Journal of Health, Medicine and Nursing
ISSN 2422-8419 An International Peer-reviewed Journal
Vol.26, 2016

Adherence to Universal Precautions in Infection Prevention among Health Workers in Kabarole District

Gordon Mpamize, MPH,

United Nations Mission in South Sudan) and Afayo Robert, MSc (International Health Sciences University)

ABSTRACT

Background: Health Care Workers (HCWs) are potentially exposed to hospital acquired infections while performing their duties. Adherence to universal precautions is regarded as an effective means of protecting health care workers, patients, and the public, thus reducing hospital acquired infections. Measures to prevent the transmission of these infectious are therefore a significant component of health care delivery.
Objective: To assess the factors influencing adherence to universal precautions in infection prevention among health workers in Kabarole district.
Methodology: This was a cross-sectional descriptive study. A total of 168 health workers were interviewed between June 2014 to September 2014 working in three hospitals and three health centre IVs of Kabarole district. Information was collected concerning the health workers' social demographic characteristics, level of adherence to universal precautions, individual factors and institutional factors influencing adherence to universal precautions in infection control.
Results: The results of the study revealed that 94% (153/163) of the respondents adhered to universal precautions infection control practices. In this study, there was a statistically significant association between health workers' Knowledge of the elements of universal precautions (OR = 65.97, C.I = 6.23-698.96, P = 0.01) and ever had training (OR, 18.52, C.I = 1.74-197.28, P = 0.016).
Conclusion: This study found out that health care workers' training and knowledge on universal precautions were the predictors of health workers' adherence to universal precautions thus need for the budget for training courses for the health workers on universal precautions periodically.

Background to the Study

Health Care Workers (HCWs) are potentially exposed to infections while performing their duties. Universal precautions are designed to protect health care workers from being exposed to potentially infected blood and body fluid by applying the fundamental principles of infection prevention, through hand washing, utilization of appropriate protective barriers such as gloves, mask, gown, and eye wear (Motamed et al,2006).
Lavoie et al. (2010) reported that worldwide, over 1.4 million people got Hospital Acquired Infections (HAI) annually, health workers being most prone. Such infections included Hepatitis B, Tuberculosis and HIV. The World Health Organisation (2006) reported that SARS was successfully transmitted from one person to another due to failure to use personal protective equipment. According to Menzies *et al.* (2007) and Joshi *et al.* (2006), the risk of acquiring hospital acquired infections, particularly TB, was higher among health care workers than the general population.
Globally about three million, HCWs are exposed to hospital acquired infections each year, with 2 million exposed to Hepatitis B Virus, 0.9 million to Hepatitis C Virus and 170,000 to HIV. These injuries may result in 15,000 HCV, 70,000 HBV and 1000 HIV cases with more than 90% of these infections occurring in developing countries such as Uganda (Honda et al 2011).
World Health Organization estimates that about 2.5% of HIV cases and 40% of Hepatitis B virus (HBV) and Hepatitis C Virus (HCV) cases among health care worldwide are the result of non-adherence to the practice of universal precautions. Various studies carried out among different categories of health care workers found that exposure to blood or other body fluid was approximately 9.3% (Vaz K et al, 2010).
According to Matomed et al. (2006), use of universal precautions significantly decreases the number of incidents of occupation exposure to hospital acquired infections. Although universal precautions have been practiced for a long time, 100% compliance has been difficult to achieve.
Kermode et al., (2005) revealed that the protection of health care workers is neglected in low and middle-income countries, even though they might be at higher risks than in higher-income countries, because of high disease prevalence among the patient population. Due to the fact that HIV and Hepatitis B, C prevalence is high in Uganda, health care workers are potentially exposed to hospital acquired infections. In Uganda, Kasiira and Ziraba (2003) observed that health workers did not consistently adhere to universal precautions.

METHODOLOGY

Study design

The study used a cross sectional study design. A total of 168 health workers were interviewed between June 2014 to September 2014 working in three hospitals and three health centre IVs of Kabarole district. The study provided a "snapshot" of the frequency of adherence to universal precautions by the health workers in relation to the stated independent variables. Variables were compared at a common point in time, with no need for follow up of respondents.

Sources of data

Primary data

This was collected from the respondents using a detailed structured questionnaire. The information collected included information on social demographic characteristics of the HCWs, information concerning the HCWs level of adherence to universal precautions, information on HCW's individual factors and information on institutional factors of health facilities.

Secondary data

This was reviewed and retrieved from participants' personal files for incidences.

