Outcomes of Preventive and Control Measures Against Medical Sharps Injuries among Healthcare Workers at Sub-County Hospitals in Mombasa County, Kenya

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ABSTRACT

Healthcare workers(HCW) are at risk of medical sharps injuries. According to the Kenya national policy on injection safety, 58% of healthcare workers have suffered these injuries. It has long been recognized that needle stick and other injuries from sharp objects place healthcare workers at risk of infection. The main objective of this research was to determine the outcomes of preventive and controls measures against medical sharps amongst HCW at Sub-County hospital in Mombasa County. The study sought to determine health workers adherence to safety guidelines available and determine the prevalence of needle-stick injuries at the county hospitals. This study focused on the HCW of different cadres. Questionnaire were distributed to the respondents of different job cadres of healthcare workers at the hospitals including Nurses, Clinical Officers, Lab Technologists, Public health officers, dentists, waste handlers/support staff who were selected proportionate to the sample frame. Interviews were done on the chosen wrkers. The research adopted a Descriptive cross sectional research design by employing both qualitative and quantitative data collection tools. A checklist was used to observe occupational risks and adherence related to exposure to medical sharps including needle sticks. The findings were collected and analysis done by use of Statistical Package for Social Sciences (SPSS), version 22.0 and presented using pie charts, contingency tables, and bar charts. Dentists were found to have the highest level of exposure to sharp injuries [X^2 (DF= 1, N= 117) = 0.408, p= 0.05].This was consistent with the findings that all dentists indicated that they re-cap used sharps. Recapping of sharps being a critical risk to sharp injuries was practiced more by those who got lower frequency of on-job training. On-job training on infection control had no effect on knowledge of risks involved with sharps injuries where those without exhibiting awareness and practiced safe disposal of sharps to a great extent [X^2 (DF= 4, N= 117) = 0.109, p= 0.05]. The use of sharp disposal containers was one of most commonly used method and had significant reduction in exposure to sharp injuries. Personal protective equipment use such as safety boots increased level of protection against medical sharps injuries while others such as hand gloves had insignificant importance. The level of adherence to preventive control measures was found to be quite low and significantly affected the outcomes of the available control measures. Low level of adherence was established at both management level and personnel level where enforcement and practice respectively were found to be deficient. With a prevalence of about 43%, medical sharps injuries at Sub-County hospitals in Mombasa County is found to be of great concern as established in this study.

Introduction

Every day while caring for patients, healthcare workers are at risk of exposure to blood borne pathogens potentially resulting in infections such as HIV or hepatitis B and C. These exposures, while preventable, are often accepted as being a part of the job risk to live with. Every year, hundreds of thousands of health care workers are exposed to deadly viruses such as hepatitis and the Human Immunodeficiency Virus (HIV) as a result of needle stick and sharps injuries. These preventable injuries expose workers to over 20 different blood borne pathogens (CDC, 1998a) and result in an estimated 1,000 infections per year, the most common being hepatitis B, hepatitis C and HIV (International Health Care Worker Safety Center, 1998).

In Kenya, 58% of health workers are at risk of injuries from injection equipment in an estimated 70% of the health facilities (MoH,2007a). One of the main causes of these injuries is inappropriate recapping of the needles which was observed in 30% of health workers (MOH, 2007).A cross sectional study of nurses in Nairobi found that 61% of needle stick and 46% of the injuries occurred due to recapping and 12% in the process of disposing (MoH, 2007). A study at Kenyatta National Hospital on the perceptions of occupational risk of exposure to blood borne pathogens among registered nurses recommends the need for further research on other risk factors which contribute to occupational exposures (Ngesa, 2008).

There are an estimated 100 HIV, 1000 HCV, and over 6,000 HBV infections that occur yearly in Kenya among HCWs due to sharps injury (Taegtmeyer *et al*; 2008).The HCWs in Mombasa County face a community threat with a HIV prevalence standing at a high of 8.1% compared to the national value of 6.3% (MCIP). Increased post exposure prophylaxis (PEP) uptake among HCWs and HIV sero-prevalence rates among patients justify HCP concerns about the risk of exposure hence vigilance when handling blood and other potentially infectious material (OPIM) (Taegtmeyer *et al*; 2008). This study will seek to find out the outcome of the controls currently in use at the sub county hospitals in Mombasa County and the level of protection they offer to the healthcare worker.

