

CHAPTER II

LITERATURE REVIEW

The researcher has studied and reviewed the concepts and theories from text books, research papers and related documents as a basis for the research approach. The following content has been consulted.

- Health care waste: Definition, hazards and management
- Universal precaution and health behavior
- Relevant researches

2.1 Health Care Waste

2.1.1 Definition

Health care waste includes all the waste generated by health care establishments, research facilities, and laboratories. It also includes waste produced at home during the course of health care (dialysis, insulin injections, etc.).

Between 75-90% of the health care waste is no risk or general waste, comparable to domestic waste. This waste is dealt by the municipal waste disposal mechanisms. The remaining 10-25% of the health care waste is regarded as hazardous and may create a variety of health risks. (WHO, Geneva. 1999.)

2.1.2 Classification of hazardous waste

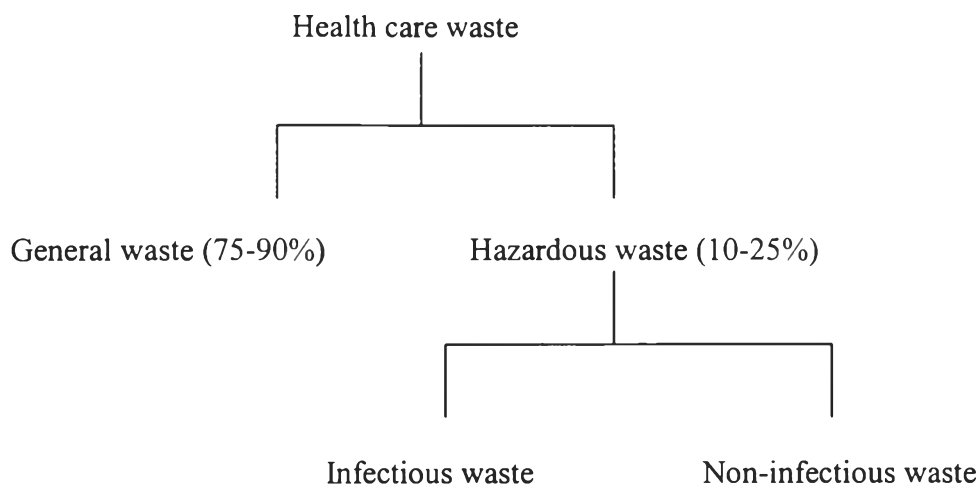


Figure 2 : Classification of hazardous waste

Hazardous wastes are classified into:

- i) Non-infectious waste e.g. pharmaceutical, genotoxic, chemicals, heavy metals, and radioactive wastes.
- ii) Infectious waste includes sharps like needles, infusion sets, scalpels, knives, blades and pathological wastes like human tissues, blood and body fluids.

Infectious wastes and sharps may contain any of a great variety of micro-organisms. Pathogens in the infectious waste may enter human body through puncture, abrasion, cuts, mucous membrane, inhalation or ingestion. Of a variety of micro-organism, particular concern about infection with HIV, hepatitis B and C has been raised. (WHO, Geneva. 1999). These viruses are generally transmitted through injuries

from used needles contaminated by human blood. Sharps not only cause cuts and punctures but also infect wounds if they are contaminated. Therefore sharps are considered as a very hazardous waste class.

2.1.3 Infectious waste management

The key to effective management of infectious waste includes segregation, collection, transport, storage, treatment and disposal of the waste.

- i) Segregation of infectious waste should be carried out at the origin of the waste and it is always the responsibility of the waste producer. Waste are sorted into colour coded plastic bags or containers. The bags should be tough, able to sustain heavy weight, water proof and resistant to chemicals. The bags should vary in size with enough capacity to contain infectious waste of no more than one day. The colour of the bag should be obvious and marked with bio-hazardous symbol.

Sharps are collected together, regardless of whether or not they are contaminated. Containers should be puncture proof (made of metal or high density plastic), tamper proof, rigid, impermeable and fitted with covers and marked with bio-hazardous symbol. Liquid infectious wastes such as sputum, discharges and blood are collected in bottles.