Dependent variable

Adherence of HCWs in Kabarole district to universal precautions infection prevention

Independent variables

These included;

•Social demographic characteristics of the HCWs. their Sex, Age, Education level and Cadre
•HCW's Level of adherence to Universal Precautions
•HCW's Individual Factors including; Experience, Knowledge, Attitude and Stress
•Information on Institutional Factors of health facilities including; Availability of PPE, Administrative support, Training and Availability of universal precaution procedures

DATA ANALYSIS

Uni-variate analysis

One variable was analyzed at a time to understand its distribution. All independent variables and the outcome variables were analyzed on their own. Results obtained were presented in form of frequency tables by computing means and medians for continuous data.

Bivariate analysis

Each independent variable was analyzed against the outcome. The data on the variable was tested for statistical significance between dependent and the independent variables in question.

During the analysis, the association of each exposure variable (Independent variable) and the outcome variable (Dependent Variable) was determined. Odds ratios, together with their corresponding P values and confidence intervals were computed based on a two-tailed test and performed at the 5% error rate.

Multivariate analysis

Basing on Bivariate analysis, all the variables that had $p<0.05$ were considered for multivariate logistic regression models.

RESULTS

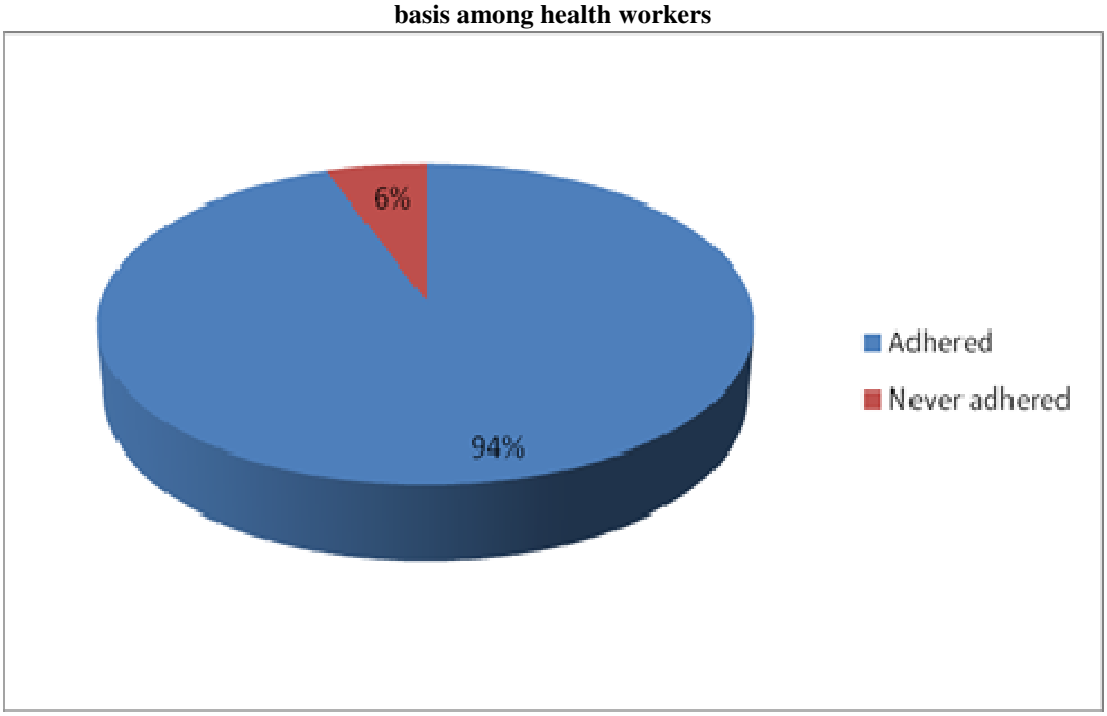
Level of adherence to universal precautions in infection prevention among Health Care Workers

Table 1: Indicates that majority of the health care workers 128/163 (81.5%) always observed their hygiene by washing their hands with soap and clean water after any direct contact with patients. Majority 91/163(61.1%) of health workers didn't recap needles,98/163(67.6%) discarded sharps in a closed sharps container,137/163(89.5%) wore gloves during the procure,125/163(81.7%) always wore gowns,124/163(84.9%) decontaminated work area immediately after body fluid spillage,110/163(74.3%) wore mask and eye protection equipment,148/163(90.2%) reported that they take care of cuts and cover them with water proof dressing,122/163(81.9%) sterilized medical equipment and 122/163(81.9%) had personal protective equipment available. This altogether shows very high adherence levels to universal precautions in infection prevention.

