Prevalence, correlates of occupational percutaneous injuries and use of post exposure prophylaxis against HIV, Hepatitis B among health workers in Kampala, Uganda-May 2016

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ABSTRACT

Introduction: Of the 3 million percutaneous exposures that occur annually among health workers (HWs), 90% are in low-income countries. The estimated average prevalence of percutaneous exposures among health workers in Uganda was 70% in 2009. However, utilization of post exposure prophylaxis (PEP) following percutaneous exposure remains largely undetermined. We determined the utilization of PEP for HIV and Hepatitis B (Hep B) following percutaneous injuries (PIs) among clinical health workers in Kampala. **Methods:** In a cross-sectional study, 709 HWs were selected and enrolled using multi-stage sampling from seven health facilities in Kampala City. Data were collected using a semi-structured questionnaire and a facility checklist. Modified Poisson regression modelling was used to estimate prevalence ratios (PRs) of PEP utilization. **Results:** One hundred and ninety-seven (28%) HWs had sustained PIs in the preceding 12 months with a Hep B vaccination prevalence of 18%. Twenty-nine (15%) of exposed HWs initiated HIV-PEP and one (0.5%) Hepatitis B-PEP. Factors associated with PEP uptake were 1-5years of professional experience (PR= 0.29 95% confidence interval (CI) (0.1-0.92)) compared to less than a year. Being an intern doctor (PR= 0.02 95% CI (<0.01-0.15)), laboratory technologist (PR= 0.05 95% CI (<0.01-0.51)), nurse (PR= 0.09 95% CI (0.01-0.6)), medical/paramedical student (PR= 0.03 95% CI (<0.01-0.17)) compared to being a consultant. Twenty (69%) completed HIV-PEP treatment and one (100%) completed Hepatitis B-PEP treatment. Six of seven health facilities lacked a reporting procedure following percutaneous injury.**Conclusion:** The prevalence of percutaneous injuries among clinical health workers in Kampala's public health facilities is high while the uptake of PEP therapy is still low. Kampala Capital City Authority should step up measures to ensure HW safety including mandatory Hepatitis B vaccination, occupational exposure surveillance especially targeting lower-level health facilities and HWs with a year or less of clinical experience.

KEYWORDS: Occupational post exposure prevention, percutaneous injuries, post exposure prophylaxis

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RECEIVED
30/05/2020

ACCEPTED
19/07/2021

PUBLISHED
12/08/2021

LINK

https://www.afenet-journal.net//content/article/4/13/full/

CITATION
Phoebe Hilda Alitubeera et al. Prevalence, correlates of occupational percutaneous injuries and use of post exposure prophylaxis against HIV, Hepatitis B among health workers in Kampala, Uganda-May 2016 J Interval Epidemiol Public Health. 2021 August; 4(3):13
DOI: https://doi.org/10.37432/jieph.2021.4.3.42

Introduction

Percutaneous injuries and blood exposures among clinical health workers result in devastating health and psychosocial and economic consequences [1-6]. The implications of transmission of blood borne pathogens among which are HIV and Hepatitis B are dire and potentially lethal [7]. The transmission risk of HIV following PI is 0.3% and that of Hep B is about 30% [1,8,9]. Much as many of the injuries may not result in transmission of blood borne pathogens, they often result in psychiatric illnesses such as: career limiting fear, depression, [10] anxiety disorder, post-traumatic stress disorder which may last for several months [10-13]. An unsafe work environment coupled with the increasing concern of exposure to infectious diseases that are highly prevalent including HIV and Hep B are major contributors to scarcity of human resource for health in developing countries [14-16].

World Health Organization (WHO) estimates that of the 3 million percutaneous exposures that occur among health workers annually, 90% are in low income countries [17]. Globally, among health workers infected with Hep B, 37% of the infections were a result of occupational exposure and approximately 10% of the HIV among health workers is due to exposure at work [18-20]. Ninety five percent of HIV occupational sero-conversions among health workers are the result of needle stick injuries and are preventable with low cost practical measures [19,21] as evidenced by the smaller numbers of infections in regions where efforts to decrease these exposures have been made [17].