- ii) Collection of the infectious wastes: Nursing and other clinical staff should ensure that waste bags are tightly closed or sealed when they are 3/4th full at the neck. The bags should be labeled with name of ward and the contents. Sealed sharp containers should be labeled and placed in yellow infectious bags.

iii) On site transport: Infectious waste should be transported within hospital by means of wheeled trolleys, containers or cart solely dedicated for it. The cart should be smooth, strong, rust free and water resistant with no leakage at the seam. It should be easy to load, unload and cleaned. It also has a floor drain for cleaning purpose. The staff responsible for carrying the waste should be trained to follow the following:

- Clean the cart with disinfectant everyday after work is completed.
- Examine the waste bags have no leakage and firmly fastened.
- Hold the fallen wastes correctly.
- Dress properly with gloves, aprons and rubber boots (PPE) while working.
- After duty to take off the PPE and soak in 0.5% sodium hypochlorite solution for 30 minutes and wash them. Take bath immediately after daily work.
- The transfer route for infectious wastes should be quickest possible and widely acknowledged in the hospital. The waste bags should not be dragged or thrown or embraced.

iv) Storage: Infectious wastes should be stored within the boundary of health or research facility. The waste in bags or container should be stored in separate area, room or building. If refrigerated room is not available, storage time (between production and treatment) should not exceed the following:

Temperate climate: 72 hours in winter and 48 hours in summer

Warm climate : 48 hours in cool season and 24 hours during hot season

v) Treatment and disposal of infectious waste: treatment is defined as a process that changes the character of infectious waste to render them non-infectious. It may or may not reduce waste volume or make it unrecognizable. Various treatment options are available like Incineration, Chemical disinfection, Wet or Dry thermal treatment, Microwave irradiation, Land disposal and Inertization. There is no ideal or perfect waste treatment method, and all the technologies have both advantages and disadvantages. Hospitals select a treatment method based on treatment effectiveness, investment, maintenance, service costs, hazardousness of post-treatment residues and environmental pollution. Almost all the treatment options are suitable for infectious waste and sharps, except inertization.

Disposal is the final placement of treated or acceptable untreated wastes and/ or their residues may be land filled.

2.2 Universal Precautions (UP)

Universal precaution guideline has been introduced by center for disease control and prevention (CDC) of United States of America in 1985 to combat the spread of human immunodeficiency virus and other blood borne pathogens like hepatitis A, B, and C in health care setting. Under UP, blood and other body fluids containing visible blood, semen, and vaginal secretions are considered potentially infectious for HIV, HBV and other blood borne pathogens. UP also applies to tissues and to the following fluids: cerebrospinal, synovial, pleural, peritoneal, pericardial and amniotic fluids. The guideline does not apply to feces, nasal secretions, sputum, sweat, tears, urine and

vomit unless they contain visible blood. UP do not apply to saliva except when visibly contaminated with blood or in the dental setting where blood contamination of saliva is predictable.

Universal precautions involve the use of protective barriers such as gloves, aprons, masks or protective eyewear, which can reduce the risk of exposure of the health care worker's skin or mucous membranes to potentially infective materials. The guidelines also recommend that all health workers take precautions to prevent injuries caused by needles, scalpels and other sharp instruments or devices.

Pregnant health care workers are not known to be at greater risk of contracting HIV infection than others who are not pregnant; however, if a health care worker develops HIV infection during pregnancy, the infant is at risk of infection resulting from perinatal transmission. Therefore, pregnant health care workers should be especially familiar with, and strictly adhere to, precautions to minimize the risk of HIV transmission.

2.3 Health Behavior

Behavior is the way people act in general especially in relation to a situation they are in or the people they are with, or is the typical way in which it functions. (Collins Cobuild. 1993.) Behavior is individual's psychological action or response to action; interaction to internal or external stimulus; and activities with observable objectives; or activities upon discretion or unconsciousness. (Longman. 1984). Thus behavior can be defined as action or expression of a person in response to mental and

external stimulus. Those action can be consciously or subconsciously noticeable by other living creatures and that the person himself.

Preserving your health and health of the population will require the acquisition of new information and the development of new skills through vicarious learning or learning through observation. Vicarious learning requires cognitive activity which must be an important aspect of any comprehensive theory of human behavior. Two cognitive processes that are especially influential over behavior are outcome efficacy expectations and self-efficacy expectations (Bandura, 1997). Based on Bandura's social cognitive theory several self-directed behavior approach models have been constructed. The most relevant model for this research is the health belief model. This is the oldest and most widely used model specifically developed to explain health behavior.

