objectives

- To review of national legislation, guidelines and plans regarding HCWM in Nepal
- To assess the existing practices and situation of HCWM in selected health care institutions that have earlier practiced HCWM
- To identify gaps in policy and practice on HCWM
- To identify the problems faced by health facilities in implementing guidelines

Chapter II

RESEARCH METHODOLOGY

2.1 Formation of Steering Committee and consultation meeting

A steering committee comprising of Key stakeholders was formulated for making the study participatory and guide the research process. The members of steering committee were senior officers of Ministry of Health and Population, Ministry of Environment, Science and Technology, Ministry of Local Development, Nepal Health Research Council, Nepal Medical Council, Department of Health Services, Kathmandu Metropolitan City, National Expert on HCWM, Representative of Consumer Association of Nepal, and Nursing Home Association of Nepal. (Name list of members who attended the meeting is given in Annex I)

Steering committee consultation meeting was conducted with agenda of introducing steering committee members, discussion on research objectives and methodology, discussion on draft research tools and the general problems in Health Care Waste Management.

2.2 Literature Review

The earlier studies, national legislations, guidelines, plans and programmes related to HCWM in Nepal were thoroughly reviewed. The plans, policies, national legislations were obtained from grey literature as well as website of concerned ministries. (List of websites is given in Annex II). The studies reports on the health care waste management in Nepal were obtained from NHRC library. In addition, further studies were searched from pubmed.com using key words health care waste management, Nepal; Hospital waste management in Nepal, Medical waste management in Nepal.

2.3 Selection of Study Sites

Twenty four Health Institutions (HCIs) were purposively selected for the study. The HCIs were selected from four Development regions (12 districts and 8 zones) representing government, semi-government, private and I/NGO managed HCI. There were 10 Government hospitals (1 Regional hospital, 3 zonal hospital and 6 district hospital), 4 semi

government hospitals, 9 private hospitals (5 Hospitals, 3 Teaching Hospitals and 1 Nursing home) and 1 I/NGO managed hospital. (List of study sites is given in Annex III).

2.4 Development of Tool and Pre-testing

A semi structured questionnaire and an observation checklist was developed to collect primary data from each selected HCI. The tools were then pre-tested in Bir Hospital, Kathmandu. Necessary modifications on the tool were made. The tool was further discussed in the consultation meeting and finalized to be used in the field. (Given in Annex IV). A digital camera was used to take the photographs from the study sites.

2.5 Field study/Data collection

Study team visited to each site and first contacted the chief of the Health Care institutions. The key informants were identified on discussion with the chief. In some institutes it was extremely difficult to identify the key informant because there was not clarity of responsibility and no one would like to respondent. The key persons were interviewed individually and/or in group using the pre-tested semi-structured questionnaire. The team observed the site accompanied by a HCI staff and recorded the observation checklist. Relevant action oriented photographs were taken. All the tools were rechecked and edited before leaving each study site.

The information generated with consultation meeting was manually noted down by the study team for further analysis.

2.6 Data management and analysis

The quantitative data generated from the field study were first entered in excel sheet. The data were validated against the written formats. Then SPSS-13 was used to analyze the data and generate relevant information. The information was then presented in tabular form.

The information from consultation meeting was summarized manually. The literature reviewed were scripted and summarized qualitatively.

2.7 Dissemination of information and collection of feedback

Upon the preparation of draft report, the findings of the study were disseminated to concerned stakeholders, research participants and steering committee members organizing a national dissemination workshop. The list of participants of dissemination workshop is given in Annex V. Discussions on the findings were made and feedbacks were incorporated in the report.

2.8 Limitation of the Study

- Adequate sample size can not be maintained as well as all categories of HCIs could be included for study due to the short duration of time and limited budget.
- The selection of the sites was not random, so generalization of the findings could be limited.
- Some information such as the amount of waste generation, separate budget for health care waste management could not be obtained due to lack of time and were not available in the HCI themselves.

Chapter III

LITERATURE REVIEW

3.1 The Related Legal Framework, Plan, Policies, Guidelines on Health Care Waste Management in Nepal

3.1.1 Related Policies

There were no specific national policies on the waste management till 1996. Earlier policies were encompassing all kinds of environmental pollution including solid waste but were not effective to deal the matters of solid waste management as desired. The adopted policy for the waste management in Nepal had following activities

- To make solid waste management system simple and effective
- To minimize the adverse effect of solid waste on the environmental and public health
- To mobilize the solid waste as a resources
- To promote public awareness for greater public participation on the solid waste management

The important measures related to solid waste were considered in Eighth, Ninth Plan and Tenth Plan of Nepal Government . According to the Eighth Plan, causes for air, water, and land related pollution was supposed to be investigated through on-the spot observation and management mitigation plans. In this regard emphasis was laid on adopting technology required for minimizing waste. However pollution control program launched during this period included limited assessment studies of existing situations in the areas of solid waste along with other sectors; air, water, noise etc. Utilization of appropriate technology still needs to be developed in the areas of solid waste including health care waste. Management work plans to control pollution caused by solid waste needs to be implemented. The solid waste aspect has also been mentioned in the Ninth Plan. The Plan includes consideration for engagement of NGOs and private sector for the management of solid waste, emphasis for composting for municipal wastes, setting of norms and standards in this field and its strict implementation in every municipality, and capacity building of local municipalities for handling solid waste related issues. The Tenth Plan has emphasized upon the Public Private

Partnership for Solid Waste Management and implementation of Pollution Pay Principle. However, these policies are silent regarding health care waste management.

Under the National Health Care Technology Strategy of the Second Long Term Health Plan (1997-2017), a functional guideline to manage medical waste at all levels, including private sector, has been envisioned.

The three year Interim Plan of Nepal Government (2064/65- 2066/67) has clearly mentioned the programmes for Health Care Waste Management. Is states that necessary programmes for the proper disposal of health care waste management will be conducted. This plan has also mentioned Urban Health Promotion Programme and according to which coordination with private and non-govermental organization and concerned ministries will made for providing the necessary facilities of health services, toilets management and sanitation.

3.1.2 Related Legislation

The Interim Constitution of Kingdom of Nepal, 2007

The Interim Constitution of Kingdom Nepal, 2007 has enshrined environment and health rights as fundamental rights of Nepali citizens. Article 16 (1) states that every person shall have the right to live in clean environment and Article 16 (2) states every citizen shall have the right to get basic health service free of cost from the State as provided for in the law.

Article 35(5) embodies following policy mandates:

"The state shall make necessary arrangements to maintain clean environment. The state shall give priority to protection of the environment and also to the prevention of its further damage due to physical development activities by increasing the awareness of the general public about environmental cleanliness and the state shall make the special protection of the environment and the rare wildlife"

With the above provisions, some constitutional responsibilities and duties have been vested upon the state for safeguarding the environment.

The Solid Waste Management Act, 2007 (Draft)

This Act has been drafted very recently from the Ministry of Local development to overcome the emerging problems of waste management in Nepal. Section 3 of this Act has the provisions of waste generation/production, disposal and collection. Section 15 (3) states that it will be the responsibility of concerned institutes to manage the waste generated from Industrial Enterprises, Business Enterprises, Educational Institute, Hospital and Nursing Home. The waste generated from the Hospital, Nursing Home, Private Clinic and Chemical factories will be managed as per the designated Standard technology. However, there are not any designated standards and technologies available in Nepal.

The Environment Protection Act, 1997

Environmental Protection Act 1997, have made provisions dealing with pollution control, Initial Environmental Examination (IEE), Environmental Impact Assessment (EIA), conservation of national heritage etc. Section 7 of Act refers to pollution control, which states "A person shall not cause pollution or allow pollution to be caused in a manner which is likely to have significant adverse impact on the environment or harm human life or public health or shall not emits, discharge sound, heat, radioactive matter from any machine, industrial enterprises or any other place above the prescribed standard."

The law has also listed chemicals, drug related industries as polluting industries, and requires that such industries should obtain pollution control certificates from the Ministry of Population and Environment (Now Ministry of Environment, Science and Technology).