Sub-Saharan Africa has the highest prevalence of Hep B with up to 10% of the adult population chronically infected [22,23] and continues to bear the brunt of the HIV pandemic with nearly 1 in every 20 adults living with HIV [23]. Most countries in sub-Saharan Africa including Uganda lack surveillance for occupational exposure to bodily fluids including blood [21,23,24]. In Uganda, a previous study among surgical staff at Mulago National Referral Hospital revealed an 82% prevalence of PIs [25]. Another study done on nurses at the same hospital revealed a needle stick injury prevalence of 57% [5]. Hep B virus infection is 95% preventable with immunization. Despite this, less than 20% of health workers have received all three doses required for immunity [26,27]. In Uganda, 9% of health workers are chronic Hep B carriers and only 4% are immune through vaccination [28].

Ascertaining safety of HWs contributes to quality of patient care and is crucial to preventing health work force losses that can potentially result in collapse of the health system [23].

The Ministry of Health has acknowledged the burden of PIs and has accordingly set up standard guidelines for infection prevention and control specifically, PEP to provide comprehensive information to health care workers and act as a reference point [29]. However, evidence on adherence to these guidelines, utilization of PEP remains almost non-existent.

We aimed to determine the prevalence and correlates of percutaneous injuries, and to assess the utilization of HIV and Hep B PEP among HWs in health facilities of Kampala City, Uganda.

Methods

Percutaneous injuries for purposes of this study refer to puncture wounds and cuts inflicted by medical instruments intended for puncturing or cutting including cannulas, scalpels, burs that may be contaminated with patient´s blood or other bodily fluids. It shall also include splash exposures also known as muco-cutaneous injuries to patient´s potentially contaminated body fluids including blood. Splash exposures for purposes of this study shall refer to non-intact skin and mucous membranes splash exposures to patient body fluids.

Health workers for purposes of this study refer to all clinical medical practitioners (doctors, nurses, clinical officers) and medical, paramedical and nursing students.

Study design, area and population

This cross-sectional study was conducted in public health facilities of Kampala Capital City. The district hosts the country´s capital with a population of approximately 1,353, 000 people [30]. It is divided into five divisions that is; Kampala Central, Makindye, Kawempe, Nakawa and Rubaga divisions. The district has over 873 health facilities of which 26 are government owned, 22 private not for profit, and 825 are private for profit [30].

The public health facilities include: two national referral hospitals- Mulago and Butabika plus a regional referral hospital- Naguru and several health centres run by the city government. The study focused on public health facilities including a hospital, health centres II, III and IV; additionally, we included a private for-profit hospital. The structure of public health facilities in Uganda is from Village health teams (lowest level) who are the first contact for people living in rural areas, they are volunteers with a target population of one thousand advise patients and refer them to health facilities. Health centre (HC) II serves five thousand people at parish level, is led by an enrolled nurse supported by a midwife and offers outpatient services for antenatal care and treatment for common diseases like malaria. HC III is at sub-county level with a target population of 20,000. It is led by a clinical officer and has a functioning laboratory. It runs an outpatient clinic and a maternity ward. HC IV at county level is led by a medical officer with a target population of 100,000, has inpatient services and an operating theatre.

District hospitals offer both general and specialized health care with a target population of 500,000. A regional referral hospital serves several districts (sub-region), is a referral hospital for a catchment area of two million people with several specialists. We sampled 1/2 national referral hospitals, 1/5 HC IVs, 4/6 HC IIIs. There are no HC II public health facilities in Kampala. The national referral hospital (NRH) is at the top of the healthcare chain and serves the entire country [31]. In this study we included Mulago National Referral hospital, randomly selected Kisenyi HC IV, Komamboga HC III, Kawaala HC III, Kiswa HC III and Bukoto HC III. We sampled more at the HC III level because of the low numbers of health workers at this level. International Hospital Kampala (IHK), a private for-profit hospital was included because of failure to accrue the required sample size from the public health facilities. We sampled all health workers in active clinical practice in the health facilities. We excluded HWs who were not around on the days of the survey and those who were around but did not consent to take part in the study.

