



COLLECTION AND DISPOSAL OF MEDICAL WASTES IN HEALTH CARE INSTITUTIONS AND THE RISKS TO HEALTH CARE PROVIDERS

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Abstract: The study examined collection and disposal of medical wastes in health care institutions and the risks to health care providers. The population of the study was Nurses, Medical Doctors and Medical Laboratory Scientists drawn from health care institutions in Anambra State of Nigeria. Simple random sampling technique was used in selecting a sample size of 210 respondents. Four research questions were formulated to guide the study. The instrument used for data collection was questionnaire. Frequency distribution and percentages were used for the data analyses, and the result indicated high rate (84.3%) usage of sharps containers in health care institutions as well as low incidence of injuries (35.2%) among the health care workers during the process of disposal of medical wastes.

Keywords: Collection, Disposal, Medical Wastes, Bloodborne Pathogens, Health care Institutions, Health Care Providers.

Introduction:

Handling of all medical wastes demands utilization of universal precautions, treating all used needles, sharps, blood and other medical wastes as potentially infectious (SBD, 2009). According to OSHA (1991), used needle disposal is regulated and requires a licenced medical waste company for disposal. Used needles must be packaged in a puncture proof, leak proof, approved sharps container; and

disposal of all used needles, used syringes, medical sharps and other medical wastes shall be in accordance with all applicable Local, State and Federal regulations.

SBD (2009) has it that medical waste includes blood and other body fluids like semen, vaginal secretions, cerebrospinal fluid (CSF), synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, and any body fluid that is visibly contaminated with blood and body fluids in situations where it is difficult or impossible to differentiate between body fluids. Also included in medical wastes are contaminated bandages, dressings, gauze pads, compresses, lancets, any item contaminated when rendering emergency medical services, gloves, beddings, used needles

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and syringes as well as medical sharps. These are considered “Regulated Waste” under the code of Federal Regulations (CFR 1910.1030). Improper managing or securing of used needles and medical sharps for disposal allows used needles, syringes and other medical sharps to pose a health risk to the public and other workers. Loose used needles thrown illegally into household and other trash containers and bags expose waste management workers to the potential of needle sticks and occupational exposure to bloodborne pathogens incidents. This illegal disposal of used needles and syringes may result in the transmission of HIV, Hepatitis and other serious bloodborne illnesses. ECRI (2001) reports that as healthcare safety research indicates, needlestick injuries, after blood draws, are most likely to occur while removing the blood-drawing needle from the patient’s arm or while disposing of an unprotected needle into a sharps container. Weltman *et al* (1995) cited by Delaune & Ladner (2002) in their study of disposal-related sharps injuries in a teaching hospital observed that out of 361 persons who reported of sharps injuries, 72 of the injuries were related to sharps disposal, and that majority of exposures to hepatitis B virus (HBV) and HIV were caused by sharp objects. The practice of removing contaminated needles and reusing blood tube holders can also pose multiple potential hazards. The manipulation required to remove a contaminated needle (even a safety engineered needle) from a blood tube holder may result in a needlestick with the back end of the needle which is only covered with a rubber sleeve (EPINet, 1993). In addition, contaminated needles and other contaminated sharps shall not be bent, recapped, or removed, unless the employer can demonstrate that no alternative is feasible or that such action is required by a specific medical or dental procedure. For appropriate handling and disposal of contaminating sharps, Bloodborne pathogens Standards (29 CFR 1910.1030) has it that employers must make available, closable, puncture resistant, leakproof sharps containers that are appropriately labeled and color-coded.

The containers must also have an opening that is large enough to accommodate disposal of the entire blood collection assembly (blood tube holder and needle).

Employees must have access to sharps containers that are easily accessible to the immediate area where sharps are used; and if employees move from one location to another (eg from one patient room to another or from one facility to another), the employee must be provided with sharps container which is conveniently placed at each location/facility. According to Delaune & Ladner (2002), other precautionary measures in handling and disposal of contaminating sharps are wearing of gloves in procedures/areas that are at risk of potentially infectious materials, immediate disposal of needle and/or syringe after use by dropping it into a biohazard sharps container from a height no greater than 6 inches, contaminating needle/syringe should not be left in an area with chux and other disposables as this may increase the likelihood of needle sticks, sharps container should be at every bedside in a hospital and next to each gurney during invasive procedures, hands should not be placed into sharps container, lid of sharps container should be closed when $\frac{3}{4}$ full (the container should not be overfilled), use of hemostat or one-hand technique if needle is to be removed from the syringe, and no attempt should be made to push out a vacutainer needle with fingers so as to avoid posterior needle puncture.