Methodology

Research design

The research utilized a Descriptive cross sectional study design. According to Burns and Grove (2001), cross-sectional studies are designed to gain more information about characteristics within a particular field of study at a given point in time and when the researcher is interested in investigating exposure to risk factors and outcomes as well as estimating the prevalence of the outcome within a relatively short time in a population or a subgroup within a population in respect to an outcome and set of risk factors, (Levin Kate 2006).The advantage of descriptive cross-sectional studies is that the information is available immediately and can be carried out within a short period of time (Dicker *et al.*, 2007).

Population

The study population included healthcare workers (doctors, nurses, clinical officers, labortory technologists, Waste collectors, and support staff/cleaners) directly providing services to patients in the sub-county hospitals. They are exposed to sharps during procedures and disposal, hence being at risk of sharp related injuries.

Sampling Frame

The study was conducted amongst HCWs working in the sub-county hospitals within Mombasa County (Kisauni, Nyali, Changamwe, Jomvu Mvita, and Likoni). The sample size consisted of doctors,Clinical Officers, Lab Technologists, Nursing workforce, and Cleaners/ support staff. The Sample size was determined using the formula as used by Fisher, Laing and Stoceckell (Mugenda and Mugenda, 2003) for sample size with a population of over 10,000 as below;

$$n = \frac{Z^2 pqD}{d^2}$$

Where n = the desired sample size if the target is more than 10,000

Z = The standard normal deviate which is 1.96 at 95% CI.

p = The proportion in the population estimated to be at risk (0.58) which is the 58% of health workers at risk in Kenya, (MoH,2007)

$q = 1 - p$ (The proportion in the population not at risk)

d = The level of significance set at 0.05

D = The desired effect which is 1.

$$n = (1.962 \times 1.962) \times 0.58 \times \frac{(1 - 0.58)}{0.05 \times 0.05} = 375$$

The required sample will be $n=375$

But since target population is way below 10,000 the final sample estimate (n_f) will be calculated using

$$n_f = \frac{n}{1 + n/N}$$

n_f =The desired sample size when the population is less than 10,000

N =The estimate of thestudy population size$= 202$

n is the required sample size.

Therefore, the final sample size estimate, n_f;

$$n_f = \frac{375}{1 + 375/202} = 131$$

Table 1.

Job Cadre	Number available	Sample size
Nurses	166	47
Laboratory technologists	54	17
Clinical officers	75	30
Doctors and Dentists	23	5
Public health officers and technicians	9	4
Waste handlers/ Support staff	48	14
Total	**n= 375**	**n= 117**

The demonstrated findings are those derived from 117 out of the 131 administered questionnaires. This goes with other related studies (Wafula, 2012).

Sample and Sampling Technique

A simple random sampling approach was used in selection of the HCW using the simple random method within the Sub-county hospitals. The study design applied the principle of picking the subjects randomly thus reducing selection bias during the process of data collection.

Instruments

A structured questionnaire comprising closed and open ended questions was administered. A questionnaire was utilized to determine the range of engineering controls measures used at Sub-County hospitals. Secondary data was obtained by use of relevant hospital registers, handbooks, manuals, policy guidelines and incident occurrence books.

Data Collection Procedure

The primary data collection methods involved structured interviews, structured questionnaires based on available studies and the international guidelines (WHO, 2010), and observational surveys by use of a checklist, and Data collection was conducted upon receiving approval from the Mombasa County Director of Health, and the Ethical Review Committee. Questionnaires were administered after obtaining HCWs consent and interviews were done on the different cadre of health workers within the selected sample frame at the Sub-County hospital. Socio-Demographic characteristics such as age, gender, Education, Training, occupation, service period, job cadre department of HCP and information regarding working experience as HCP was recorded. In addition, respondents were asked about the frequency of exposure to needle stick injuries that they had in incurred throughout their working time before the start of this study.

Pilot Test

A pilot test involving the structured questionnaire was administered at the Msambweni Hospital in Kwale County for a day, the questionnaires were pretested the English language on 10 randomly picked healthcare workers at Msambweni Hospital,which were answered and returned. The results of the pilot study were used to modify the final draft of the questionnaire.