We determined the sample size using the formula suggested by Keish Leslie for a cross-sectional study with categorical outcome variables with the following assumptions: prevalence of PIs was 69.5%, 1.96 value at 95% confidence interval (CI), 5% margin of error and 20% non-response. The estimated population of health workers in Kampala is 2792 [32]. On adjusting for a finite population of HWs in Kampala using formula suggested by Keish Leslie and for design effect, the required sample size was 740.

The study was cross-sectional and outcome of interest was categorical so we used formula put forward by Kish-Leslie for cross-sectional studies with categorical outcome of interest for sample size calculation:

$$n = \left(\frac{Z^2 PQ}{\delta^2}\right)$$

[35] where Z α/2 = 1.96 (standard normal value at α=5% level of significance)

Prevalence of percutaneous injuries = (82+57)/2= 69.5%

Z= 1.96 Q = 30.5%

δ= Maximum error we were willing to allow was 5%

The required sample size is 326.

Since the population of HWs in Kampala is finite, the sample size was adjusted using the formula:

$$\frac{n}{1+n/Pop}$$ [33]

Where the estimated population of health workers in Kampala is 2792 [34] giving a sample size of 296.

Adjusting for design effect; (296*2). Final N= 592.

Adjusting for non-response (20%); 592/0.8 = 740

Data collection

Data were collected a structured questionnaire adopted from Centres for Disease Control (CDC) [34], which was used to elicit self-reported occupational exposure to potentially infectious body fluids among HWs in the preceding 12 months. The

CDC workbook for designing sharp prevention tool adapted for this study is a multiple item scale for:

• Basic demographics

• Occupational data: HW cadre, department, years of experience

• Exposure history: site, injury type, device, number of incidents, procedure, protective wear, training.

• Post exposure management for percutaneous injuries: site management, reporting of incident, subsequent investigations, receipt of prophylaxis treatment. The questionnaire was pre-tested and questions refined as necessary. We administered the questionnaires with the help of trained research assistants from March to May 2016. In order to identify the status of infection prevention and control at the facilities, we did health facility verification using an observational checklist that included:

• Infection control team in place with minutes available

• Availability of occupational exposure records book

• Availability of documented reporting procedure in wards

• Records available on periodic trainings on occupational risk reduction

• Availability of PEP drugs; free of charge

• Availability of records on PEP management

• Availability of protective gear

• Appropriate disposal of sharps

Statistical analysis

Descriptive statistics are presented using proportions of HWs exposed by cadre, years of work experience, level of health facility. The prevalence of PIs among health workers was determined. At univariate analysis, descriptive statistics (means, medians, frequencies, proportions) are presented on utilization of PEP. We ran a model to determine factors associated with utilization of PEP among the exposed HWs.

We used modified Poisson regression to determine the unadjusted effects of socio-demographic and occupational characteristics on utilization of PEP. We used a cut-off of 0.2 to avoid being too restrictive to miss potentially important variables for inclusion at multi-variable analysis stage. Variables not found significant at bivariate analysis but important according to literature were also carried to multi-variable analysis. At multivariable analysis, multiple modified Poisson regression to determine the adjusted effects of socio-demographic and occupational characteristics on PEP utilization among HWs using logical model building technique. All observations with missing data on some variables were included.

Availability of data and materials

The data that support the findings of this study belong to the Makerere University School of Public Health, and restrictions apply to the availability of these data and so are not publicly available. Data are however available from the corresponding author upon reasonable request and with permission of the Makerere University School of Public Health.

Ethical considerations

We obtained ethical approval from Makerere University School of Public Health Higher Degrees Research and Ethics Committee (HDREC). We also obtained written permission to conduct the study from the Kampala city council authority and administrators at the study hospitals. We obtained verbal and written informed consent from study participants, all of whom were adults using informed consent forms.