Appropriate handling and disposal of other contaminated materials include immediate washing of hands and replacement of gloves when torn, punctured, covered with blood or other potentially infectious materials, disposal of all disposable materials such as gloves, gauze sponges, alcohol pads and/or chux pads in regular trash, and if grossly contaminated dispose in a leak proof, red “Biohazard” bag, always take extra time to look closely for any hidden needles, ampoules or sharp objects when gathering and disposing contaminated materials, dispose of blood specimens in a container that prevents leakage (red “sharp” container), if blood spill occurs, use decontamination

procedures stipulated within the Bloodborne pathogen SOP, and above all use universal precautions and consider all body fluids as potentially infectious materials (CDC, 1987).

It is the responsibility of Health Institutions to finally dispose all the medical wastes collected from the various units. Clark (1999) pointed out that safe disposal of such wastes is important so as to prevent injuries and other hazards like environmental pollution to the community. Choice of method of final disposal of medical wastes in health institutions differ with institutions. Some health institutions may choose a medical waste disposal company as the disposal choice while some may choose incineration with the incinerator installed in the institution.

Incineration is particularly beneficial for treatment of certain waste types such as medical wastes and certain hazardous wastes where toxins and pathogens can be destroyed by high temperature (Onu, 2003). In addition, incineration of waste reduces the solid mass of the original waste by 80 to 85% and the volume by 95%-96% (Lucas & Gilles, 1981; Mckenzie & Pinger, 1997). Other used needle disposal options are Syringe and used Needle Exchange Programmes (SEP) and Sharps Mail-back Services. SEP are established to ensure that used needles are disposed of properly and to decrease the risk of transmission of diseases. SEP also ensure that used needles are exchanged for new needles keeping the used needles out of the public hands (North American Syringe Exchange Network). In Sharps Mail-back Services, new sharps containers are mailed to the home, and when full of used needles and syringes, they are mailed back for destruction. Sharps Mail-back Service is a good safe way to dispose of low volume of used needles and syringes, and it is economical time saver.

Safety-engineered medical devices have been improved and have become more available to health care workers. While engineering controls exist to significantly reduce injuries to health care workers, hazardous work practices continue to cause injuries which could be linked to how medical wastes are handled by health care

workers. Hence, the problem this study addresses is the strategies for disposal of used needles and other medical wastes in health care institutions. Four research questions were used to guide the study, and they are:

- To what extent are sharps containers available in the various units of Health Institutions?
- What methods do Health Institutions adopt for disposal of medical wastes in the various units?
- To what extent do Health care workers sustain injuries during the process of disposal of medical wastes?
- What type of medical waste injure/endanger Health Care Workers most during the process of disposal?

Materials and Methods.

Descriptive survey design was adopted for this study. Ethical approval and respondents' consent were obtained. The population for the study were nurses, medical doctors and medical laboratory scientists drawn from Health Centres, General Hospitals and a Teaching Hospital in Anambra State. Simple random sampling was adopted in selecting a sample size of 210 respondents for the study. The instrument used for data collection was Questionnaire on Disposal of Medical Wastes (QDMW). The questionnaire is made up of sections A and B. Section A of the instrument elicited information on demographic data such as profession, level of health institution, unit of the health institution where the respondent is working and the nature of duty of the respondent. Nurses were coded 1, Medical laboratory scientist were coded 2, while Medical doctors were coded 3. These codes applied as separate factors.

Section B of the instrument elicited information on types of medical wastes disposed of by the various health institutions (eg, used needles, broken injection ampoules, body fluids, dressings, infusion sets, rubber materials etc), the methods used in disposal of medical wastes in the various units, the extent to which health workers sustained injuries during the process of disposal of medical wastes, and the medical wastes that mostly endanger health care workers

during the process of disposal. Reliability coefficient of the instrument was established through test-retest procedure. Copies of the questionnaire were administered to 20 nurses and medical laboratory scientists in a General Hospital that was not used as a sample in the main study. The instrument was administered twice in the same subjects, and the retest interval was two weeks. Using kinder Richards formular **Result.**

21 method of estimating reliability, the reliability coefficient of the instrument was 0.82. The researchers used direct contact approach in collecting data from the respondents. Also the service of research assistants was employed to facilitate the work. The data colleted were analysed using frequency distribution and percentages.