The Chapter 3 of Regulation has provided various provisions under rules 15 to 29 for preventing and controlling pollution. These provisions include stopping emission and discharging solid waste against the standards (rule 15) to install and maintain properly the equipment or treatment plants (rule 16). EIA is also mandatory for the establishment of facilities, including treatment plant, recycling plant, storage and landfill for management of hazardous waste Rule 3, annex- 2 of the Regulation states that an EIA is necessary prior to the development of any health care facility with 25 or more beds (Now with100 or more beds as per the notification published in Gazzete 3rd Bhadra, 2064 B.S). Safe disposal of Health Care waste is also made mandatory for this category of health care facility.

Solid Waste Management and Resource Mobilization Act, 1987

This Act is one of the key legislation in Nepal for the management of solid waste. The main objectives of this Act are:

- To manage the solid waste and to mobilize the resources
- To minimize the adverse effect of the solid waste on the public health and environment

For the execution of the objectives of the Act, Solid Waste Management and Resource Mobilization Center (SWMRMC) Rule was formulated in 1989. These Rules laid down procedures for the management of solid waste. The Act and Rules empower the Solid Waste Management and Resource Mobilization Center in the matter of the solid waste management.

Fundamentally, the Act conferred power and responsibility to the Solid Waste Management Board to carry the functions especially for Kathmandu Valley. On behalf of the Board, SWM&RMC carries out day-to-day activity. Section 5 (5.1.1.16) states that it is prohibited to emit, dispose and throw the wastes generated from the hospital, nursing home, private clinic and dispensary on the streets and public places. Similarly, sub-section 5.1.1.17 states that any type of hazardous can not be emit, throw, store or dispose in any place except the place designated by the center which adversely affects the public health. However, the Act doest not empower to fine for those who work against sub-section 5.1.1.16 and 5.1.1.17.

The Labor Act, 1991

The Labor Act 1991, which is administrated by the Ministry of Labor, is the main regulation regulating the working environment. Chapter 5 of this Act deals with occupational health and safety. Section 27 of Chapter 5 requires the management to make certain arrangements such as the removal of waste accumulated during production process and prevention of accumulation of dust, fume, vapor, and other impure materials, which would adversely affect health of workers. Section 28 and 29 require management to provide protective clothing and devices to workers handling chemical substances and other hazardous and explosives substances. In order to prevent accidents, section 30 of the Act requires the proprietor to make arrangements for fire safety equipment and emergency equipment while section 31

requires the placement of sturdy fences around hazardous machines and equipment operated by energy.

Industrial Enterprise Act, 1992

This Act provides that industrial license is required if it is related with defense, public health and environment. Section 11 clearly provides that license or registration certificate shall contain provisions regarding concessions, exceptions, facilities that will be given to enterprise and prescribed conditions to be fulfilled by them. Section 13 also provides that the industrial promotion board establishment under the Act can direct the industries to make arrangements for controlling environmental pollution. The Act gives priority to industry based on waste products and industry manufacturing pollution control devices. Similarly, section 25 (2) empowers GON to punish those who don't comply with the conditions mentioned in the license or registration certificate.

The Town Development Act, 1988

Section 9 of this Act empowers the Town Development Committee to regulate, control or prohibits any act or activity that has an adverse effect on public health or the aesthetic of the town, or in any way pollutes the environment. It contains penalty provisions in the form of fines for the violation of the Act.

The Local Self- Governance Act, 1999

The Local Self-Governance Act, 1999 makes municipalities responsible for managing domestic solid waste. Municipalities are also supported to preserve water bodies such as lakes and rivers, assist in controlling water, air, and noise pollution and prevent the spread of infectious disease. The Act does not require the local governments to manage hazardous waste but empowers them to fine anyone up to Rs. 15000.00 for haphazard dumping of solid waste. As Nepal does not have any policies or legislation on hazardous or medical waste, the government should immediately formulate a national policy and legislation on hazardous waste management. The legislation should be in the form of a set of regulations and under

the existing Environmental Protection Act. These documents should clearly define hazardous waste and designate responsibilities for managing medical waste.

3.3 Review of Guidelines:

National Health Care Waste Management Guidelines 2002

These Guidelines were prepared by Nepal Health Research Council and World Health Organization in 2002 and circular was made by the Minister Level decisions to implement in all levels of health facilities. This guideline has made the provisions of waste management policy, waste management committee, waste management plan, waste minimization, waste segregation, handling, labeling, containment, transport, storage, waste treatment/disposal, occupational health and safety, training, monitoring system, and enforcement instruments for implementation of health care waste management guidelines. The WHO has classified health care waste into eight categories and this Guideline has categorized in to three groups namely sharps, hazardous waste and general waste.

Kathmandu Medical Waste Management Guidelines 2004

These guidelines were developed by Kathmandu Metropolitan City (KMC) with the support from Kathmandu Valley Mapping Programme in 2004. These guidelines were primarily produced to assist in the management of medical waste that are generated in the course of medical treatment in Kathmandu's hospitals, nursing homes, clinics, pathological labs and drugstores. These guidelines have also included classification of medical waste, its sources and amount, in-source management of medical waste, technologies for treatment and disposal of medical waste, health and safety for health care personnel and waste handlers, and responsibilities for medical waste management In contrary to the National Health Care Waste Management Guidelines 2002, it has classified the waste into five categories; ordinary medical waste, ordinary inorganic waste, hazardous waste suitable for incineration, hazardous sharp waste and non-burnable hazardous waste.

National Guidelines on Health Care Waste Management (Swastha Sansthajanya Phor Maila Sammbandhi Rastya Nirdasika 2064). This Guidelines has also classified the waste into five categories; ordinary medical waste, ordinary inorganic waste, hazardous waste suitable for incineration, hazardous sharp waste and n0n-burnable hazardous waste. It has includes the process of health care waste management, responsibilities for health care waste management. One of the very important aspect of this guideline is that it has mentioned the waste management options at different levels of health care institutes indicating the type of waste generation, methods of disposal/treatment and responsible persons.

3.2 Studies conducted in Nepal on HCWM

ENPHO and KMC (2000) conducted a survey in 45 Health Care Institutions (13 government hospital, 23 private HCI, 8 clinics and pathological labs and 1 drug manufacturing company) in Kathmandu valley by interviewing hospital officials using a questionnaire. It reported that, in 55.5 percent of the HCI, health care waste was collected in uncovered containers. (Excluding clinics, pathological labs and drug manufacturing company). It was observed that 44.44% did not segregate waste at all. On an average, 28% separate only sharps, 19.44% separate sharps, infectious and non-infectious, 8.33% separate the waste as infectious and non-infectious. The storage period ranged from a day to as long as 15 days. There were no separate rooms for storage but were kept in the hospital/nursing home premises, usually backyard, openly before the municipality finally picks them up. Sixteen percent of the HCI had self treatment and disposal facility, 42 percent partially treat the waste and dispose rest in municipality containers while the rest 42 percent were totally relied on municipality for management of their Health Care Waste. About 56% provided gloves and /or mask to the waste handlers and a few of them even provided boots and /or aprons. In addition to gloves and masks, 19% of the institutions had provision of vaccination against Hepatitis B or other immunization injections. 25% did not provide any kind of safety measures. 47% have not conducted any sort of awareness programs, only 42% have provision of training/workshop/meeting and 6% were limited to the hospital waste management only. The study recommended for centralized medical waste management in the valley and strict enforcement of national level policies, legislations and standards regarding health care waste and its management.

Sapkota, Adhikari and Devkota (2003) conducted a survey in 3 HCIs (Bir Hospital, Patan Hospital and TU Teaching Hospital). They conducted in-depth waste management, interviewed to cleaners and housekeeping in-charge and on-site observation of hospital waste management. The average general, hazardous and sharp waste per person per day were 1.3 kg, 0.3kg and 0.15kg respectively. The study revealed that two of three hospitals namely Patan and TU Teaching Hospital had integrated approach of waste management while Bir Hospital had a poor hospital waste management system. There were no central authorities to monitor the management practices of hospital waste. High proportion of waste handlers were found to be exposed to the risks associated with medical waste handling and were unaware of risk associated with health care waste. The study had recommended to create public awareness, proper hygienic education to scavengers, compulsory staff training and legislation to regulate HCW system to encounter the problem with current practice of HCW management.