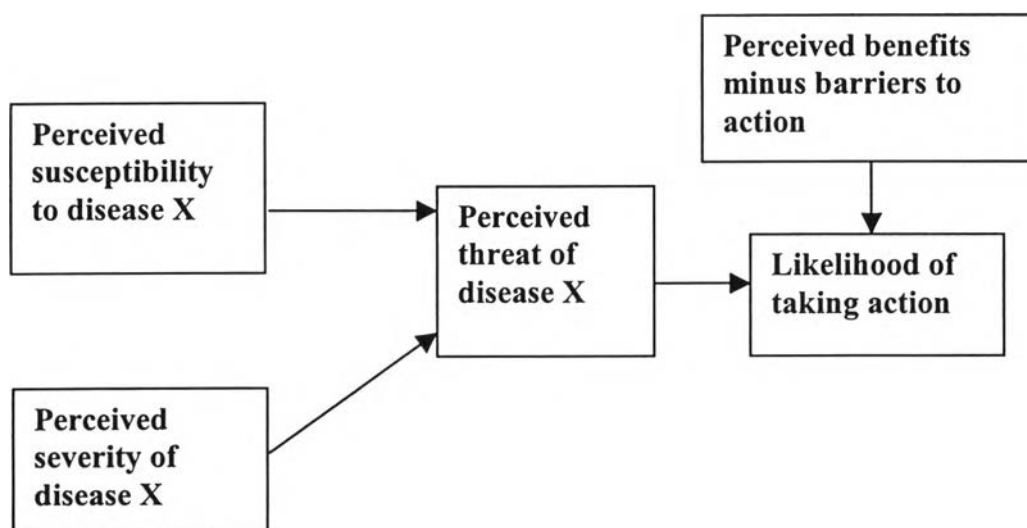


Figure 3 : Diagram of the health belief model

There are four major types of beliefs that influence the likelihood of taking action that is relevant to a given disease or condition. The perception of threat of the

condition or disease is combined with perception of behavior to yield the likelihood of action. Thus, the highest likelihood of action occurs when the perceived threat of the disease is high and the perceived benefits of the health behavior outweigh the barriers. (Kaplan, et. Al. 1993). The above four major areas can reflect the knowledge; attitude and behavior of health care workers towards proper management of infectious wastes.

Knowledge is defined as information and understanding about a subject which a person has in mind or which is shared by all human beings, or facts or experiences known by a person or group of people through experience or learning. (Collins. 1993). Knowledge is reflection of immediate or general issues, methods, procedures, or situations, with focus on memory. (Bloom, et al. 1971.) In this study the knowledge about the infectious wastes means information and understanding about the hazards, segregation, collection, transport, storage, treatment and disposal of the infectious wastes. There are many knowledge measuring tools. Each tool suits to measure different kinds of knowledge. Here the most popular tool, a test (Boontham Kijpredaborisuthi. 1998.) will be discussed. A test or exam is regarded as stimulant, i.e. arousing test takers to express their responses through certain actions such as speaking, writing, and acting, so as to notice or come up with numbers that can represent level of qualification of a person. The three forms of tests are oral, written and practical. The researcher has chosen written limited answer multiple choices as a form of test for the health care workers.

Attitude is defined as the way a person view something or tends to behave towards it, often in an evaluative way. (Collins. 1993.) Attitude can be defined as likes

and dislikes, biases, views, feelings concerning a particular thing or issue. (Thurston. 1967.) Attitude can be classified as normal, specific, positive and negative. There are many ways of measuring attitude like Therstone, Likert, Guttman and Osgood's measurement scales. Each method has its own pros and cons and thus suits different types of attitude. The researcher has chosen Likert scale to measure the attitude of the health care workers in the proper management of infectious wastes.

Behavior, the major types are:

- i) Overt behavior which is noticeable from outside. It comprises of molar and molecular behavior.
- ii) Covert behavior which is unnoticeable with eyes thus requires tool in measuring and examining. It consists of feelings, perceiving, remembering and thinking and making decisions.

Behavior of a person changes in line with development throughout life time i.e. from womb to tomb. Changes in behavior can be brought about by force (social laws), imitation of role models (parents, teachers and actors) and acceptance of its merit. The noticeable overt behavior can be studied by both direct and indirect observations. The unnoticeable covert behavior can be studied by indirect methods like interviews, tests and experiments. The study of behavior of health care workers and the auxiliary staff consists of both overt and covert behaviors. The researcher will employ indirect behavioral study with questionnaire as research tool.

2.4 Relevant Documents and Researches

The literature with relation to infectious waste management determined that behavior had strong correlation to level of knowledge, attitude, incentives and equipment availability.

Nartrudee Krasaetanont. 2001. has studied the behavior of nurses in infectious waste management in Bhumibol Adulyadej hospital. It was found that nurses had good attitude towards and good behavior on regular basis regarding infectious waste management. Information exposure, incentives and availability of equipment for infectious waste management were at medium level. Behavior regarding infectious waste management depended on knowledge, attitude, incentives and equipment availability, with statistical significance of 0.05. The behavior of nurses did not rely on information exposure. The suggestions were that the nurses under go an orientation of knowledge of infectious waste management and there should be provision of adequate equipment and more incentives so as to urge nurses to understand and give importance to appropriate infectious waste management.

Chainrong kaewjumnong. 2002. The behavior of sub-district health officers concerning infectious waste management in health center was studied. The behavior of the sub-district health officers concerning infectious waste was found to be high. Factors affecting behavior like acceptance of information on infectious waste management showed a statistical significance at 0.01 where as work experience, number of sub-district health officer showed a negative correlation on the behavior. Recommendation for training of sub-district health officers, establishment of a center

for infectious waste management consultation and supervision and provision of adequate material and equipment was made.