Table 1: Level of adherence to universal precautions in infection prevention among HCWs

Variable	Frequency(N=163)	Percent (%)
Wash hands with soap and clear water after a procedure		
Always	128	81.5
Often	22	14.0
Seldom	6	3.8
Never	1	0.6
After phlebotomy and giving injections		
I don't recap used needles	91	61.1
I remove needles and syringes from disposables	25	16.8
I bend needles by hand to prevent injury	4	2.7
I recap used needles	29	19.5
When I discard the used needles or sharp objects, I use		
Any available container	8	5.5
A dust bin covered with a black liner	14	9.7
A closed plastic bin	25	17.2
A puncture proof container	98	67.6
The sharps disposal containers are located close		
Yes	135	90
No	15	10
Wear gloves for contact with body fluids,non intact skin and mucous		
Always	137	89.5
Often	10	6.5
Seldom	3	2.0
Never	3	2.0
Wear gown/plastic apron during procedures likely to generate splashes		
Always	125	81.7
Often	19	12.4
Seldom	3	2.0
Never	6	3.9
Wear a mask and googles for eye protection		
Always	111	73.5
Often	17	11.3
Seldom	10	6.6
Never	13	8.6
Cover all abrasions and cuts with a clean water proof dressing		
Always	110	74.3
Often	18	12.2
Seldom	9	6.1
Never	11	7.4
Clean your work area		
Yes	148	90.2
No	4	2.6
Decontaminate work area immediately after body fluid spill		
Yes	133	86.9
No	20	13.1
Sterilize medical equipment used during a procedure		
Always	124	84.9
Often	13	8.9
Seldom	2	1.4
Never	7	4.8
Post exposure prophylaxis (PEP) available		
Yes	122	81.9
No	27	18.1

Figure1: A Pie chart showing level of adherence to universal precautions in infection prevention on daily basis among health workers



Of the 163 health workers interviewed,153/163(94%) adhered to unversal precautions for infection control practices as indicated in the figure 1

Individual factors influencing adherence to universal precautions in infection prevention.

Table 2: Bivariate analysis of Individual factors influencing adherence to universal precautions in infection prevention among health workers in Kabarole district.

Variable	N (%)	Adhered (%)	Never (%)	χ^2	p-value
Ever heard about UPs					
Yes	139(90.3)	134(92.4)	5(55.6)	13.095	**<0.001***
No	15(9.7)	11(7.6)	4(44.4)		
Universal precaution applies to					
Patients	22(14.5)	20(13.8)	2(28.6)	1.543	0.462
Health workers	10(6.6)	10(6.9)	0		
Everyone	120(78.9)	115(79.3)	5(71.4)		
Perceived risk of contracting disease					
Yes					
No	141(89.8)	133(89.9)	8(88.9)	0.009	0.925
Have fear of contracting disease	16(10.2)	15(10.1)	1(11.1)		
Yes					
No					
When Wash hands after touching blood or body fluids	144(96.6)	136(97.1)	8(88.9)	1.776	0.183
Immediately	5(3.4)	4(2.9)	1(11.1)		
After shift					
Anytime	144(95.4)	136(95.8)	8(88.9)	7.280	**0.026***
Busy to put on PPE	2(1.3)	1(0.7)	1(11.1)		
Yes	5(3.3)	5(3.5)	0		
No					
Knows elements of UPs	59(39.9)	1(11.1)	1(11.1)	3.305	0.069
Yes	89(60.1)	8(88.9)	8(88.9)		
No					
	139(91.4)	135(94.4)	4(44.4)	27.023	**<0.001***
	13(8.6)	8(5.6)	5(55.6)		

**Statistically significant association between the independent variable and compliance to UP with P-Value ≤ 0.05*

Results in table 2 show that health workers who had heard about universal precaution ($\chi^2 = 13.095$, $P < 0.001$), immediate washing of hands ($\chi^2 = 7.280$, $P = 0.026$) and knowledge of the elements of universal precaution.

Socio demographic characteristics of Health Care Workers

Table 3 indicates that majority 68/163(41.7%) of the health care workers were aged 21-30 years while only 10/163(6.1%) were above 41years and this study comprised mainly of females at 86/163 (52%).
Out of the total number of participants, only one had attained a master's degree (0.6%) with majority 101/163 (62.3%) having certificates.