Rana and Malla (2001) conducted case studies of 40 Health Care Institutions in Kathmandu, Patan, Bhaktapur and Pokhara. The case series reported that in the HCI, wastes collected in containers were not covered during transportation and colour codes were not used for waste segregration. Both hazardous and non hazardous wastes were collected in the containers provided by the Kathmandu metropolitan city which were later land filled. There were high chances of health risks of waste handlers. The transport personnel were not seem using protective clothing. The report also coded that the hospital management lacked waste management, hygiene and infection control responsibilities. It further stressed on the lack of national level policies, legislation and standards regarding health care waste management. The case series has recommended for central waste disposal unit, take preventive measures in the hospital for handlers and to pressurize government authorities to formulate strict rules and regulations regarding colletion and disposal of medical wastes.

Poudel, Acharya and Pokhrel (2005) conducted a follow-up study in 5 HCIs in Kathmandu through interview of hospital personnels, observation of current practices and review of existing literatures. It was found that waste minimization policy was adopted at certain level. Re-use was practiced in all the surveyed HCI whereas re-cycling was practiced in none. All HCIs were found to segregate sharps but no strict procedure were followed for other wastes. The HCI wastes were also found to be dumped together in a public place such as the hospital surroundings, roadside and riverside or municipality container. The wastes storage was not

more than 24 hours. However, sharps were found to be stored for longer time. The wastes were collected in closed buckets in only one hospital and labeling of the waste was excellently done in two of them. Mislabeling and mis-used of colored bucket was seen in some hospitals. Incinerator was found to be the most common method of treatment/disposal of health care waste whereas direct discharge of liquid waste in sewage was seen in most of the surveyed HCIs. Regarding the safety measures taken by the handlers, almost all used gloves whereas very few were found to use masks and apron. Needle stick injury was a major type of injury found other than cuts from scalpel and broken ampoules. All HCIs reported to give vaccines to handlers. The most commonly given vaccine was Hepatitis and Tetanus.

Pakurel *et.al* (2005) conducted a study in HCWM in Pokhara Sub-metropolitan city. The team surveyed 11 HCIs with detail survey of 5 HCIs of Pokhara sub metropolitan city through structured interview, observation, group discussion and key person interview. Based on the study, the health care waste composition was found as - 2% were sharps, 12% were hardous, and 86% were non-hazardous. The report showed that waste segregation system was very poor among the HCIs. Waste collection system was quite satisfactory but the problem was lack of disinfection of collection container. Most of the HCIs lacked effective central storage system for the HCW. Some HCIs had provision of short time storage but mostly openly stored. The incinerator use was unscientific and environmentally unfriendly. The HCI wastes were disposed either by the HCIs themselves or by the municipality. Both of them did not have safe disposal method. Occupational health safety was not given due attention by the HCIs. Moreover the waste handlers were unaware about their health.

Chhipi Shrestha (2005) conducted a study in HCWM in Kathmandu valley. The study surveyed 10 HCIs of the valley. The average bed occupancy rate of the HCIs was 83 percent. It reported that there was an attempt of segregation of HCW in 80 percent of the hospitals but there was lack of proper segregation. Seventy percent of the hospitals had storage facilities in open container whereas not had large close containers or separate room with locking system. All HCI practiced combustion of syringes and IV sets but the combustion was not complete in some HCIs. Unsafe burial was also practiced in some HCIs. The most hospitals gloves and masks are provided as safety measure but gloves are thinner and may be punctured easily. Eighty percent of the HCIs had willingness to pay for the effective management of HCW

The review of literature showed that less there is no clear policies and legislations available for Health Care Waste Management in Nepal. The studies conducted so far have focused on

the situation analysis on Health Care Waste Management and they are mostly concentrated in big urban areas. In addition, most of them are limited to case series and project studies.

CHAPTER IV

FINDINGS FROM THE STUDY

Sound management of health care waste has become a need to safeguard the public health from adverse effects caused due to improper management of healthcare waste. In recent years, healthcare waste disposal has become even more difficult due to increasing number of health facilities and use of disposal needles, syringes and similar items. Review of literature reveals that many studies and surveys have already been conducted related to health care waste management in Nepal. Studies reveal that majority of health care institutions do not practice safe waste handling, segregation, transportation and disposal methods. The key recommendation of almost all studies is to formulate and implement the national legislation of health care waste management. In Nepal, there are many policies, plans and Acts related to health and environment. But, there is no any special policy and Act related health care waste management in Nepal. Though the development plans recognized the importance of solid waste management issues, the policy lack emphasis on health care waste related issues. Three Guidelines in Health Care Waste Management developed by NHRC, KMC and MOHP were found but most of the healthcare institutes were not sensitize about the availability of Guidelines and their implementation.

A total of 24 Health Care Institutions were visited. The staffs of HCIs were interviewed using a standardized questionnaire. The management of health care waste were observed using a Observation Checklist. The findings are presented as follow

4.1 Amount of waste generation

The total number of operational beds of 24 HCIs ranged from 15 to 700 with the median of 95 (Q1:38, Q3:316.50). The median OPD visit per day was 106.5 (Q1:59.7; Q3:206.5). The mean Bed Occupancy Rate was 60.7±20.8 percent.

However, Information on amount of waste generation was received from only 3 HCIs (Patan Hospital, National Kidney Center and Koshi Zonal Hospital). The information is presented in Table 1.

Table 1. Amount of waste generation

	Average waste per day (Kg)						
	Total	General waste		Hazardous waste		Sharp waste	
Name of HCI	waste	kg	%	kg	%	kg	%
Patan Hospital	594.0	377.0	63.5	165.0	27.8	52.0	8.8
National Kidney Center	28.0	14.1	50.0	4.8	17.0	9.3	33.0
Koshi Zonal Hospotal	441.4	302.0	68.4	125.5	28.4	13.9	3.1

The total waste generation in Koshi zonal hospital was 441 kg per day (68.4 % general waste, 28.4% Hazardous waste and 3.1% sharps). The total waste generation in National Kidney Center was 28.0 kg (50.0% general waste, 17.0% Hazardous waste and 33.0 % Sharp waste). The total waste generation in Patan Hospital was 594 kg (63.5% General Waste, 27.8% Hazardous Waste and 8.8% Sharps)

4.2. Waste Management Policy

Health staffs of the HCIs were interviewed whether they were using any Regulations/ Guidelines for the management of Health Care Waste. The information is presented in Table no 2.

Table 2. Use of Wsate Management Policy in HCI

Use of Regulations/Guideline	Frequency	Percent (%)
Currently using any guideline	**N=24**	
None	16	66.6
National Health Care Waste Management Guideline	4	16.7
WHO guideline	4	16.7
Reason for not using any regulation	**N=16**	
Don't know about guideline	10	62.5
No sensitization	5	31.3
Not trained to use guideline	1	6.3

It was found that, in majority of the HCI (66.6%) none of the regulations or guidelines was used for HCWM. Seventeen percent reported to use National Health Care Waste Management Guideline and the similar percent reported to use WHO guideline for HCWM. Among those who were not using any guideline for HCWM, Majority (62.5%) said that they did not know about any guideline, 31.3 percent were not sensitized and 6.3 percent replied that they were not trained to use guideline.

4.3 Waste Management Committee

When asked about the responsible body for the HCWM, different individuals, committee and department were found to be responsible body for HCWM. The information is summarized in Table 3.

Table 3. Responsibility of Health Care Waste Management

Responsibility of HCWM	Frequency (N=24)	Percent (%)
HCWM Committee		
Present	6	25.0
Absent	18	75.0
Responsible individual/body to manage HCW		
Medical Superintendent	5	20.8
Administration	4	16.7
Housekeeping	8	33.3
Nursing Staff	4	16.7
Team/Committee	2	8.3
Logistic Department	1	4.2

Health Care Waste Management Committee was formed in one fourth of the HCIs (25%)

Sanitary Department of House keeping department was found to be the responsible body for the HCWM in one third (33.3%) of the cases. Committee/Team was actively responsible in only 8.3 percent of the HCI.

4.4 Waste Minimization Plan

Each HCI needs to establish a Waste Management Plan, a comprehensive document that outlines policies and procedures for the management of health care waste. However, none of the Health Care Institutions were found to have Waste Management Plan among the visited HCIs.