Shafqat Jawaid Sheikh. 1999: Knowledge, attitude and practice of the sanitary workers towards management of hospital waste in Islamabad, Pakistan; The knowledge of sanitary workers were found to be poor while 2/3rd had high attitude and more than half had good practice. Only 1/10th received training. Recommendations were pre-service and in-service training of the hospital sanitary personnel and close and regular supervision.

Jirisuda Kraissak. 2002: Infectious waste management of general hospital in public health zone 9 was studied. It was found that 3 hospitals used incinerators and the rest used steam sterilizers for infectious waste treatment before final disposal in landfill. The average infectious waste generation rate was 0.24kg/bed/day. Most of the infectious waste was generated from medical wards and least from ENT and Eye wards. The knowledge and practice of medical personnel were not significantly correlated with incorrect waste segregation. The knowledge of medical personnel was significantly correlated with practice.

Tarinee Navanuja. 2002: An appropriate management by using infectious waste incinerator ; a case study of hospital under ministry of public health in Nonthaburi. The findings were that the directors needed to formalize the policy, determine appropriate infectious waste practices and budget, especially with regard to using incinerator. Most of the general medical staff had high level of knowledge, but occasional lapses in

practice and behavior. There is relationship between behavior and knowledge and waste management training, there was no relationship between knowledge on infectious waste and numbers of years in service. The recommendations were to develop sound policy and its deployment, especially in using incinerator.

A.O. Coker, K. A. Sikiru, and A. Y. Sangodoyin. 1999: Characterization and management of solid hospital wastes, Ibadan, Nigeria; The average waste generation rate in three strategically selected hospitals was found to be 150gm/head/day. It is likely that a large sized private hospital following well established standard international practice of patient care and hygiene will generate more waste than a public hospital running on limited facilities. No proper waste management practice exists in all the hospitals. Lack of training and equipment for waste handlers was a common feature, particularly in public hospitals.

Dr. Shantanav. P Chitnis. 2001: A pilot project in an attempt to streamline the system of biohazard us waste management at Ruby hall clinic as a part of total quality management approach. The commonest error noted was, the finding of patient dressings in the bedside waste bins thrice. The error of finding syringes in the bedside waste bin helped to address an oversight.

A. Habibur Rahman et al. 1999 : A study of hospital waste management in Dhaka city, Bangladesh. It reveals that only 15% of the hospital waste constitutes hazardous requiring special attention. Unhygienic disposal of hospital waste poses a serious health hazard to city dwellers in general and the scavengers in particular. The hospitals require proper waste management system to minimize the risk to public health and the environment. The waste

generation rate ranges between 0.8 to 1.67kg/bed/day and these includes 15% of hazardous waste.

Blom-Hoffman and J. DuPaul George, 2003: School based health promotion; The effects of a nutrition education program. There was robust increases in knowledge related to healthy eating among students who received nutrition education but changes in eating behaviors were not statistically.

2.5 Summary of Related Research Review

Author	Topic	Results	n
1. Nartrudee Kraesaetanont 2001	Behavior of nurses in Infectious waste management Bhumibol Adulyadej hospital.	Behavior depends on knowledge, Attitude, incentive and equipment availability (p=.05). Does not depend on information exposure.	225 Nurses
2. Chainrong Kaewjumngong 2002.	Behavior of sub-district health officers in inf. waste management.	Behavior affected by acceptance of information sig. (p=.01) and no. of sub-district health officers. Negative correlation with work experience, no. of patients and no. of sub-districts.	304 Sub-district health officers
3. Shafquat Jawaid Sheikh 1999	KAP of sanitary workers towards management of hospital waste, Islamabad, Pakistan.	Knowledge level poor. Attitude 2/3 rd had high. Practice more than half good practice.	259 Sanitary workers
4. Jirisuda Kraisaak 2002.	Infectious waste management of general hospital in public health zone 9.	Knowledge of health workers sig. correlated with practice. Knowledge of sanitary workers not sig. correlated with practice.	788 health workers 126 sanitary workers
5. Tarinee Navaraja 2002.	Appropriate management by using incinerator: A case study of hospital in Nonthaburi	Knowledge, training and work duration are associated with behavior. No association between knowledge and work duration.	185 medical staff.
6. Suthat-Chottanapund 2002	Factors affecting practice of Universal precaution in Bamrasnaradura Institute	UP practice depended on age, level of education, work experience, place of work, previous training, knowledge and attitude. Gender, marital status, work position had no affect on practice.	311 health workers
7. Blom-Hoffman and J DuPaul George 2003	School based health promotion: The effects of nutrition education program. Boston.	Robust increase in knowledge related to healthy eating. Changes in eating behaviors were not statistically significant.	161 students