Data Processing and Analysis

The data was collected through questionnaires and was processed by editing, coding and entering into the computer.

Microsoft Access database was used to enter data collected from all the respondents. The cleaned data was exported to SPSS version 22.0 and MS Excel for analysis. Descriptive statistics such as frequencies and percentages were used to analyze the data. Chi-square was used to test significance of association to determine the statistical significance adherence to the guidelines, and the Outcomes of preventive and controls measures in preventing medical sharps and needle-stick injuries amongst health care workers at the Sub-County Hospitals. The results are presented in pie charts, bar charts and tables.

Results and Discussions

The demonstrated findings are those derived from 117 out of the 131 administered questionnaires with a response rate of 89.4%. This compares well with other related studies (Mangasi, 2009; Wafula, 2012). The participants were derived from all the targeted job cadres, namely: doctors, nurses, clinical officers, lab technologists, Waste collectors, and support staff/cleaners. A simple random sampling approach was used in selection of the HCW using the simple random method within the Sub-county hospitals. The demonstrated findings are those derived from 117 out of the 131 administered questionnaires with a response rate of 89.4%. This agrees with other related studies (Mangasi, 2009; Wafula, 2012).

Social and other demographics of the study population

Out of the 117 respondents, 38.5 % (45) were male and 61.5% (72) female. The majority of the participants were in the 21-30 years age bracket at 39.3% (46), followed by the 31-40 group at 35.9(42). There were 17 (14.5%) respondents between 41-50 years of age, 12 (10.3%) aged over 50 years. The marital status for those who reported as being single, married, divorced stood at 17.9%, 78.6%, 3.5% respectively. The respondents were predominantly diploma holders (52.3%), an indication of the academic qualification for most healthcare personnel at Sub-County healthcare facilities. Others were Bachelor's degree holders (14.1%), and Certificate holders at 13.4% (14). The housekeeping personnel had mainly primary (10.1%) and secondary (6.7%) level of education. Table 4.1 and figures 4.1, 4.2 and 4.3 provides a summary of the traits under social and other demographics of the study population.

Table 2. Social and other demographics.

Variable	Trait	Frequency (N)	Percentage (%)
Gender	Male	45	38.5
	Female	72	61.5
	Total	**117**	**100**
Age (years)	21-30	46	39.3
	31-40	42	35.9
	41-50	17	14.5
	Above 50	12	10.3
	Total	**117**	**100**
Marital Status	Single	21	17.9
	Married	92	78.6
	Divorced	4	3.4
	Total	**117**	**100**
Educational Level	Primary	13	10.1
	Secondary	9	6.7
	Certificate	14	13.4
	Diploma	63	52.3
	Bachelor's degree	18	14.1
	Total	**117**	**100**

Engineering control measures

A majority, 87(74.4%), had access to engineering control measures for sharp injuries and they included retractable needles 14.5 %(17), Needle stick sheath 13.7 %(17), Sharp disposal containers 95.7 %(112) while auto lock syringes at 14.5 %(17). The commonly used and readily available form of engineering control was sharp disposal containers in form of safety boxes at 95.7%.
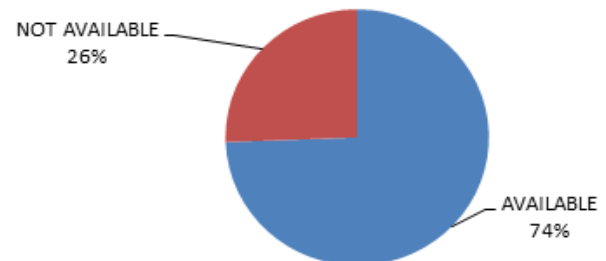
Engineering Controls Availability

Figure 1. Engineering controls availability.

Job cadre description and duration of employment

Majority of the respondents were nurses at 40.2 %(47), clinical officers 25.6 %(17), lab technologists 14.5 %(17), cleaners (12 %), Dentists 4.3 %(5) and public health officers 3.4%. Majority of the workers had spent between 1-10years at 28.2%, 11-20years 11.1%, 21-30 years at 14.5% and over 30years at 6.8%. Majority 65% (76) worked between 5-8 hours while 35 %(41) worked for more than 8hours daily.