This table further indicates that majority of the health workers were single, 121/163(74.2%) while majority were nurses 84/163 (51.5%) with a majority health workers 38/163(29.0%) from medical ward and the health workers with 1-10years experience at work were the majority 113/163(88.3%)

Table 3: Univariate analysis of socio-demographic characteristics of the respondents

Variable	Category	Frequency (N=163)	Percent (%)
Age (years)			
	≤20	61	37.4
	21-30	68	41.7
	31-40	24	14.7
	>41	10	6.1
Gender	Male	77	47.2
	Female	86	52.8
Education level	Certificate	101	62.3
	Diploma	45	27.4
	Degree	15	9.1
	Masters	1	0.6
Marital status	Single	121	74.2
	Married	36	22.4
	Separated	2	1.2
	Widowed	2	1.2
Cadre	Nurse	84	51.5
	Lab personnel	16	10.3
	Doctor	3	1.9
	Clinical officer	23	14.8
	Others	29	18.7
Department	Medical	38	29.0
	Laboratory	18	13.7
	ART	13	9.9
	OPD	29	22.1
	Surgical	12	9.2
	Others	21	16.0
Experience at work			
	1-10 years	113	88.3
	11-20 years	12	9.4
	21-30 years	3	2.3

Socio-demographic factors influencing adherence to universal precautions in infection prevention

Table 4: Bivariate analysis of Socio-demographic factors influencing adherence to universal precautions in infection prevention

Variable	N=156 (%)	Adhered (%)	Never (%)	χ^2	p-value
Age (years)					
≤20	60(38.5)	54(36.7)	54(36.7)	3.453	0.327
21-30	63(40.4)	61(41.5)	2(22.2)		
31-40	23(14.7)	22(15.0)	1(11.1)		
>41	10(6.4)	10(6.8)	0(0.0)		
Gender					
Male	72(46.2)	68(46.3)	4(44.4)	0.011	0.916
Female	84(53.8)	79(53.7)	5(55.6)		
Qualification					
Certificate	96(61.9)	88(60.3)	8(88.9)	3.050	0.384
Diploma	44(28.4)	43(29.5)	1(11.1)		
Degree	14(9.0)	14(9.6)	0		
Masters	1(0.6)	1(0.7)	0		
Marital status					
Single	116(74.8)	108(74.0)	8(88.9)	1.055	0.788
Married	35(22.6)	34(23.3)	1(11.1)		
Separated	2(1.3)	2(1.4)	0		
Widowed	2(1.3)	2(1.4)	0		
Cadre					
Nurse	80(53.7)	72(51.4)	8(88.9)	5.776	0.217
Lab personnel	14(9.4)	13(9.3)	1(11.1)		
Doctor	3(20)	3(2.1)	0		
Clinical officer	23(15.4)	23(16.4)	0		
Others	29(19.5)	29(20.7)	0		
Department					
Medical	38(30.4)	36(30.8)	2(25.0)	1.807	0.875
Laboratory	16(12.8)	15(12.8)	1(12.5)		
ART	13(10.4)	13(11.1)	0		
OPD	29(23.2)	26(22.2)	3(37.5)		
Surgical	12(9.6)	11(9.4)	1(12.5)		
Others	17(13.6)	16(13.7)	1(12.5)		
Salary scale					
≤5	75(60)	68(58.6)	7(77.8)	1.277	0.258
>5	50(40)	48(41.4)	2(22.2)		
Experience at work					
1-10 years	113(88.3)	106(87.6)	7(100)	0.983	0.612
11-20 years	12(9.4)	12(9.9)	0		
21-30 years	3(2.3)	3(2.5)	0		

At bivariate analysis, all the of social demographic characteristics that is age, gender, education level, marital status, cadre, department, salary scale and experience at work had no statistically significant relationship with adherence to universal precaution as shown in the table 4.

Institutional factors influencing adherence to universal precautions in infection prevention.

Table 5: Bivariate analysis of Institutional factors influencing adherence to universal precautions in infection prevention among health workers in Kabarole district.

Variable	N (%)	Adhered (%)	Never (%)	χ^2	p-value
Have safety policy					
Yes	144(94.7)	136(95.1)	8(88.9)	0.657	0.418
No	8(5.3)	7(4.9)	1(11.1)		
Health facility provides PPE					
Yes					
No	139(92.1)	134(93.7)	5(62.5)	10.085	**0.001***
Get regular supply	12(7.9)	9(6.3)	3(37.5)		
Yes					
No	117(78.5)	114(80.9)	3(37.5)	8.436	**0.004***
Ever heard training	32(21.5)	27(19.1)	5(62.5)		
Yes					
No	111(72.5)	109(75.7)	2(22.2)	12.161	**<0.001***
Get support supervision	42(27.5)	35(24.3)	7(77.8)		
Yes					
No	112(76.7)	107(77.0)	5(71.4)	0.115	0.735
Attitudes of HCWs	34(23.3)	32(23.0)	2(28.6)		
Low					
Medium	11(7.3)	10(7.0)	1(12.5)	0.377	0.828
High	85(56.3)	81(56.6)	4(50.0)		
	55(36.4)	52(36.4)	3(37.5)		

**Statistically significant association between the independent variable and compliance to UP with P-Value ≤ 0.05*

Results in table 5 revealed some of the significant institutional factors that influence adherence to universal precautions in infection prevention among health workers in Kabarole district. The health facilities that provide PPE (χ^2 = 10.85, P =0.001), regular supply of PPE (χ^2 =8.436, P = 0.004) and training of health workers (χ^2 = 12.161, P<0.001) were the only institutional factors found to significantly influenced adherence to universal precautions.