Results

During the study period of March to May 2016, we approached 740 HWs from Mulago National Referral Hospital, International Hospital Kampala (IHK), Kisenyi HC IV, Komamboga HC III, Kawaala HC III, Bukoto HC III and Kiswa HC III. Of these 709 agreed to participate in the study (95.8% response rate). Among the 709 HWs interviewed, 84% (596) were from Mulago National Referral Hospital, 9% (66) from IHK and 7% (47) from Public Health centres. The median (Inter quartile range) age

was 26 (8) years, 38% (270) of participants were below 25years of age and 12% (82) over 40years. Three percent of HWs were consultants (24), 10% (71) were medical officers, 43% (307) were paramedical/medical students. 24% (167) of HWs were stationed at the Obstetrics and Gynaecology (OBGY) department and 3.8% at the outpatient departments. Median years of work experience were 4.6 years with 15% of HWs having over 10 years of work experience Table 1.

Prevalence of percutaneous injuries, characteristics of exposure among clinical health workers in health facilities in Kampala Capital City

Twenty eight percent (197) of HWs reported having experienced a splash exposure or an injury by a sharp medical device in the preceding 12 months. Among the exposed HWs, 30% (56) of PIs occurred in the morning, 38% (71) in the afternoon and 31% (58) at night. About nine out of every ten (173) of exposed HWs were wearing protective equipment. Among those who reported wearing protective equipment, slightly more than half were wearing a single pair of gloves (107). Of the 12% (23) not wearing protective equipment, 83% (20) reported it was due to unavailability or inadequate supply. 29% (205) of HWs reported having received in-service training on infection control within the last 12 months.

The majority of PIs occurred among HWs below 25 years followed by HWs aged 25-29 years. There were less PIs among HWs aged 30 and above, and the numbers of PIs were comparable across the three age groups of 30 years and above Table 2.

Post exposure site management and level of PEP uptake among clinical health workers in health facilities in Kampala Capital City

Seventy seven percent (152/197) of exposed HWs cleaned under running water immediately after the exposure, 19% (37/197) squeezed exposure site, 63% (124/197) cleaned with one or more chemicals of hypochlorite solution, iodine, chlorohexidine and/or methylated spirit and 15% (29/197) took no action after the incident. Thirty five percent (68/196) reported the exposure incident Table 2. Of those who reported the exposure incident, 7% (5/68) reported to the anti-retroviral therapy (ART) clinic, and 3% (2/68) to infection control department Table 2. Eighty two percent (53/65) reported within an hour of the exposure Table 2. Fifty-two percent (66/128) of HWs who did not report the exposure incident gave being unaware of reporting systems as reason for not having reported, and 22% (28/128) were already immunized against Hep B Table 2. Eighty four percent (152/181) of the exposed HWs had their source patient´s sero-status identified and three quarters (113/181) of these reported that their source patient was HIV sero-negative Table 2.

Eighty eight percent (15/17) of source patients were Hep B sero-negative, and 11% (2/17) of source patients were Hep B sero-positive. Eighteen percent (29/161) of the exposed HWs reportedly received PEP of which 100% (29/29) received anti-retroviral (ARVs) and 3% (1/29) received Hep B vaccine series. PEP was reportedly not required after evaluation for 13% (21/161) of exposed HWs. Thirty one percent (9/29) of those who initiated PEP did not complete the treatment regimen. Of those who did not complete treatment, 78% (7/9) cited side effects of the drugs as the reason while 11% (1/9) tested PCR negative and 11% (1/9) were still on treatment Table 2.

Level of PEP uptake by socio-demographic, occupational characteristics among the exposed HWs and associated factors

We used modified Poisson regression analysis because the prevalence of PEP uptake among the exposed HWs was 15% and using logistic regression would overestimate the measure of association. At bivariate analysis using a cut-off of 0.2, factors significantly associated with PEP uptake were health facility types, workstation, years of experience, depth of injury, number of times injured, bleeding at site of injury, reporting PI incident and risk management protocol Table 3.