Table 3. Job description.

Variable	Response	Frequency (N)	Percentage (%)
Job Cadre	Nurses	47	40.2
	Lab technicians	17	14.5
	Clinical officer	30	25.6
	Public health officer	4	3.4
	Cleaner	14	12.0
	Dentists	5	4.3
	Total	**117**	**100**
Duration of employment	< 1	46	39.3
	1-10	33	28.2
	11-20	13	11.1
	21-30	17	14.5
	>30	8	6.8
	Total	**117**	**100**
Hours worked daily	5-8 hours	76	65
	>8 hours	41	35
	Total	**117**	**100**

Level of adherence to medical sharps control guidelines

Most of the respondents (65%) had professional training on infection control at college level. 41 out of the 117 (35%) had no formal training on infection prevention and control upon commencement of employment. 36.8% (43 out of 117) reported to receive on-job training at least once every year, 23.9% twice a year, 12.8% thrice a year, while 10.3% four times every year. 16.2% of the respondents reported never to have received any on-job training in the course of their employment. 80.3% of participants indicated to have been trained on preventive control measures at some point. On the other hand, 95.7% reported to have been practicing hand washing.

Although, this may indicate improved practice of HCWs, however there is still room for improvement. It implies further training of HCWs in such procedures.

Adherence to control measures is essential to decrease provider to patient (and vice versa) transmission of blood borne pathogens. Several studies have shown inadequate adherence to preventive measures and increased likelihood of injury, such as recapping needles, routinely wearing gloves for phlebotomy, and hand washing after glove removal (Saghafil 1992,Hersey JC 1997).63.2% (74 out of 117) indicated to have been provided with medical sharps handling guidelines at their respective workstations. 89 out of 117 (76.1%) respondents indicated to comprehend the available reporting system in case of exposure through sharps injury. 23.6% reported that there are no reporting systems while 4.3% pointed not to be aware of any reporting systems. A majority 84.6% (99) indicated that they don't recap the sharps after using them while 18 out of the 117 reported that they recap needles and other sharps after use. The risk of injury is directly related to the precautions used. The practice of never recapping needles is associated with an overall reduction in the likelihood of a NSI, compared with recapping at least occasionally.

58.1% reported to be handling metal sharps and another 37.6% to be handling both glass and metal sharps. Only 4.3% indicated to handle bones as sharps. Only 8.5% reported to be using plastic containers for sharps disposal while the majority 87.2% use safety boxes. Notably, 4.3% pointed to have used plastic bags at some point for sharps disposal.

Table 4. Level of adherence to medical sharps handling guidelines.

Variable	Response	Frequency (N)	Percentage (%)
Practice hand washing	Practice	112	95.7
	Do not practice	5	4.3
	Total	**117**	**100**
Sharps handling guidelines	Provided	74	63.2
	Not provided	43	36.8
	Total	**117**	**100**
Accident/incident reporting system	Available	89	76.1
	Not available	23	19.7
	Don't know	5	4.3
	Total	**117**	**100**
Recapping of used sharps	Recaps	18	15.4
	Does not recap	99	84.6
	Total	**117**	**100**
Types of sharps handled	Metals	68	58.1
	Bones	5	4.3
	Metal and glass	44	37.6
	Total	**117**	**100**
Sharps disposal	Safety boxes	102	87.2
	Plastic bags	5	4.3
	Plastic containers	10	8.5
	Total	**117**	**100**
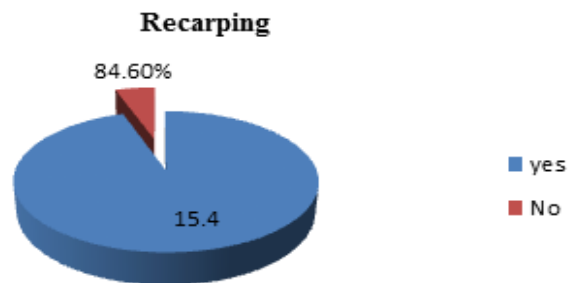
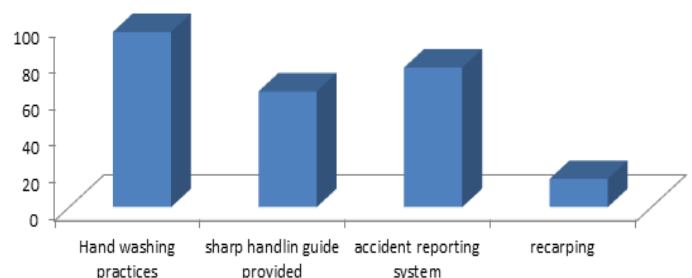**Figure 2. Recapping of the needle before disposal.**