Multivariate analysis of the factors associated with adherence to universal precautions

Table 6: Multivariate analysis of the factors associated with adherence to universal precautions

Variable	N (%)	OR(95%CI)	p-value
Busy to put on PPE			
Yes	137(91.9)	1	
No	12(8.1)	15.96(0.80-318.76)	0.07
Knows elements of universal precaution			
Yes	139(91.4)	65.97(6.23-698-96)	0.01
No	13(8.6)	1	
Ever heard training			
Yes	111(72.5)	18.52(1.74-197.28)	0.016
No	42(27.5)	1	

Basing on Bivariate analysis, all the variables that had $p < 0.05$ were considered for multivariate logistic regression and stepwise elimination method was used to remove all the non-significant variables with $p > 0.05$.

The association between health workers who know elements of universal precaution remained significant. These health workers who knew elements of universal precautions were 65.97 times more likely to comply with

universal precaution than those who didn't comply to the elements of universal precaution. (OR= 65.97, C.I =6.23-696.96, P = 0.01).

The association between health workers who had received training on universal precaution and adherence to universal precaution remained significant even at multivariate analysis. These health workers who received training on universal precautions were 18.52 times more likely comply with universal precautions than the health care workers who had not received training
(OR= 18.52, C.I =1.74-197.28, P = 0.016) as presented in table 6.

DISCUSSION

Level of adherence to universal precautions in infection prevention among health workers

The study findings on observations of health care workers established that adherence to universal precautions in infection prevention in Kabarole district was less than 100% as per the national and international standards.
Adherence levels in various health facilities have continued to vary and some improvement has been registered in particular health facilities as regards hand washing, disposal of sharps and gloves. In this study, adherence levels as regards the use of gloves and gowns was high at 89.5% and 81.7% respectively in agreement with findings of Robert (2006) where adherence levels as regards use of gowns shot from 82-100%.(Robert *et al*., 2006). This was further witnessed physically during the stage of data collection.
As compared to the study conducted in London by Gammon & Gould (2005), where adherence to universal precaution was at 38%, this study found adherence level to be at 94% whereas the study at Mbarara University of science and technology hospital found non-adherence at 32%. High adherence levels protect health workers from exposure to infections such as HIV, HBV, TB and HCV. The level of adherence to universal precautions was found to be at 94% which was due to the observed discipline in use of infection prevention material and hand washing with soap was well practiced as the 2013 MoH Uganda guidelines state.
The lack of compliance to universal precautions as an approach to Infection Prevention and Control to treat all human blood and body fluids, such as the correct use of protective clothing, was also found in a study conducted by Zungu et al. (2008). Participants occasionally admitted their own mis-behavior with regards to the wearing of plastic boots and reported that some HCWs complained of contracting infection.

5.2 Individual factors and adherence to universal precautions

Washing of hands after touching bloody or body fluids immediately and ever hearing about universal precaution were found to be significant influencing factors to adherence to universal precautions at bivariate analysis (P =0.026, χ^2 =7.280), ((P = <0.001, χ^2 =13.095) respectively. These factors however had no statistical significance with adherence to universal precautions at multivariate analysis and cannot be based on to influence health workers' compliance with the universal precautions.
Knowledge about the elements of universal precautions can be a predictor of health workers' compliance with the practice of UPs in infection control in Uganda. In this study, there was a statistically significant association between health Knowledge of the elements of universal precaution and adherence to universal precautions. These health workers were 65.97 times more likely to adhere to universal precautions as compared to those who did not have the knowledge (OR, 65.97, 95% C.I = 6.23-698.96, P = 0.01).
The study findings are consistent with those of a similar study done by Okechuku et al (2012) revealed that 77.5% of the health care workers were aware of the universal precautions in infection prevention. Ibadan study findings also indicated that health care workers had inadequate knowledge on the potential sources for transmission of infectious agents and situations requiring hand hygiene. By equipping health care workers with skills and knowledge will increase the level of adherence in infection prevention.
A study done by Jain et al (2012) also revealed that more than half of the participants (55.3%) had suboptimal knowledge regarding standard precautions and 31.8% of the participants lacked knowledge on risks associated with Hospital Acquired Infections.
World health organization (2003) suggested to health care workers to be equipped with requisite knowledge, skills and attitudes for good practices of universal precautions in infection prevention, which must be applied to all patients at all times regardless of diagnosis and infectious status.
This was in agreement with the findings of a study carried out in Malaysia to assess the knowledge of blood-borne diseases transmitted through needle stick injuries amongst health-care workers in a tertiary teaching hospital and their practices of universal precautions and its correlation with the facts showed that there was a

small, positive correlation between knowledge and actual practice of universal precautions (r = 0.300, n = 206, p < 0.001) (Hamid *et al,* 2010). This implies that in the Ugandan setting, knowledge on universal precautions can be based on to influence adherence to universal precautions.