4.5 Co-ordination with other organization for HCWM

For Health Care Waste Management, 50 percent of the HCI were found to be coordinating with Municipality. Seventeen percent said that they were coordinating with Non Governmental Organization (NGO) for waste management. Thirty seven (37.5 %) were not coordinating with other organizations and managing the whole waste themselves. (Table 4)

Table 4. Co-ordination with other organizations for HCWM

Coordination with other organization	Frequency (N=24)	Percent (%)
None	9	37.5
Municipality	12	50.0
NGO/Other organization	6	23.0

4.6 Waste Minimization

Waste Minimization has the potential to reduce hazards to human health, reduce costs, conserve resources and protect the environment. Effective Waste minimization strategies include waste avoidance, reduction, re-use and recycle.

None of the HCI were reported to have a written policy on waste minimization. However, they were found to practice it to some extend. (Table 5). Re-use of some

Table 5. Waste Minimization in HCI

Waste Minimization	Frequency (N=24)	Percent (%)
Avoidance	3	12.5
Reduction	7	29.1
Re use	24	100.0
Sold for recycle	0	0.0

materials were practiced in all HCI. This includes re-use of gloves, kidney trays, instruments etc. None of the HCI had any recycle plant for any waste. Twelve percent reported to practice waste reduction by selling some sellable wastes and 12.5 percent reported to avoid some kinds of wastes like plastics and practice minimum packaging.

4.7 Management of Health Care Waste

4.7.1 Waste Collection and segregation

Waste should be segregated according to appropriate classification immediately after waste is generated. The waste collection and segregation were observed in each HCI. The information is presented in Table 6.

Table 6. Waste collection and Segregation

Waste collection/ Segregation	Guideline present		Guideline absent		Total (n=24)	
	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
Waste collection at generation site	8	100	16	100	24	100
Use of clean container	8	100	11	68.8	19	79.2
Puncture proof for sharps	8	100	16	100	24	100
Plastic bag for collection of waste inside container*	5	62.5	2	12.5	7	29.2
Waste segregation*	8	100	6	37.5	14	58.3
Colour code use for segregation*	6	75	8	33.3	8	33.3

* P<0.05

Both of the HCI that follows guidelines and does not follow guidelines practiced to collect the waste at generation site. Seventy nine percent of all total HCIs use the clean container among which guideline users are cent percent but among guideline non users there was only 68.8 percent. Puncture proof containers were used in all HCIs. Plastic bag was used for waste collection in 29.2 percent. However, the use of plastic bag was 62.5 percent among guideline users and 12.5 percent among non users.

In concern with waste segregation, only 58.3 percent had practice of waste segregation. However, all of the guideline users try to segregate waste but only 37.5 percent of non users has segregated at least three types of wastes i.e. general waste, hazardous waste and sharps.

4.7.3. Waste Treatment/Disposal

Health Care Institution has the responsibility to ensure that its wastes are transported and treated appropriately before disposal in order to prevent hazard from it. Different methods should be used for health care waste treatment, depending on the type of waste materials.

Treatment/ Disposal Facilities

Table 8. Treatment and disposal facilities

Treatment/Disposal	Guideline present		Guideline absent		Total (n=24)	
	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
Incinerator present*	5	62.5	1	6.3	6	25
Autoclave present	8	100	10	100	24	100
Burial in HCI premises	3	37.5	8	50	11	45.8

*P<0.05

Regarding Treatment/ Disposal facilities, Incinerator was present in only 25 percent of the HCI. Among guideline users, 62.5 percent were found to have incinerator in comparison to only 6.3 percent of non users. Autoclave was present and was used by all HCIs. Burial method was present in 45.8 percent of the HCI. Among guideline users, 37.5 percent practice burial method which is lesser then the non user i.e. 50 percent.

Treatment/Disposal of General Waste

Table 9. Disposal of General Waste

Disposal of General Waste	Guideline present		Guideline absent		Total (n=24)	
	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
Municipality	3	37.5	5	31.3	8	33.3
Burn	1	12.5	5	31.3	6	25
Dump	3	37.5	2	12.5	5	20.8
Bury	0	0	2	12.5	2	8.3
Burn and Bury	0	0	1	6.3	1	4.2
Selling, Composting and autoclave	1	12.5	0	0	1	4.2
Taken by NGO	0	0	1	6.3	1	4.2

In one third of the HCI (33.3%), Municipality took the general waste in regular interval. Among the guideline users, 37.5 percent of the HCIs were disposing general waste in municipality container in comparison to 31.3 percent of the guideline non users.

Twenty percent were found to dump the waste in the hospital premises. However, 37.5 percent of guideline user and 12.5 percent of guideline non users had practice of dumping. Only one HCI was found to properly segregate the waste and sell, compost and autoclave them. (Table 9)

Treatment/Disposal of Hazardous Waste

Table 10. Disposal of Hazardous waste

Hazardous Waste	Guideline present		Guideline absent		Total (n=24)	
	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
Burn	2	25.0	6	37.5	8	33.3
Burry	1	12.5	3	18.8	4	16.7
Incineration	4	50.0	1	6.3	5	20.8
Municipality	0	0	3	18.8	3	12.5
Burn and Bury	0	0	2	12.5	2	8.3
Autoclave and sell	1	12.5	0	0	1	4.2
Taken by NGO	0	0	1	6.3	1	4.2

The hazardous waste was burnt in incinerator in only 12.5 percent of the HCIs. Among guideline users, 50.0 percent burn hazardous waste in incinerator in comparison to 6.3 percent in non users. Seventeen percent of HCIs bury the hazardous waste in the hospital premises. Nineteen percent of guideline user has burial practice and only 12.5 percent of non users practiced burial. In 12.5% of the HCI, hazardous waste was disposed in municipality; all of them were guideline non users. In one HCIs from guideline user, hazardous waste was found to be autoclave and sell. (Table 10)

Treatment/Disposal of sharps

Table 11. Disposal of Sharps

Sharps	Guideline present		Guideline absent		Total (n=24)	
	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
Burn	4	50	8	50	12	50
Bury	0	0	1	6.3	1	4.2
Incineration	3	37.5	0	0	3	12.5
Municipality	0	0	3	18.8	3	12.5
Burn and Bury	0	0	1	6.3	1	4.2
Taken by NGO	0	0	2	12.5	2	8.3
Needle destroyer	1	12.5	1	6.3	2	8.3

The major sharp waste included needles and used syringes in the HCIs. Burning of sharps in open place was found in half of the HCI (50%) in both guideline user and non user. However, 12.5 percent burnt it in incinerator which was all from guideline user. Similarly, 12.5 percent put in municipality container which was all from guideline non user. 8.3 percent that is 2 HCIs one from guideline user and non user use needle destroyer. (Table 11)

Treatment/ Disposal of Liquid waste

In most of the HCIs, liquid waste was found to be disposed in the open drainage (33.3%). In 29.2% it was disposed in toilet, in 12.5% it was disposed haphazardly in the HCI premises and only two HCI (8.3%) had treatment plants functioning well to treat the liquid waste. (Table 12)

Table 12. Treatment/Disposal of Pharmaceuticals

Pharmaceuticals	Guideline present		Guideline absent		Total (n=24)	
	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
Returned to supplier	5	71.4	4	25	9	39.1
Dump	0	0	4	25	4	17.4
Burnt	0	0	3	18.8	3	13
Burnt in incinerator	2	28.6	0	0	2	8.7
Burry	0	0	3	18.8	3	13
Burn and Burry	0	0	1	6.3	1	4.3
Taken Bv NGO	0	0	1	63	1	4.3

Pharmaceuticals waste was found to be returned to the supplier by 39.1 percent of the HCIs. However, 71.4 percent are from guideline user and 25.0 percent are from non user. Seventeen percent dumped the wastes, 13.0 percent burn and 13.0 percent bury, all are guideline non users. Among the rest, 1 HCI burn and bury user and in other the waste pharmaceuticals were sent to NGO for disposal and both are from guideline non user. (Table 12)

4.8 Occupational Health and Safety

Each HCI is responsible to provide safe, healthy workplace and safe system of work for all. The management of waste presents a number of potential hazards to employee's especially sanitary staffs. In addition to the appropriate waste management, HCI should ensure the safety on health of the employees. The information on the occupational health and safety measures is presented in Table 13.