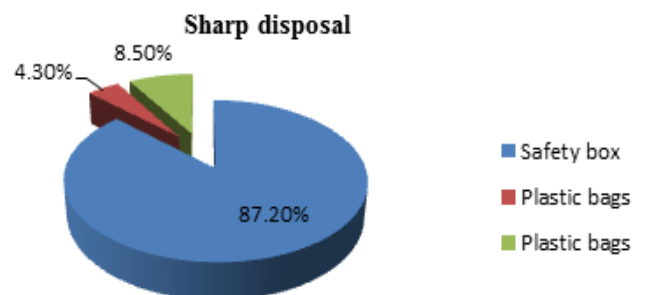**Figure 3. Adherence to sharp management guide.**

Figure 4. Showing sharp disposal mechanisms.

Prevalence and level of exposure to medical sharps injuries

Findings from the study revealed that 42.7% of the respondents have been exposed at least once to blood borne pathogens through sharp injuries. This was similar to what was reported in prevalence of 31.2% and 42.0% in Ilorin, Nigeria and the West Indies respectively (Vaz K 2010). However, a higher prevalence of 58.2% was reported among nurses in Benin City, and 61.8% was reported among resident doctors in UBTH(Omorogbe VE 2012).

Table 5. Prevalence of exposure to infectious pathogens through sharps accidents.

Variable	Response	Frequency (N)	Percentage (%)
Sharps/Needle stick injuries	Experienced	50	42.7
	Never injured	67	57.3
Circumstance leading to accident	During procedure	41	35.0
	During disposal	9	16.2
	Never injured	67	57.3
	Total	**117**	**100**
Incident reported	Reported	36	30.8
	Not reported	14	12.0
	Never injured	67	57.3
	Total	**117**	**100**

Also reported were, 83.8% in Minna, Nigeria (Olaleye AO 2014), 76.3% in Malawi (Van der Maaten 2010), 67.9% in Egypt (Hanafi MI 2011)and 80.1% in India (Muralidhar S

2010). 57.3% reported never to have been injured at any point in the course of their practice. 41 out of 50 (82%) indicated to have been injured during surgical and/or other procedures while 9 out 50 (18%) at disposal of used sharps. 36 out of the 50 cases were reported while 28% of those exposed never reported.
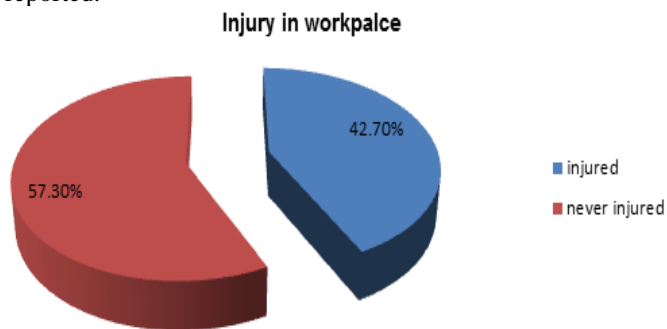

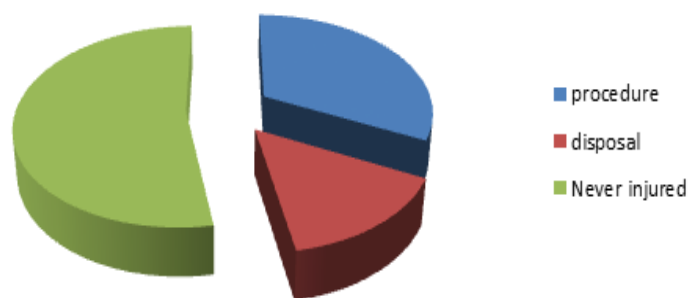**Figure 5. Sharps injury at workplace.**

Figure 6. Circumstances surrounding injury.