Inadequate knowledge as a factor leading to non-compliance was also found in other studies (Osborne, 2003; Askarian *et al.,* 2006; Chan *et al*., 2007, Nwankwo & Aniebue, 2010).

Participants in this study also raised concerns about the use of old methods when they are not updated with regards to new developments in their practice and this has a negative impact on compliance to universal precautions. Participants in a study conducted by Kermode (2005) had a positive perception of the safety climate in their workplace as revealed in this study.

The study also revealed that health workers find it time consuming to adhere to some universal precautions. These findings are supported by those of a study done by Hersey et al (2004) which revealed that excessive patient care responsibilities did not allow health care workers sufficient time for them to always follow universal precautions when indicated. Another study done by Rajinder (2008) also revealed that 56.7% of the respondents communicated that hand hygiene as time consuming.

Socio demographic factors and adherence to universal precautions

Certain influencing factors to adherence to universal precaution for health workers are sex and age. This was established in a cross sectional study carried out in Canada where men were less compliant to all types of infection control (Annalee Yassi *et al*,.2007). This however is contrary to the findings of this study since sex and age had no statistical significance as it was the case in a study carried out in Malaysia to assess knowledge of blood borne diseases transmitted through needle stick injuries amongst health workers in a tertiary teaching hospital and their practice of universal precautions.

This study found that age and years of experience did not contribute towards the practice of universal precaution (Hamid *et al*., 2010). This implies that both age and sex of health workers in the Ugandan setting as compared to Canada cannot be based on alone to influence their adherence to universal precautions and other factors have to be put into consideration as is discussed in the in the discussions that will follow in this chapter.

This study found a non-significant relationship with age and sex as far as adherence to universal precautions is concerned in the setting of Kabarole district hospitals and this is highly attributed to the fact that gender and age difference among health workers did not have any bearing as of whether health workers adhere or not to universal precautions. This is due to the fact that information on universal precautions is made available to all health workers.

Institutional factors influencing adherence to universal precautions

According to the study conducted by Thomas E, *et al*. (2004), the provision of personal protective equipment can be a predictor of health workers' adherence to universal precautions in infection control in Uganda. In this study, there was a statistically significant association (P = 0.001, χ^2=10.085) between health facilities that didn't provide personal protective equipment, those that provide personal protective equipment regularly (P =0.004, χ^2 = 8.436) and adherence to universal precautions. This was in agreement with the findings of Thomas (2004) in U.S where the facilities that had a continuous supply of infection prevention materials had their staff 1.82 times more likely to adhere to universal precautions than facilities with limited supply of PPE, OR, 1.82 and 1.42, respectively.

Providing personal protective equipment regularly helps maintain motivation and positive behavior among health workers towards universal precautions. This implies that the health facilities that regularly provide personal protective equipment have their staff protected from many hospital related infections and at the same time any recorded decline in provision of these personal protective equipment materials will cause a decline in adherence levels thereby exposing their staff to these infections.

Non-availability of infection prevention supplies and equipment such as masks, goggles, alcohol based hand rub, delivery packs and linen were reported as obstacles for implementing universal precautions. This finding is not unique for it is consistent with those findings of a study done by Lee (2009) revealed that lack of supplies and equipment contributed to non-adherence with standard precautions.

Another study by Reda (2010) also indicated that 44.8% of the health care workers were reported that there was inadequate supply infection prevention materials and perceived their workplace as a place of high risk to hospital acquired infections.

A study done in Chile by Rosina & Lillian (2009) also revealed that lack of infection prevention materials and equipment contributed to failure by health care workers to adhere with IP standard precautions. It is important for health care workers to have all the essential infection prevention supplies and equipment to facilitate

provision of safe and quality patient care hence there is need for hospital management to ensure consistent supply. Time restraint was another barrier; Participants reported that due to heavy workload, time to follow the guidelines becomes a challenge, even if they want to.

According to the study by Kermode et al, (2005), personal protective equipment were also reported in other research studies as a contributing factor to non-compliance. Insufficiencies have already been discussed above in this study as major causes of poor adherence with great implications regarding the transmission of hospital acquired infections to health care workers and patients as well.