Table 13. Occupational health and safety measures						
	Guideline present		Guideline absent		Total (n=24)	
Occupational Health and Safety measures	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
Train staff	6	75	8	50	14	58.3
Vaccination	5	62.5	2	12.5	7	29.2
Use of PPE						
Apron	6	75	7	43.8	13	54.2
Mask	7	87.5	9	56.3	16	66.7
Glove	8	100	14	87.5	22	91.7
Boot	3	37.5	2	12.5	5	20.8

It was found that in only 58.3 percent of the HCI, staffs had received training on waste management and was a part on infection prevention training. However, among guideline user 75 percent were trained whereas 50 percent in non user. Only 29.2 percent of HCI reported to give vaccination to the staffs. Among the guideline users, 62.5 percent of HCI reported to give vaccine to staffs and among guideline non users 12.5 percent of HCI vaccinated sanitary staffs. The vaccines included Hepatitis B, Tetanus, Typhoid and Meningitis but not all the four vaccines in the 7 HCIs.

Regarding the use of PPE, Gloves were used in 91.7 percent of HCI. Cent percent among guideline users and 87.5 percent among non users used gloves. Use of mask was present in 66.7 percent of HCIs. Apron users were found among 54.2 percent of HCIs and the use of Boots was found in 20.8 percent of HCIs. (Table 13)

4.9. Monitoring System

There was no regular monitoring system in health care institution and no written plan for it. However, most of HCI reported that they monitor by onsite observation and supervision and discuss the concerned matters in HCI meeting. There is no practice of reporting of accidents/incidents from waste management in any HCI. None of the HCI reported to practice any enforcement (reward and punishment) system.

4.10 Problems/Constraints for waste management

Numerous problems and constrains were found to be faced by for Health Care Waste Management at policy and implementation level. There is no clear policy and legislation regarding Health Care Waste Management. Although policies and legislations do exist in the country, these are in general for environmental protection and not specific to health care wastes. So, punishment and reward system can not be exercised for any HCI for the effective implementation of Health Care Waste Management. The problem was also seen for the disposal of cytotoxic wastes in the HCI with facility of cancer treatment. There is no clear guideline available for the proper disposal of cytotoxic wastes in the country.

Within the HCI, it was observed that segregation had been tried to practice by the most of them. There was complaining regarding the behavior of visitors not segregating according to HCI rule. However, it was found that segregated wastes were transported and treated together. Major problem was with the lack of place for disposal facilities practiced in the HCIs. These were low technological and less safe burning chambers in most of the HCI and burial pits with low depth. In HCI that practiced high technological incinerators, some incinerators were not in work. The disposal of HCW was haphazardly done in riverside or municipality containers. In the urban area, health care centers do not have enough space to dispose appropriately.

In most of the HCI, manual transportation of health care waste was practiced and transportation trolley was not available. According to the WHO guideline, there should be separate path for transportation trolley from waste generation to disposal/treatment site. But we could not find the separate path for transportation trolley in any HCIs except in National Kidney Center, Banasthali.

There is no separate budget for health care waste management and none had calculated the actual cost of HCWM. As far as Occupational health and safety is concern, there was no use of PPE properly by waste handlers.

There was no monitoring and planning system in any of the HCI for health care waste management, which was one of the most important factors for not managing health care waste properly. In most of HCIs, Health Care Waste is responsibility of Housekeeping

department and other departments and there is no active committee. Those departments who were responsible for HCW were implementers with less authority of decision making.

Outside the hospital, there was a problem of unavailability of different colour bucket in the market. This was the problem for unable to create uniformity of colour coding within and with other HCIs. HCIs in which HCW is taken by municipality, there was irregularity for taking Health care waste. The HCIs which had contract with private companies/NGOs, did not have confidence of sustainability and safe disposal.

4.11 Suggestions from the respondents to improve HCWM

There were numerous suggestions and views from the respondent in regard to the HCWM. According to them, the government should have policy and action plan for health care waste management of all government, private and non governmental health care institutions indicating different level of health institution. Legislation should be enforced for HCWM. There should be a responsible body for waste management formulated with authority to supervise and monitor HCWM. Government should provide subsidy to those HCI that practice recycle. Haphazard medical practice should be control and HCW should be minimized.

There should be a centralized Health Care Waste management system including all the HCI (Government, Private, Non government, Semi-government and including small clinics). There need to be a different section for HCWM in the HCI with government approved Guidelines/ Policy New HCI registration should not be approved without sound HCWM system. There should also be system of renewal of license only if HCWM is maintained soundly.

Separate and adequate budget should be allocated for HCWM in all HCI. There should be an active HCWM committee in HCI and all the HCWM activities should be implemented through the committee. Reduction, Reuse and recycle should be promoted through a separate responsible body.

Awareness should be raised among lower level workers as well as among Management level staffs regarding HCWM. Basic training and refresher training should be provided to all Health Care Institutions.

Some of the respondent said HCW should be managed by Health Care Institutions themselves. Waste should be segregated by hospital and common treatment/disposal should be build with financial and technical contribution of all HCIs in a particular area. Appropriate area should be made available for disposal of solid waste. And there should be provision of incinerators in all HCIs. And some of respondent gave the views that Municipality should take all the responsibilities for the safe treatment and disposal of HCW including hazardous waste.

Chapter V

Discussion

Rapid study on the assessment on health care waste management in Nepal was conducted in 24 HCIs of Nepal from 4 development regions. This was a cross sectional study conducted by visiting to the purposively selected HCI and interviewing and observing the HCIs. Since, these HCI were purposively selected and less sample size, there is limitation in the generalization of this study. However, this study is able to present a scenario of HCWM in context of Nepal. In addition to field study, policies and relevant publications were reviewed and efforts have been made to find out the gap in policy and practice.

There was no practice of waste quantification in HCI in Nepal. Among the surveyed HCI, only 33.4 percent was found to follow guideline (NHCWMG or WHO guideline). Although NHCWM guideline was circulated in all HCI for its implementation 5 years ago, two-third of HCI did not use it. The reasons for not using the guideline were either they did not know about it, they were not sensitized or they were not trained to use the guideline. The guideline was circulated in all health institutions in 2002 but it seems that mere circulation of guideline is not enough to sensitize and motivate them to follow it.

The responsibilities of waste management in the surveyed HCI were taken by different departments within HCI. Mainly, housekeeping department and chief of the HCI were termed as responsible body for the management of HCW in the HCI.

Management committee was present in only 25 percent of surveyed HCI and one third of them are considered as responsible body for the HCWM and in rest two third they were inactive. However, none of the HCI had waste management plan.

Fifty percent of the HCI coordinated with municipality indicating that municipality is definitely a major stake holder and player in HCWM. Some HCI also managed HCW with coordination with other HCIs.

Among the surveyed HCI, all practiced reuse. This includes reuse of gloves, kidney trays, instrument etc after autoclaving. None of he HCI had re-cycle plant. Some were found to

reduce waste by selling them such as plastic saline bottles, cartoon papers etc. However, this was found to be done by waste handles and for their financial benefits. A previous study conducted by Paudel K (2005), also showed the similar results i.e reuse was practiced by 100 percent of the HCI, recycle by none and reduction and avoidance by some among the 5 surveyed HCIs

Encouraging aspect was seen in waste collection as cent percent of the HCI were found to collect waste at generation site and all used puncture proof container for sharps (needle and used syringe). Almost all of HCI were aware that waste should be segregated. All segregated sharp waste that posses double risk of injury and infection. Waste segregation of at least three categories of general, hazardous and sharp was tried by all HCIs. But it was not properly implemented. HCI following guideline had better segregation practice than those not using guidelines.

The common problem mentioned for not successfully implementation of waste was lack of monitoring system in this regard. In addition, there were no facilities to treat the waste separately and the segregated waste was also transported together minimizing the importance of segregation in HCI. There were also complaining of unavailability of different colored bucket in the market limiting the use of colors coding.

Use of transportation trolley was very limited i.e. 33 percent. Among guideline users, it was 75 percent in compared to only 12.5 percent in non users the manual transportation of waste has potential hazard on the waste handlers. Especially in the situation where only 29.2 percent of HCI provided vaccination and 42 percent had not received any orientation or training regarding risk of HCW handling. In addition, although 91 percent were using gloves, this was not the utility gloves.