Conclusion

This study investigated the outcomes of preventive and control measures of sharps injuries in the sub-county Hospitals in Mombasa County. This was shown by using Chi Square (X^2) to evaluate the Adherence to guidelines range of PPE available and the prevalence. The level of adherence to preventive control measures was found to be quite low and significantly affected the outcomes of the available control measures. A low level of adherence was established at 23.6% where enforcement and practice respectively were found to be deficient. With a prevalence of about 43%, medical sharps injuries at Sub-County hospitals in Mombasa County are of great concern as established in this study this was similar to what was reported in prevalence of 31.2% and 42.0% in Ilorin, Nigeria and the West Indies respectively and a higher prevalence were reported 83.8% in Minna, Nigeria, 76.3% in Malawi, 67.9% in Egypt and 80.1% in India

Acknowledgement

REFERENCES

Bolarinwa OA, Asowande A, Akintimi CI. Needle stick injury pattern among health workers in primary health care facilities in Ilorin, Nigeria. Acad Res Int. 2011;1:419–27.

CDC, (2005). *Proceedings of the National Sharps Injury prevention meeting*, September, 2005. Atlanta GA, USA.

CDC, (2008). *Workbook for Designing, Implementing and evaluating a sharps injury prevention program.* United States. Center for Disease Control and Prevention. Atlanta GA, USA.

CDC, (2009). *European Risk Observation working paper.* Biological Agents and Pandemics: review of literature and national policies. CDC, USA.

CDC, (2010). NIOSH Hazard Review: *Occupational Hazards in Home Healthcare*. Atlanta GA, USA.

CDC, (2012)"*Hepatitis B, Epidemiology and prevention of vaccine-preventable diseases.*The Pink Book" Center for Disease Control and Prevention, 12th Edition, 2012.Atlanta GA, USA.

CDC, (1998a). *Guidelines for infection control in health care personnel*. Infection Control and Hospital Epidemiology, 19(6).

CDC, (1998b, Oct16). *Recommendations for prevention and control of hepatitis C virus (HCV).* MMWR, 47(RR-19),1-39.

Center for Disease Control and Prevention (Jul 15,2015) NIOSH directory of engineering controls- USA

US Environmental Management (Oct21,2014), *Waste-Non-Hazardous Waste- Industrial Waste* USA.

Hanafi MI,Mohamed AM, Kassem MS,Shawki M. Need lestick injuries among health care workers of University of Alexandria Hospitals. East Mediterr Health J. 2011;17:26–35.

Global Occupational Health Network GOHNET, *"Occupational health of health workers",*GOHNET Newsletter,No7,pp.1-31.

GoK, 1958. *Kenya gazette supplement Acts Public Health Act* (Cap. 242) Government printer, Nairobi.

GoK, 2006.*Environmental Management and Coordination* (Waste Management Regulations, 2006. Government Printer, Nairobi, Kenya.

GoK, 2007. *Occupational Safety and Health Act,* 2007. Government Printer, Nairobi, Kenya.

GoK, 2008. *Nairobi West District Development Plan* 2008-2012.Government printer, Nairobi.

HerseyJC,Martin LS .Use of infection control guidelines by workers in healthcare   facilities to prevent occupational transmission of HBV and HIV: results from a national survey *Infect Control Hosp Epidemiol* ,1994, vol.15 (pg. 243 -52

ILO. 2003.―SafeWork: Thirteenth Session of the Joint Committee on Occupational Health.‖ ILO, Geneva

Ibekwe RU, Adam VY. Injection safety practices among resident doctors in a tertiary health facility in Benin City. Niger J Clin Pract. 2014;17:403–6.

Jahan, S.2005. *Epidemiology of Needlestick injuries among healthcare workers in a secondary hospital in Saudi Arabia. Annals of Saudi Medicine*2005; 25(3):233-238.

Jagger J. (2007). *Caring for healthcare workers*: A global perspective. Infection control and Hospital epidemiology, 2007.28(1); editorial.