Table 1. Frequency Distribution of Availability of sharps containers

Availability	Frequency	Percentage
Yes	177	84.3
No	33	15.7
Total	210	100

Table 1 shows that the extent of availability of sharps containers was 84.3% while it was unavailable in 15.7% of cases.

Table 2. Unit methods of disposal of medical wastes of different types.

Unit Disposal Methods	Medical wastes											
	Sharps		Body fluid		Dressings		Infusion sets		gloves		Catheters	
	frequency	%	frequency	%	frequency	%	frequency	%	frequency	%	frequency	%
Disposed directly into sharps containers	168	80	9	4.3	9	4.3	8	3.8	4	1.9	7	3.3
Disposed into ward dust bin	30	14.3	43	20.5	53	25.2	84	40.0	112	53.3	60	28.6
Collected first in receivers, and then poured into sharps containers	11	5.2	10	4.8	1	0.5	10	4.8	5	2.4	7	3.3
Disposed in leak-proof plastic bags	1	0.5	56	26.7	90	42.9	52	24.8	42	20.0	64	30.5
Collected in a receiver and disposed in a pit	-	-	77	36.7	38	18.1	35	16.7	40	19	42	20.0
Nil	-	-	15	7.1	19	9.0	21	10.0	7	3.3	30	14.3

Total population N = 210

Table 2 shows the rates of disposal methods for various medical wastes in the units. Sharps containers were directly used in disposal of sharps in 80% of cases, body fluids were collected in receivers and disposed of in pits in 36.7% of cases, dressings were collected in leak-

proof plastic bags in 42.9% of cases, infusion sets and gloves were disposed of in unit dust bins in 40% and 53.3% of cases respectively, while catheters were disposed of in leak-proof plastic bags in 30.5% of cases.

Table 3. Incidence of injuries during disposal of medical wastes

Injuries	Frequency	Percentage
Yes	74	35.2
No	136	64.8
Total	210	100

In table 3, 35.2% of the respondents sustained injuries during disposal of medical wastes while 64.8% did not.

Table 4. Types of medical wastes that cause injuries.

Medical Waste	Frequency	Percentage
Sharps	69	32.9
Body fluid	5	2.4
Nil	135	64.2
Missing value	1	0.5
Total	210	100

Table 4 shows that sharps caused injuries in 32.9% of cases while body fluid caused injuries in 2.4% of cases

Discussion.

Findings from the study show that the extent of availability of sharps containers in the units is 84.3% (table 1). This result although high, still contradicts the stipulations of regulatory standards of Occupational Safety & Health Administration (OSHA). Blood Pathogen Standards (CFR 1010.1030) states that employees must have access to sharps containers, and that sharps containers must be accessible to the immediate area where sharps are used.

The study also indicates that all sharps were not adequately disposed of in sharps containers. In 14.3% of cases, sharps were disposed into unit dust bins while in 0.5% of cases, plastic bags are used to collect sharps (table 2). The implication is that sharps could pierce through the plastic bags and injure the handler; also the wastes collected in the unit dust bins could be finally disposed of in inappropriate locations thereby posing health hazards to people. Occupational Safety and Health Act (Section 5(a) (a)) stipulates that employers must provide their employees with a

workplace free from recognized hazards likely to cause death or serious physical harm. The use of receivers to first collect most of the medical wastes (table 2) gives an impression of inadequate supply of the ideal receptacles (sharps containers for sharps and leak-proof plastic bags for body fluids) to the units by employers. Ideally, there should be 100% supply of these equipment to the units, and this standard should not be compromised.

Findings from the study also indicate incidence of injuries from medical wastes (table 3), and the particular medical wastes that cause the injuries (table 4). This calls for more precautionary measures in handling of medical wastes by health workers. According to CDC (1987) universal precautions should be adopted by health workers in handling and disposal of contaminated materials, and all body fluids should be considered as potentially infected materials. In addition, OSHA's Bloodborne Pathogens Standard (29 CFR 1910.1030) and Delaune & Ladner (2002) warned that contaminated needles and other contaminated sharps shall not be bent or recapped, hands should not be placed into sharps containers and that gloves should be worn in invasive procedures.

Conclusions.

This study has indicated high rate of usage of sharps containers in health care institutions, low rate of injuries among the health care workers during the process of disposal of medical wastes, and that the medical waste that injure health workers most are sharps.

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