Using trolley was not considered as important because they were habitual to take these manually ante there were not trolley path from waste generation site to disposal or treatment site. Separate storage for hazardous waste was found in only 25 percent of HCI. The major reason was hazardous waste was not treated separately and was transported collectively with general waste.

Incineration was present in only 25 percent of the HCI and 3 out of these 6 incinerators were not functioning at the time of field visit. There was lack of technical expertise available in local context for maintenance of incinerator.

Autoclave was present in all HCI whereas safe burial was practiced in 45.8 percent. Mostly pathological waste such as placenta and body part was disposed in these pits. Community was actively taking action against that pathological waste if seen in public place. SO, HCI expressed mandatory to dispose at least pathological waste safely.

All surveyed HCI were sound to use cost effective simple ways of waste treatment/disposal. Brick/Drum incinerator was locally made and used by most of HCIs. The suitable options recommended for Nepal by the study conducted by NHRC are incinerator, autoclave, chemical disinfection, sanitary landfill and safe burial methods, as these methods were easy, safe and cost effective. (NHRC, 2002)

There was not much difference seen in technique used to dispose and treat general waste and hazardous waste. General waste was taken by municipality. However, 12.5 percent of HCI disposed Hazardous waste in municipality container. Burning was practiced openly and in drum/brick incinerator. However, mixed method of burning, dumping and burying was also found to practices.

Although sharps were effectively segregated, 41.7 percent practiced open burning and dumping of the remains. However 12.5 percent disposed it off in municipality container. Liquid waste was not found to be treated except in two HCIs. Others simply dispose it without disinfecting in the toilet or drainage.Pharmaceuticals waste were mostly returned back to suppliers, 17.4 percent burn it and 13 percent dump it.

No regular monitoring system was found in any HCI. However, onsite supervision and observation of sites were practiced in almost all. Specially Private HCIs were more sensitive for cleanliness as they reported that cleanliness was considered as one of the indicators of their quality service by the clients.

Both policy and implementation level problems were faced by the health care institutions. It was noticed that although segregation was tried to practice, the waste were transported and disposed together. There was seen lack of appropriate treatment/facility. Similar findings was

reflected in study conducted by ENPHO and KMC (2000), Rana and Malla (2001) and Shrestha Chippi (2005). There was no path seen for the transportation of waste in a trolley and the use of trolley was also minimal. There was lack of space for waste disposal and treatment in many HCI. It was primarily because these HCIs were located within residential areas with little space around. In addition, the public also protested for the use of incinerator in these areas.

Till now no trend has been seen to separate budget for Health Care Waste Management. In government HCI, the budget is already allocated by the National Planning Commission and Ministry of Finance in the different budget headings that can not be changed by the local authority. As no specific budget is separated for the HCWM, there is no availability of capital investment for the establishment of treatment facilities in the surveyed HCIs.

In most of the HCIs, the sanitary staff did not use PPE. However, Sapkota, Adhikari and Devkota (2003) had stated that high proportion of waste handlers were found to be exposed to the risks associated with medical waste handling and were unaware of risk associated with health care waste. Similarly Pyakurel et al (2005) mentioned that occupational health safety was not given due attention by the management and the waste handlers were unaware about their health.

The study also revealed that none of the HCI had any monitoring system and the efficiency and effectiveness of the HCWM evaluated through direct observation and onsite supervision. Moreover, Health Care Waste is responsibility of Housekeeping department and other departments in most of the HCIs and there is no active committee. These departments are implementers with less authority of decision making.

Chapter VI

Conclusion

Health Care Waste management is poorly addressed despite of knowledge of hazards attached to it. Except few environment protection legal provisions, no any legal instruments are available for Health Care Waste. Although an Obligatory waste management plans for healthcare facilities has been prepared but is in process for parliament approval. Logistic Management strategy has also included health care waste management as one of its objectives and is planned for implementation. NHRC with support of WHO also developed and National Health Care Waste Management Guideline and circulated all the HCI of Nepal but its implementation was not effectively done in many HCIs. The major issue was being unaware of and not sensitized enough to not to use the guideline.

Some HCI have tried to manage their wastes by applying advanced exported technology that could not remained functional for long due to high running cost, lack of spare parts and skilled human resource. Many other institutions are manging their wastes by adopting poor method using earthen trenches in unsafe sites with low depth, buring in low temperature incinerators and futher on many institutions were found dumping the waste in nearby rivers, ponds corners of hospital buildings or anywhere around the premises. For many public and private institutions in urban areas the common practice is to use municipal waste container without any pre treatment to hazardous waste. Liquid wastes including hazardous chemicals are not addressed in HCIs.

The management of HCI do not have any policy and/or monitoring system for the effective management of HCI. The occupational health is an neglected issue. Most of the HCI do not provide vaccination to the sanitary staffs and sanitary staffs are not obligated to use Personal Protective Equipments for their protection. However, the practice among the guideline users was better than among the non users.

Chapter VI

RECOMMENDATIONS

- At policy level
  - There needs to be a national policy on Health Care Waste Management
  - There needs to be legal provision for punishment and reward for effective management of Health Care Waste
  - A central authorized body is necessary for monitoring of HCWM
  - Further action needed
- At practice level
  - Installment of cost effective, simple and safe treatment/disposal of HCW
  - Central treatment facility is necessary in big municipalities (Kathmandu, Pokhara, Biratnagar)
  - Formation of Committee and practice Waste Management in a team
  - Regular planning and monitoring of HCWM in the HCI
  - Vaccination, training and supply of PPE to sanitary staffs should be practiced without delay
  - Proper recording of waste related accidents/incidents for evaluating effectiveness of HCWM

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Annex 1- List of Selected Health Care Institutes for Study

SN	Name of Health Care Institution	Type	District	Zone	Developme nt Region	Remarks
1	TUTH	Teaching Hospital	Kathmandu	Bagmati	Central	*
2	Bhaktapur Hospital	Government Hospital	Bhaktapur	Bagmati	Central	
3	Maternity Hospital	Government Hospital	Kathmandu	Bagmati	Central	*
4	Martyer Gangalal National & Heart Center	Semi-Goverment Hospital	Kathmandu	Bagmati	Central	
5	Patan Hospital	Community Hospital	Lalitpur	Bagmati	Central	
6	National Academy of Medical Science	Government Hospital	Kathmandu	Bagmati	Central	
7	Kathmandu Model Hospital	Private Hospital	Kathmandu	Bagmati	Central	*
8	Tilganga Eye Hospital	Private Hospital	Kathmandu	Bagmati	Central	*
9	Om Nursing Home	Nursing Home	Kathmandu	Bagmati	Central	
10	National Kidney Center	NGO Hospial	Kathmandu	Bagmati	Central	
11	BP Koirala Memorial Cancer Hospital	Semi-Government Hospital	Chitwan	Narayani	Central	
12	Central Development Regional Hospital	Government Hospital	Chitwan	Narayani	Central	
13	Bharatpur Medical College	Private Hospital	Chitwan	Narayani	Central	*
14	Jaya Budha Hospital	Nursing Home	Chitwan	Narayani	Central	
15	Narayani Community Hospital	Nursing Home	Chitwan	Narayani	Central	
16	Manakamana Nursing Home	Nursing Home	Chitwan	Narayani	Central	
17	District Hospital Makwanpur	Government Hospital	Hetuda	Makwanpur	Central	
18	Koshi Zonal Hospital	Government Hospital	Morang	Koshi	Eastern	
19	Birat Nursing Home	Private Hospital	Morang	Koshi	Eastern	
20	Novel College of Medical Science	Private Hospital	Morang	Koshi	Eastern	
21	BPKIHS	Semi- Government	Sunsari	Koshi	Eastern	
22	Mechi Zonal Hospital	Government Hospital	Jhapa	Mechi	Eastern	
23	Amda Hospital	Private Hospital	Jhapa	Mechi	Eastern	*
24	District Hospital Illam	Government Hospital	Jhapa	Mechi	Eastern	*
25	Fewa City Hospital	Private Hospital	Kaski	Gandaki	Western	
26	Gandaki Regional Hospital	Government Hospital	Kaski	Gandaki	Western	
27	Manipal Teaching Hospital	Private Hospital	Kaski	Gandaki	Western	
28	Regional Tuberculosis Center	Government Hospital	Kaski	Gandaki	Western	*
29	Buddha Hospital	Private Hospital	Kaski	Gandaki	Western	*
30	District Hospital Syanja	Government Hospital	Syanja	Gandaki	Western	
31	District Hospital Parbat	Government Hospital	Parbat	Dhaulagiri	Western	
32	District Hospital Baglung	Government Hospital	Baglung	Dhaulagiri	Western	*
33	Bheri Zonal Hospital	Government Hospital	Banke	Bheri	Mid-western	
34	Nepalgunj Medical College and Hospital	Private Hospital	Banke	Bheri	Mid-western	
35	Mahendra District Hospital	Government Hospital	Dang	Rapti	Mid-western	