Compared to consultants, those who took PEP were less likely to be medical officers (prevalence ratio (PR)= 0.13, 95% CI =0.03-0.56), less likely to be intern doctors (PR= 0.02, 95% CI =<0.01-0.15), less likely to be laboratory technologists (PR= 0.05, 95% CI =<0.01-0.51), less likely to be nurses (PR= 0.09, 95% CI =0.01-0.6), less likely to be medical or paramedical students (PR=0.03, 95%CI =<0.01-0.17).

Compared to HWs with less than a year of professional experience, HWs who took PEP were

less likely to have 1-5years of professional experience (PR=0.29, 95% CI=0.1-0.92), less likely to have 6-10years of professional experience (PR=0.36, 95% CI =0.13-0.99), less likely to have more than ten years of professional experience (PR=0.05, 95% CI =<0.01-0.27) Table 3.

Compared to HWs with superficial injuries, PEP uptake was more likely among HWs with moderately deep injuries (PR= 2.41, 95% CI=1.38-4.19), more likely among HWs with deep injuries (PR=1.56, 95% CI= 0.57-4.26) Table 3.

Health facility verification

Majority of the health facilities lacked records on occupational exposure including PIs (6/7), reporting procedures (6/7), risk management protocol (5/7) and did not conduct periodic trainings on occupational risk reduction (5/7). All health facilities reported PEP drugs available free of charge and all the time, sharps containers available at points of use with sharps appropriately disposed of.

Discussion

We conducted a cross-sectional study among clinical HWs in Kampala capital city and aimed to determine the level of utilization PEP for HIV and Hep B following PIs. Fifteen percent of HWs who had sustained a PI in the preceding 12months initiated PEP and 10% completed treatment.

Prevalence of PIs

Over a quarter of HWs in this study had sustained a PI in the past year. Half of these injuries were due to sharp medical devices and the other half were due to splash exposures. This finding can be attributed to the high patient volumes in all facilities included in the study. Our finding is comparable to similar other studies in our setting [15,35]. This finding however, is contrary to that reported in a study done in Nigeria [6]. This much higher prevalence may be so because they included only resident doctors in their study who tend to do more invasive procedures compared to this one, which included clinical HWs of various cadres.

More invasive procedures being done later in the day in the outpatient clinics, mounting pressure to clear patient lines and fatigue among HWs as the day wears on explains our finding of majority of PIs having occurred in the afternoon (2pm-7pm).

This finding is contrary to finding by Mbaisi et.al of most exposures having occurred during morning shift [24]. This is because in Kenyan public health facilities, invasive procedures are performed in the morning [24]. Over three-quarters of all exposed HWs were wearing some form of personal protective equipment, with over half wearing at least a pair of gloves. This may be due to concerted efforts by government to ensure gloves are widely available in all public health facilities. This finding is comparable to similar other studies [9].

Half of those not wearing protective gear at the time of PI reported it was due to unavailability. This is possibly because of large patient volumes hence health facilities run out of protective gear fast. These findings are contrary to a similar study in our setting in which much lower levels of HWs were wearing protective gear [15]. This is because they sought prevalence of all necessary personal protective equipment versus prevalence of any form of protective equipment sought by this study.

The high proportion of the HWs that had never received an in-service training on infection control and low proportion of HWs that had received training on infection control in less than a year underscore the need for infection control teams tasked with provision of in-service trainings on infection control and occupational exposure surveillance. Our finding is slightly different from that of other similar studies [36,37]. This difference is because the former included only HWs at a public hospital and did not include medical/paramedical students, while the latter conducted their study among resident doctors only. Majority of all PIs were among HWs with less than a year of experience. Experience improves skills and awareness. This finding is comparable to a study by Sharma et.al in which HWs with less than a year of work experience accounted for a high proportion of needle stick injuries [38].