Isah et al., (2009) reported that poor maintenance of hospital equipment, lack of water supply, lack of supplies personal protective equipment as well as the shortage of human resources contribute to non-compliance to universal precautions. Health facilities have the role to play in providing resources and facilities for ensuring a safe working environment and proper implementation of universal precautions to prevent hospital acquired infections.

Training of health workers may be a predictor of health workers' adherence to universal precautions in infection control in Uganda. In this study, there was a statistically significant association between training of in universal precaution and adherence to universal precautions. These health workers were 18.52 times more likely to adhere to universal precautions as compared to those who were not trained. (OR, 18.52, 95% C.I = 1.74-197.28, P = 0.016).

This was in agreement with the findings of a cross sectional study conducted by Gertrude Moyo (2013) where the association between knowledge on the elements of universal precautions and having attended formal training on infection prevention was statistically significant (p=0.015).

In agreement with this study's findings are the findings of an Italian study where education and training programs were found to have a positive impact on adherence to universal precautions

The health care workers in this study reported that training and continuous medical evaluations played a role in uptake of the practice of adherence to universal precaution in infection prevention which in agreement with the study conducted by Nsubuga & Jaakkola, (2005) that indicated that inadequate training of health care workers was also cited as a reason for non-compliance and hindered the practice of universal precautions and a high risk to hospital acquired infections.

These training courses that were directed to all hospital personnel including interns and student nurses were found to bring about a global reduction of potentially preventable exposures such as those occurring with improperly discarded needles or due to a lack of protective garments (Puro *et al*., 2001). This implies that training of health workers in the Ugandan setting can be based on to influence their adherence to universal precautions.

Having been trained in universal precautions, the health workers were informed of the importance of observing universal precaution. This empowered them to adopt positive behavior and the health workers motivated to adhere to universal precautions as opposed to their counterparts who had not attained any training. This implies that training of health workers in the Ugandan setting can be based on to influence their adherence to universal precautions.

The study had some limitations. Findings from the study area may not be generalized to the entire population of health care workers in Uganda. This is in view of the small population of health care workers in Kabarole district. High level of compliance with universal precautions could be attributed to the fear of contracting Ebola virus since there was an outbreak of the disease in the country during the study period.

CONCLUSION

The level of adherence to universal precautions in infection control in Kabarole district health facilities was high (94%) but less than the expected 100%. This reflects great progress as regards to protection of health workers from exposure to infections such as HIV, HBV, TB, HCV and other hospital acquired infections. This study did not find social demographic factors of health workers as significant influencing factors of their adherence to universal precautions. More so, among the institutional factors, this study found out that health care workers' training on universal precautions a predictor of health workers' adherence to the practice. Furthermore, among the individual factors, in this study, there was a statistically significant association between health workers' Knowledge of the elements of universal precautions (OR = 65.97, C.I = 6.23-698.96, P = 0.01) and ever had training (OR, 18.52, C.I = 1.74-197.28, P = 0.016).

ACKNOWLEDGEMENT

I am greatly indebted to those who have so kindly helped me materially, financially and morally in my work and tender them my most grateful thanks. My parents, Mr.& Mrs. E.Keekomo, brothers, sisters, my wife Mrs. Anita Mpamize and all my friends for all their support. Special thanks go to my supervisor, Mr.Afayo Robert, for giving me all the necessary advice and guidance throughout this study and reading through the manuscript.

REFERENCES

AISIEN, A.O, SHOBOWALE, M.O., (2005). Health Care Workers' Knowledge on HIV and AIDS: Universal precautions and attitude towards PLWHA in Benin-City, Nigeria**.** *Nigerian Journal of Clinical Practice. 8(2): 74-82.*

Amadu M.O., Saka M.J., (2012). Knowledge, Awareness and Compliance with standard precautions. *Journal Community Med Health education, 2:131*

ANNALE YASSI, (2007). Determinants of Healthcare Workers' Compliance with Infection Control Procedures, *Vol. 10 No.1*

GERSHON, R.R.M, VLAHOV,D.,FERSHON, R.R.M., VLAHOV, D., FELKNOR, S.A., VESLEY, D., JOHNSON,P.C, DELCIOS,G.L. & MURPHY, L.R.,(2004). Compliance with universal precautions among health care workers at three regional hospitals, *American journal of Infection control.*

HAMID, M.Z., AZIZ, N.A., ANITA, A.R., NORLIJAH, O. (2010). Knowledge of blood-borne infectious diseases and the practice of universal precautions amongst health-care workers in a tertiary hospital in Malaysia. *Southeast Asian Journal of Tropical Medicine and Public Health.* 41(5): 1192-1199.