* Unable to include in the study

Annex –2
Research Tools

Rapid Assessment Study on the Status of Health Care Waste Management in Nepal

QUESTIONNNAIRE

This is a rapid assessment study on the status of Health care waste management in Nepal conducted by Nepal Health Research Council (NHRC) with support of World Health Organization (WHO). The objective of this study is to assess the current status of the health care waste management activities and prepare a basis to enable medical establishments to comply with guidance and legislation on Health Care Waste Management (HCWM). This hospital has been selected as study unit for the study. This is one of the 30 selected hospitals of Central, Eastern, Western and Mid-western Development Region.

So, we request you to support us by providing us the necessary information for the study. The information provided by you will be confidential and will be used only for purpose of this study. None of the information will be personalized.

Date:.../..../..... (dd/mm/yyyy)

Name of the respondent: .....

Designation: .....

Working in the hospital since: ..../...../..... (dd/mm/yyyy)

GENERAL INFORMATION

1. Name of hospital .....
2. Address: District .....

   Zone .....
3. Year of establishment: ...../...../.....
4. Type of Health Care Institution

   a. Government
      i. Teaching hospital ☐
      ii. Central hospital ☐
      iii. Zonal hospital ☐
      iv. Regional hospital ☐
      v. District hospital ☐

   b. Semi-government ☐

   c. Private
      i.Teaching hospital ☐
      ii.Nursing home ☐
      iii.Private hospital ☐

   d. I/NGO managed ☐

5. Total number of beds: .....
6. Total Staffs of the hospital : ..... Male: ..... Female: .....
7. Total Annual budget of the hospital in the last fiscal year : NRs .....
8. Total number of in-patients in last fiscal year .....
9. Total number of out-patients in last fiscal year .....
10. Bed occupancy rate of last fiscal year .....
11. Total waste generation ..... kg/day (If recorded or estimated)
    General waste .....kg/day **OR** .....% of total waste
    Sharp waste .....kg/day **OR** .....% of total waste
    Others (if any) .....kg/day **OR** .....% of total waste

INFORMATION ON HEALTH CARE WASTE MANAGEMENT

12. Does this hospital have a Waste Management Committee or Team?
    a. Yes ☐ b. No ☐

    If yes, Please list the members with their designation and major responsibilities

SN	Name	Designation	Major Responsibilities	Remarks

13. What regulations or code of conduct does this hospital follows for Health Care Waste Management
    a. None ☐
    b. National Health Care Waste Management Guidelines ☐
    c. Medical Waste Management Guideline ☐
    d. Self developed protocol (Please provide a copy) ☐
    e. Others (Specify and please provide a copy) .....
14. Do you have waste management plan in this hospital?
    a. Yes ☐ b. No ☐

    (Please provide a copy)

If yes, have you followed the plan?

a. Yes ☐ b. No ☐

15. Do you have waste management policy adapted in the hospital?

a. Yes ☐ b. No ☐

If yes, how?

a. Avoidance ☐
b. Reduction ☐
c. Re-use ☐
d. Recycling ☐
e. Others (Specify) .....

16. What % of the hospital budget has been allocated for the Health Care Waste Management in the last fiscal year? .....
Total budget allocated in HCWM in last fiscal year : NRs .....
Not calculated ☐

17. What was the actual cost for Health Care Waste Management in this hospital in the last fiscal year?

NRs .....

18. How much would you like to pay per year if anyone would like to manage the health care waste of this hospital?
NRs .....

19. Have the staffs of this hospital received training in Health Care Waste Management?

a. Yes ☐ b. No ☐

If yes, how many of the staffs have received training (excluding refresher training)?

..... Male ..... Female .....

20. Are there any newly recruited staffs in this hospital in the last fiscal year?

a. Yes ☐ b. No ☐

21. Have the newly recruited staffs received training or instruction in Health Care Waste Management?

a. Yes ☐ b. No ☐

22. Are the sanitary staffs (those involved in collection, handling, storage and disposal) given vaccination?

a. Yes ☐ b. No ☐

If yes, specify.....

23. Please tick (✓) the appropriate adequacy of following supplies for the efficient management of health care waste in this hospital

SN	Supplies	More than sufficient	Sufficient	Not sufficient
1	Waste containers			
2	Plastic Bags			
3	Apron			
4	Masks			

5	Gloves			
6	Boot			
7	Collection Trolley			
8	Others (Specify)			

24. How are the following types of waste managed in this hospital?

SN	Type of waste	Method used to manage	Remarks
1	**General waste** *(Eg: Paper, Cardboard, Kitchen waste, metal containers etc)*		
2	**Hazardous waste** *(Eg: Used cotton, gauze, soiled bandage, blood bags, human and animal tissues, body parts etc)*		
3	**Sharps** *(Eg: needles, syringe, blades, broken glass, infusion sets, saws, knives)*		
4	**Radio active waste** *(Eg: Waste generated from radiology department)*		
5	**Liquid waste** *(Eg:waste waterdischarged, blood etc)*		
6	**Pressurized container** *(Eg; Pressurized cylinder, cartridge, aerosol canes)*		
7	**Pharmaceutical** *(Eg :Unused, expired, spilt, contaminated drugs, vaccines, sera etc)*		

25. Do you have your own health care waste management disposal sites in within this hospital premises?
    a. Yes ☐
    b. No ☐
    c. Partly ☐
    Specify for which waste

If not, who takes the wastes?.....

26. Who does generally transport the health care wastes from the hospital?
    a. Hospital itself ☐

b. Municipal service ☐
c. Private company or contractor (Specify) ☐

27. When do you dispose the health care waste from the hospital premises?
    a. Within 24 hours ☐
    b. After 24 hours ☐
    c. Not scheduled (Whenever necessary) ☐

28. Do you keep the records of injuries/accidents/incidents regarding health care waste management in this hospital?
    a. Yes ☐ b. No ☐
    If yes, how many incidents have occurred in last fiscal year? .....
    With staffs .....
    With visitors .....
    With transporters .....
    Others (Specify) .....

29. Do you have any monitoring system for monitoring efficient and appropriate management of health care waste in this hospital?
    a. Yes ☐
    b. No ☐

If yes, Please explain in short

.....
.....
.....
.....
.....

30. What problems are generally faced and what are the possible solutions for the effective and efficient management of health care waste in this hospital?

Problems faced	Possible solution

31. What are the limitations that you face for the effective and efficient management of health care waste in this hospital?

32. What are the strengths and weaknesses of health care waste management in this hospital?

Strengths	Weakness

33. In your opinion, what steps should be taken for the sound management of health care waste in Nepal?

Annex-3
Steering Committee for Conducting
"Rapid assessment study on the status of Health Care Waste Management in Nepal"

1.	Dr. Sharad Raj Onta, Member-Secretary , NHRC	Coordinator
2.	Dr. Shinendra Uprety, Focal Person, Environmental Health, MOHP	Member
3.	Joint –Secretary, Environment Division, MOEST	Member
4.	The Chief, Environment Section, MOLD	Member
5.	The Director, Management Division, DOHS Teku	Member
6.	The Chief, Environment Division, Kathmandu Metropolitian City	Member
7.	Dr. Baburam Marashini, SPHA , Health Sector Reform Unit, MOHP	Member
8.	Mr. Han Heijnen, Environmental Health Advisor, WHO	Member
9.	The Representative, Nursing Home Association of Nepal	Member
10.	The Representative, Consumer Association Nepal	Member
11.	The Representative, Pro- Public Nepal	Member
12.	Dr. Sushil Koirala, HCWM Expert	Member
13.	The President, Nepal Medical Council	Member

Annex-4
Name list of participants of Dissemination Workshop

Dissemination Workshop on Health Care Waste Management in Nepal
Date: 31st December 2007
Venue: Hotel Shanker, Lazimpat, Kathmandu, Nepal.