Post exposure site management and Hepatitis B vaccination status

Most of the exposed HWs immediately cleaned under running water. This finding underpins a

substantial level of general awareness of post exposure management of the PI exposed site. However, many of the HWs took additional actions of cleaning with anti-septic solutions, which only serve to cause inflammation of the exposed site thereby aiding spread of the pathogens. These findings further corroborate the need for routine in-service training on infection control for all HWs. Less than half of the exposed health workers reported the exposure incident and the non-uniformity in people reported to is a reflection of the underlying need for a universal reporting procedure and an occupational exposure office. Furthermore, 18% of the exposed HWs reported they were vaccinated against Hep B. This finding points towards the need for mandatory vaccination of HWs against Hep B [15]. This finding is contrary to much higher level of Hep B vaccination among HWs reported by Ndejjo et.al. This difference is possibly because our study included medical and paramedical students in clinical years as part of the study sample.

Majority of the exposed HWs who reported did so immediately within an hour. This finding affirms that there is general awareness on PEP management although this knowledge needs reinforcement. This finding is comparable to similar other studies [9].

Level of PEP uptake and factors associated with PEP uptake among exposed HWs

The prevalence of PEP uptake among all other cadres was lower than that among Consultants. Consultants are overall more knowledgeable, which explains our finding. All HWs with a year or more of professional experience had a prevalence of PEP uptake lower than that among HWs with less than a year of professional experience. This is because newly qualified HWs are more enthusiastic while experienced HWs are more complacent. This finding is comparable to a similar study by Obi et.al [37].

Health facility verification

The lack of occupational exposure records underscores the need for promoting surveillance of occupational exposure among the health work force. The unavailability of risk management protocols, reporting procedures at most of the facilities expresses the need for translation of the infection control guidelines set up by the ministry of health in ways that reach the end users- HWs.

Study strengths and limitations

This study assessed for information on PIs in the preceding 12months, this introduced recall bias. This in turn may have resulted in under estimation of the prevalence of PIs among the HWs. There may have been social desirability bias with under reporting of PI hence an under estimation of the prevalence of PIs.

In addition, because the majority of respondents in the study were from Mulago Hospital (84%), the findings of this study may not be generalizable to lower-level health facilities: Health centers IIs, III, and IVs.

On the positive side, this study included all cadres of HWs including medical and paramedical students, across a national referral hospital, lower-level public health facilities and a private hospital. This study contributes to the existing knowledge, the prevalence of PIs, characteristics of exposure incidents, level of PEP uptake and associated factors following PIs among the clinical health work force. This information is important for appropriate policy interventions to promote and maintain a healthy healthcare workforce.

Conclusion

PIs are prevalent among health workers in Kampala and are mostly among those below 25 years of age. PEP uptake was low, being a consultant, having less than a year of professional experience were significantly associated with PEP uptake.

Recommendations

The Directorate of Public health and Environment, KCCA, the Executive Director, Mulago NRH and the Director Surgery, Education and Research, IHK should ensure active infection control teams are in place and are tasked with PI exposure surveillance, routine education on infection control, evaluation and treatment of exposed HWs.

Institutional guidelines on infection control in form of PEP management of exposed sites and reporting procedure should be made widely available

throughout all health facilities in all their departments and on all their wards.

Further research- we recommend a prospective study on incidence of PIs, serological and clinical follow-up of the exposed HWs. This will help estimate the burden of HIV and Hep B among HWs due to occupational exposure.

What is known about this topic

- Health workers are often exposed to percutaneous injuries due to lack of occupational safety guidelines, lack of safe devices putting them at substantial risk of HIV, Hepatitis B infections.

What this study adds

- Empirical research on the knowledge and utilization of PEP following percutaneous injuries by exposed health workers in our setting still remains scarce.
- This paper provides critical information on utilization levels of PEP for HIV and Hep B among HWs following occupational exposure and the associated factors.
- Percutaneous injuries are prevalent among younger health workers; however, their PEP utilization is low.

Competing interests

The authors declare no competing interests.

Funding

This study was supported by grant #D43TW009284 from the Fogarty International Center of the U.S. National Institutes of Health (Chronic Consequences of Trauma, Injuries, Disability Across the Lifespan: Uganda). The funder had no other role in the study.