KASIIRA and ZIRABA, (2003). Prevalence and factors associated with Hepatitis B Infection among health care workers in Mulago Hospital. Available at: *http://dspace3.mak.ac.ug/xmlui/handle/10570/959,* Accessed on 19th August 2014.

KOLUDE, OO, OMOKHODION, FO, OWOAJE, ET. (2004). Universal Precaution: Knowledge, Compliance and perceived risk of infection among doctors at a University Teaching Hospital. *Int. conf. AIDS; Abstract no MoPed 3676.*

LAVOIE, M. C. *et al*., (2010). International collaboration to protect health workers from infectious diseases in Ecuador. *Rev Panam Salud Publica. 2010;27 (5):396–402.*

MEHRDAD ASKARIANA, MARY-LOUISE, MCLAWSB, MARYSIA MEYLAN,(2006). Knowledge, attitude, and practices related to standard precautions of surgeons and physicians in university-affiliated hospitals of Shiraz, Iran http://www.sciencedirect.com/science/article/pii/S1201971206000920 , Accessed on 18/08/14

MINISTRY OF HEALTH, (2008). *Guidelines for occupational safety and health, including HIV in the health services sector.* Chapel Hill, NC: Capacity Project.

MOTAMED, N, BABAMAHMOODI, F, KHALILIAN, A, M, NOZARI, M, (2006). Knowledge and practices of health care workers and medical students towards universal precautions in Mazandaran province. *Eastern Mediterranean Health Journal*

MOYO & GERTRUDE MUNTHALI, (2013). Factors Influencing compliance with Infection Prevention Standard Precautions among Nurses Working at Mbagathi District Hospital, Nairobi, Kenya

M. KERMODE, D. JOLLEY, B. LANGKHAM, M.S. THOMAS, W. HOLMES, S.M. GIFFORD,(2005).Compliance with universal/standard precautions among health care workers in rural north India

ORJI EO, FASUBAA OB, ONWUDIEGWU U,(2002).Occupational health hazards among health care workers in an obstetrics and gynaecological unit of a Nigerian teaching hospital. Journal of Obstetrics and Gynaecology http://dx.doi.org/10.1080/01443610120101781, Accessed on 21/09/14

OSBORNE S, (2004). Influences on compliance with standard precautions among operating room nurses. *American journal of infection control*

Reda A.A., Vandeweerd J.M., Egata G., (2008). HIV /AIDS and exposure of HCWs
to body fluids in Ethiopia: attitudes towards UPs. *Journal of Hospital Infection, 163-169.*

SHEPARD CW, SIMARD EP, FINELLI L, FIORE AE, BELL BP, (2006). Hepatitis B Virus Infection: Epidemiology and Vaccination.
http://dx.doi.org/10.1093/epirev/mxj009, Accessed on 17/7/14

SIEGEL JD, RHINEHART E, JACKSON M, (2007).Guideline for Isolation precaution: Preventing Transmission of Infectious Agents in Healthcare Setting. http://www.cdc.gov/ncidod/dhqp/pdf/isolation2007.pdf, Accessed on 18/06/14

THOMAS, (2004). Factors promoting consistent adherence to safe needle precautions among hospital workers**.** *vol. 25 no. 7*

SREDHARAN J, MUTAPILYMYALI J, VENKATRAMANA M, (2004). Knowledge about standard precautions among university hospital nurses in the United Arab Emirate. *Eastern Med. Health journal*

KATORO, SUA JOEL; ONYUTHI, APECU RICHARD; RUGERA, SIMON PETER,(2008). Knowledge, attitudes and practice towards the universal precautions of HIV/AIDS at work place.

VAZ K, MCGROWDER D, ALEXANDER-LINDA R, GORDON L, BROWN P, IRVING R.,(2010). Knowledge, attitude and compliance with universal precautions among health care workers at the university hospital of West Indies, Jamaica.

WANG, H, FENNIE, K, BURGESS, L, WILLIAMS, AB, (2004). A training program for the prevention of occupational exposure to blood borne pathogens: Impact on knowledge, behavior and incidence of needle stick injuries among student nurses in Changsha, People's Republic of China. *Journal of Advanced nursing*

WHO,(2006). *Avian Influenza, Including Influenza A (H5N1), in Humans: WHO Interim Infection Control Guideline for Health Care Facilities*, p.34, World Health Organization.

WILLIAMS,C.M AND PIETERSE, (2005). Basic Peri-Operative Nursing Procedures Guideline. *South African Theatre Sister.*

YANG LUO, (2010). Factors impacting compliance with standard precautions in nursing, *China. International Journal of Infectious Diseases.*