 Jagger, J., Perry,J., Gomaa,A., Komblatt Philips, E.,2008. The impact of US policies on healthcare workers from bloodborne pathogens; *the critical role of safety engineered devices. J Infect.* Public Health 2008;1: 62-71

KinCheung,R.N.,Ching,S.S., Chang,K.K.P., and Ho, S.C. (2012) Prevealence of and risk factors for needle stick and sharp injuries among nursing students in HongKong. *American journal for infection control Vol.40 issue 10 page 997-1001/ Doi:* ttp://dx.doi.org/10.1016/j.ajic.2012.01.02

KwaZulu-Natal, Department of Health, (2001), South Africa

Lineman CC, Cannon C,(2002) Effects of education programs, rigid sharps containers and universal precautions on reported needlestick injuries in health care workers 2002;12:214-259.

Manyele SV, Anicetus H (2006). *Management of medical waste in Tanzanian hospitals*. Tanzan Health Res Bull 2006; 8(3):177-182.

M.O.H, 2007 a). National Policy on injection safety and medical waste management. MOH, Nairobi, Kenya.

M.O.H, 2007 b).National Standards and Guidelines on injection safety and medical waste management. MOH, Nairobi, Kenya.

M.O.H, 2008. The National Healthcare Waste Management Plan. MOH, Nairobi, Kenya.

Muralidhar S, Singh PK, Jain RK, Malhotra M, Bala M. Needle stick injuries among health care workers in a tertiary care hospital of India. Indian J Med Res. 2010;131:405–10.

Mugenda and mugenda, 2003, research design and methodology

Nagao M, Iinuma Y, Igawa J, Matsumura Y, Shirano M, Matsushima A, Saito T, Takakura S & Ichiyama S (2009). *Accidental exposures to blood and body fluid in the operation room and the issue of underreporting*. Am J Infect Control. 1-4.

Nagao Y, Baba H, Torii K.(2007) A long term study of sharps injuries among healthcare workers in Japan. American Journal of Infection Control 2007; 35(6):407-411.

Ngesa Anna Adhiambo (2008). The Management of blood and body fluids in a Kenyan university hospital: a nursing perspective. Masters research reports, University of Stellenbosch, SUN Scholar, Research Repository. 2008-03

Omorogbe VE, Omuemu VO, Isara AR. Injection safety practices among nursing staff of mission hospitals in Benin City, Nigeria. Ann Afr Med. 2012;11:36–41.

Olaleye AO, Ogunleye OA, Awokola BI, Olatunya OS, Olaleye OA, Adeyanju T, et al. Occupational exposures to HIV and use of post-exposure prophylaxis in a general hospital in North Central, Nigeria. Int J Occup Saf Health. 2013;3:11–7.

Taegtmeyer M, Suckling RM, Nguku PM (2008) . *Working with Risk: Occupational Safety Issues among healthcare workers in Kenya.*AIDS Care 2008: 20(3):304-310.

Saghafi L, Raselli P, Francillon C, Francioli P. Exposure to blood during various procedures: results of   two surveys before and after the implementation of universal precautions, *Am J Infect Control* , 1992, vol.20 (pg.53-7)

van der Maaten GC, Nyirenda M, Beadsworth MJ, Chitani A, Allain T, van Oosterhout JJ. Post exposure prophylaxis of HIV transmission after occupational injuries in Queen Elizabeth Central Hospital, Blantyre, Malawi, 2003-2008. Malawi Med J. 2010;22:15–9

Vaz K, McGrowder D, Crawford T, Alexander-Lindo RL, Irving R. Prevalence of injuries and reporting of accidents among health care workers at the University Hospital of the West Indies. Int J Occup Med Environ Health. 2010;23:133–43

Wafula, K. S., (2012), *Occupational Risk Factors Contributing to Injury by Medical Sharps among Health Workers at Kenyatta National Hospital*, Nairobi, Kenya, Kenyatta University

World Health Organization. (2002).The world health report 2002: *Reducing risks, promoting healthy life*. Geneva: WHO.

W.H.O., (2005a). Management of Solid Healthcare waste at primary Healthcare centers: A decision-making guide.

WHO, Geneva, Switzerland. W.H.O., (2005 b). Preparation of National Healthcare waste management plans in Sub-Saharan counties, Guidance manual.

WHO, Geneva, Switzerland. WHO. 2006. The world health report-2006: working together for health. Geneva. Switzerland.