Authors' contributions

All authors listed on this manuscript led by PHA made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data. All authors led by PHA were involved in drafting the manuscript and or revising it critically for important intellectual content and have read and approved the manuscript to be published.

Acknowledgements

We thank all the respondents who generously gave in their time to take part in the study. We acknowledge the support of the Kampala city council authority and the different health facility administrations.

Tables

Table 1: Socio-demographic and occupational characteristics of clinical health workers in Kampala, 2016
Table 2: Characteristics of PI exposure, management of exposed body sites and PEP uptake
Table 3: Level of PEP uptake among exposed HWs and associated factors

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Table 1: Socio-demographic and occupational characteristics of clinical health workers in Kampala, 2016		
Characteristics	**Frequency n=709**	**Percentage (%)**
Health facility		
Mulago NRH	596	84.1
Kisenyi HC IV	9	1.2
Komamboga HC III	5	0.7
Kawaala HC III	11	1.6
Kiswa HC III	14	2.0
Bukoto HC III	8	1.1
International Hospital Kampala	66	9.3
Gender		
Male	372	52.5
Female	337	47.5
Age years - mean (SD), median (IQR),	29.2 (8.1), 26 (8)	
Age categorized		
<25	270	38.1
25 to 29	186	26.2
30 to 34	103	14.5
35 to 39	57	8
≥40	82	11.6
Cadre of health worker		
Consultant	24	3.4
Doctor Medical officer	71	10
Doctor Intern	45	6.4
Nurse	127	17.9
Clinical officer	34	4.8
Laboratory technologist	47	6.6
Midwife	44	6.2
Student	307	43.3
Others	10	1.4
Work station		
Operating theatre	27	3.8

Table 1: Socio-demographic and occupational characteristics of clinical health workers in Kampala, 2016		
Casualty	43	6.1
Intensive Care Unit	15	2.1
OBGY ward	167	23.6
Surgical ward	155	21.9
Blood bank	5	0.7
Pediatric ward	107	15.1
Medical unit	121	17.1
Laboratory	59	8.3
Year of experience - mean (SD), median (IQR)	1 (7.8), 4.6 (6.0)	
Years of experience		
<1year	341	48.7
1-5years	164	23.4
6-10years	88	12.6
>10years	107	15.3

Table 2: Characteristics of PI exposure, management of exposed body sites and PEP uptake		
Characteristics	**Frequency**	**Percentage (%)**
In the past 12 months sustained a splash exposure or an injury by a sharp medical device	**N=709**	
Yes	197	27.8
Age in years		
<25	71	36.2
25-29	58	29.6
30-34	24	12.2
35-39	21	10.7
≥40	22	11.2
Time of exposure	n= 185	
Morning (6am-1pm)	56	30.2
Afternoon (2pm-7pm)	71	38.4
Night (8pm-5am)	58	31.3
Wearing protective equipment	n=196	
Yes	173	88.3
Type of protective gear	n=173	
Single pair of gloves	107	61.8
Double pair of gloves	90	52
Goggles	12	6.9
Face shield	5	2.9
Gown	73	42.2
Mask	43	24.9
No, why	n=24	
Low risk perception	9	37.5
Not available, inadequate supply	20	83.3
No reason	4	16.7
Undergone in-service training in last year		
Yes	205	29
Ever undergone an in-service training	n= 707	

Table 2: Characteristics of PI exposure, management of exposed body sites and PEP uptake		
Characteristics	**Frequency**	**Percentage (%)**
Yes	538	76.1
Immediate action after the exposure	n=19	
Cleaned under running water	152	77.1
Squeezed site	37	18.8
No action taken	29	14.7
Cleaned with hypochlorite solution, iodine, chlorohexidine and/or methylated spirit	124	6.6
Report exposure incident	n=196	
Yes	68	34.7
Reported to	n=68	
ART clinic	5	7.4
Doctor on call, lab, nurse on duty, counsellor, other	61	89.7
Infection control	2	2.9
Time of reporting	n= 65	
Immediately/ within 1 hour	53	81.5
After 1 hour	12	18.5
Reasons for not reporting	n=128	
No reporting system/ Not aware of reporting method	66	51.6
Did not know the risk, not infectious, no time, not emergency	34	26.5
Already immunized against Hep B	28	21.9
Identification of patient's sero-status	n=181	
Yes	152	83.9
HIV sero-status of source patient	n=152	
Positive	39	25.7
Negative	113	74.3
Hep B sero-status of source patient	n=17	
Positive	2	11.8
Negative	15	88.2
Receive PEP	n=161	
Yes	29	18