S. N.	Name	Organization	Remarks
1	Mr. Deepak K. C.	BPKIHS, Dharan	
2	Mr. Gobind Katuwal	Koshi Zonal Hospital, Biratnager	
3	Mr. T. N. Rawal	NGMC-TH, Kohalpur, Banke	
4	Ms. Durga Laxmi Shrestha	Mahendra Hospital, Dang	
5	Ms. Bindu Gurung	Kathmandu Model Hospital	
6	Ms. Nirala Chitrakar	TUTH, Maharajgunj	
7	Dr. Ashok Bajracharya	Bir Hospital, Kathmandu	
8	Mr. Toya Nath Dawadi	NKC	
9	Mr. J. B. Karki	DPHO, Bhaktpur	
10	Mr. Bikash Adhikari	W. R. Hospital, Pokhara	
11	Mr. Russ Parisean	HECAF, Kathmandu	
12	Mr. Amar Singh Thapa	AVA Media	
13	Mr. Dhrub Bahadur Basnet	NMCTH, Jorpati	
14	Mr. Laxman Adhikari	Kamana Publication	
15	Mr. Mahesh Nakarmi	HCWMP/HECAF	
16	Ms. Saraswoti Thakuri	HCWM/HECAF	
17	Ms. Ishani Shrestha	Kidney Center, Kathamdu	
18	Mrs. Bhuna Bhandari	Patan Hospital, Lalitpur	
19	Mr. Arjun Bahadur Singh	NHTC, MOHP	
20	Mr. Rishi Prasad Lamichane	DPHO Lalitpur	
21	Mrs. Sumitra Devi Shrestha	MOHP	
22	Dr. Sudha Sharma	PMWH	
23	Mr. Suman Dahal	NHEICC, MOHP	
24	Mr. Ramesh Bhusal	CDES/TU	
25	Ms. Nita Dongol	SGNHC	
26	Mr. Narayan Gyawali	MLD, Laitpur	
27	Dr. Bimal Dhakal	Bhaktapur Hospital	
28	Dr. S.S Tiwari	Management Division, MOHP	
29	Mr. Bhusan Tuladhar	ENPHO	
30	Mrs. Jaya Laxmi Shayka	Management Division, MOHP	
31	Bandana Pradhan	IOM, Maharajgunj	
32	Dr. Gyanu Basnet	Maternity Hospital	
33	Mr. Giri Raj Subedi	MOHP	
34	Mr. Mukunda Raj Gautam	MOHP	
35	Ms. Daya Laxmi Vaidya	Nepal Nursing Council	
36	Ms. Bijaya Kumari Prasain	NPCS	
37	Mr. Laxmi Raj Joshi	NHEICC	
38	Mr. K. R. Parajuli	Management Division, MOHP	
39	Mr. G. S. Pokhrel	Management Division	
40	Mr. K. P. Dhakal	Management Division	
41	Ms. Rita Joshi	Management Division	
42	Ms. Meena Khanal	MOEST	
43	Mr. Dipendra Bahadur Oli	SWMRMC, Laitpur	
44	Mr. Chuda Mani Bhandari	DPHO, KTM	
45	Dr. B. R. Marasaini	MOHP	
46	Ms. Roshnee Shrestha	KMCTH	
47	Mr. Nabraj Bhatta	Management Division, MOHP	

S. N.	Name	Organization	Remarks
48	Mr. Kapil Mani Acharya	Nature Nepal	
49	Ms. Sapana Wagle	RSS	
50	Ms. Uttama Ghimire	RSS	
51	Mr. Shanker Shah	Samaya Sarad	
52	Mr. Deepesh	ANA.COM	
53	Mr. Ashok Raj	Metro FM	
54	Mr. Makal Shrestha	Kantipur	
55	Ms. Poonam Maharjan	Kantipur	
56	Mr. Satish Sharma	Pratipaksya	
57	Mr. Ram Chandra	Rajadhani	
58	Mr. Purna Basnet	N. Mata Weekly	
59	Mr. Nabin Aryal	Gorkha F.M	
60	Mr. Shib Raj Bhattarai	HNNK	
61	Ms. Salabi Biswas	Lok Prabah	
62	Mr. Sudip K. C.	Times	
63	Mr. Subodh	ANA	
64	Ms. Kanchan	ANA	
65	Ms. Laxmi Khatiwada	Gorkhapatra	
66	Mr. Nischal Rijal	Freelancer	
67	Mr. Kumar Panthi	Rajdhani	
68	Dr. Mahesh Maskey	NHRC	
69	Dr. Sharad Onta	NHRC	
70	Ms. Pearl Banmali	NHRC	
71	Mr. Meghnath Dhimal	NHRC	
72	Mr. Nirbhay K. Sharma	NHRC	
73	Mr. Subodh K. Karna	NHRC	
74	Mr. Purushottam Dhakal	NHRC	
75	Ms. Shailee Singh Rathor	NHRC	
76	Mr. Bijay Kumar Jha	NHRC	
77	Mr. Gopal Prajapati	NHRC	
78	Mr. Chandra Bhusan Yadav	NHRC	
79	Ms. Archana Shrestha	NHRC	
80	Ms. Nisha Rana	NHRC	
81	Ms. Sanju Bhattarai	NHRC	
82	Ms. Milima Singh Dangol	NHRC	
83	Ms. Alina Maharjan	NHRC	
84	Ms. Dipika Das	NHRC	
85	Mr. Puka Lal Ghising	NHRC	
86	Mr. Ajay K. Lal Karna	NHRC	
87	Mr. Saraswoti Prasad Bhattarai	NHRC	
88	Mr. Min Bahadur Ghising	NHRC	
89	Ms. Bina Sitaula	NHRC	
90	Mr. Lal Bahdur Ghising	NHRC	
91	Mr. Bir Bahadur Ghising	NHRC	
92	Mr. Man Dhowj Tamang	NHRC	
93	Mr. Buddhi Man Limbu	NHRC	
94	Mr. Maheshwor Chaudhari	NHRC	
95	Mr. Ram Prasad Pokharel	NHRC	
94	Mr. Lok Bikram Chauhan	NHRC	
95	Ms. Kamala Pode	NHRC	
96	Ms. Goma Khadka	NHRC	

Annex-5
Result of Group Discussion

Following recommendations have come forward as a result of group discussion

Policy Level

- Health Care waste management should be a national priority program
- There needs be formulation of a steering body representing stakeholders that would formulate the guidelines/acts and dissemination and later finalize.
- There needs to be a clear policy of solid waste management. There is need of policy guideline, operational guideline for health sector, operational strategy, indicators and training guideline for the proper management of Health Care Waste Management
- There needs to be formulation of a standard mandatory to.follow by each health care institution.
- A legal act for health care waste management in important
- The responsible/authorized body for the management of Health Care Waste Management should be clearly come forward. This organizational body should take the authority and responsibility of implementation of guidelines and acts hence eliminating the overlapping responsibilities of different sectors.
- There should be an authorized center for information dissemination regarding Health Care Waste Management
- The need assessment representing the whole country should be conducted coming up with the real problem and further action to be taken.
- Proposals should be developed for sustainable management of Health Care Waste and search research from different sectors including WHO
- Replicability of National Kidney center should be explored in terms of capital cost, operational cost and impact assessment

Implementation level

- All health care institutions should conduct waste audit and make plan of action to manage health care waste accordingly.
- Training is needed to orient the risk and proper management of health care waste from lower level to the highest level of health care staffs.

- HCI should separate budget for health care waste management.
- There should be a coordination committee and monitoring body at the district level with networking upto FCHV level.
- Central treatment system is necessary for urban areas like Kathamandu, Biratnagar, Pokhara etc.