Table 2: Characteristics of PI exposure, management of exposed body sites and PEP uptake		
Characteristics	**Frequency**	**Percentage (%)**
Not required after evaluation	21	13
Specify PEP received	n=29	
HBV	1	3.4
ARVs	29	100
If no PEP, why	n=110	
Ignored	88	80
No protocol available	22	20
Completion of treatment	n=29	
Yes	20	69
Reason for not completing treatment		
Side effects	7	77.8
Tested PCR negative	1	11.1
treatment	1	11.1

Table 3: Level of PEP uptake among exposed HWs and associated factors					
Explanatory variable	**Prevalence (n=29)**	**Un adj. PR**	**CI (95%)**	**Adj. PR**	**CI (95%)**
Health Facility					
Mulago NRH	12.7 (25)	1 (Reference)	REF	REF	
Health centers	2 (4)	2.3	1.2-4.6*	3.6	1.1-11.8*
IHK	0	2.6	1.3-5.4*	1.4	0.5-4.1
Age (Years)					
<25	5.1 (10)	REF			
25 to 29	4.1 (8)	1.6	0.8-3.1		
30 to 34	3.1 (6)	1.6	0.7-3.5		
35 to 39	0.5 (1)	1.8	0.7-4.5		
≥40	2 (4)	1.1	0.4-2.8		
Cadre					
Consultant	0.5 (1)	REF			
Medical doctor officer	3.1 (6)	1.9	0.5-7.3	0.1	0.03-0.6*
Doctor Intern	1.5 (3)	0.9	0.2-4.3	0.02	<0.01-0.2*
Nurse	1.5 (3)	1.2	0.3-4.9	0.1	0.01-0.6*
Clinical officer	1.5 (3)	1.9	0.4-8.4	0.2	0.04-0.6*
Laboratory technologist	1.52 (3)	1.1	0.2-5.4	0.05	<0.01-0.5*
Midwife	0.5 (1)	0.5	0.08-3.3	0.09	0.01-0.6*
Student	4.57 (9)	0.8	0.2-3	0.03	<0.01-0.17*
Complete Years of experience					
<1 year	6.6 (13)	REF			
1-5years	4.6 (9)	1.6	0.9-2.9	0.3	0.1-0.9*
6-10years	1.5 (3)	1.9	0.96-3.8	0.4	0.13-0.99*
> 10 years	1.5 (3)	0.6	0.19-1.6	0.05	<0.01-0.27*
Ever received in service training					
No	3.6 (7)	REF			
Yes	11.2 (22)	1.03	0.54-2		
Depth of injury					
Superficial	6.6 (13)	REF			
Moderate	5.1 (10)	2.4	1.4-4.1	2.4	1.4-4.2*
Deep	1.5 (3)	2.3	0.98-5.3	1.6	0.6-4.3
Wearing protective equipment					

Table 3: Level of PEP uptake among exposed HWs and associated factors					
Explanatory variable	**Prevalence (n=29)**	**Un adj. PR**	**CI (95%)**	**Adj. PR**	**CI (95%)**
No	1.02 (2)	REF			
Yes	13.2 (26)	1.2	0.47-3.3		
Report exposure incident					
No	0.9 (6)	REF			
Yes	3.2 (23)	2.7	1.6-4.6*		
Risk management protocol in place					
No	0.56(4)	REF			
Yes	3.5(25)	0.47	0.24-0.92*	1	