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Adherence to post exposure prophylaxis for Hepatitis B virusamong health care workers in Accra, Ghana

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Abstract:*Hepatitis B Virus (HBV) infection is a global issue and a huge occupational hazard to Health Care Workers (HCWs) all over the world. Health Care Workers in resource poor settings have higher potential risk of occupational exposure to HBV. Despite this problem, the use of HBV vaccine which is as a pre-exposure prophylaxis measure for blocking the chain of transmission of the virus is suboptimal among HCWs in our part of the world. The benefits of Post Exposure Prophylaxis (PEP) for HBV can be explored to give instant protection for HCWs against occupational acquisition of HBV.*

Objectives*: The study was designed and implemented to assess the level of adherence to the five steps of PEP for HBV among HCWs.*

Methods: *The study was a hospital based cross-sectional type involving 340 participants. Exposure to blood and body fluids in the immediate past 12 months and PEP use was assessed among six categories of HCWs by the use of a pretested structured questionnaire. Data was analyzed using SPSS version 21. Proportions of HCW who adhered to the various stages of the PEP protocol was obtained. Level of adherence was categorized as 'low', ≤50%, 'intermediate'= 51-74% and 'high' ≥75%. Bivariate analysis in the form of chi-square test was performed to test the association between exposure reporting and some occupational and sociodemographic variables. Level of significance was set at 0.05.*

Results: *Exposure to blood and body fluids (12 months preceding the study) was recorded in 11.2% (38/240) participants. Needle stick injuries predominated all the exposure forms. Exposure reporting which is the first stage of the PEP management pathway was high (76.3%) and was significantly associated with the facility type ($\square^2$ = 17.9; p= 0.001). Adherence to evaluation for PEP was also high 97% (28/29). PEP usage was fair or intermediate with 70% of eligible participants using PEP. Timeliness for PEP as well as evaluation or assessment post PEP use were both universal among those who were eligible to use PEP.*

Conclusions: *Adherence to the five steps or pathways under PEP for HBV was good on average among the study population. Health facilities with adequate logistics and clear exposure reporting protocols and pathways can utilize this good level of adherence to prevent HBV infections among HCWs especially in areas where unsatisfactory gains have been made in achieving high HBV vaccination coverage for HCWs.*

Key Word*:****Adherence, Health Care Workers, Hepatitis B Virus, Post Exposure Prophylaxis***

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I. Introduction

Hepatitis B Virus (HBV) infection which is caused by a highly transmissible virus belonging to the *hepadnaviridae* family of viruses has long been identified as a public health problem globally (1). Estimates available indicate that close to 350 million people are currently living with the chronic form of the disease (2). The majority of the infected people live in developing countries of Sub-Saharan Africa and Asia. Evidence is available to show that HBV is the most common cause of chronic viral hepatitis, liver cirrhosis and liver cancer (3). The infection is efficiently transmitted through percutaneous and per-mucosal exposure to blood and body fluids contaminated with the virus. This property of the virus makes it a huge occupational hazard to Health Care Workers (HCWs) all over the world (4). Evidence is available to show that 37% of HBV infections among HCWs are as a result of occupational exposures (5). There is also enough evidence to suggest that HCWs in Africa carry a higher potential risk of HBV exposure compared to their counterparts in other parts of the world (6). Reports available indicate that 12 months prevalence of exposure to blood borne pathogens through percutaneous injuries among HCWs in Africa was 36.0% (7) with subsequent high HBV prevalence. Studies done in specific settings in Africa equally revealed high HBV prevalence among HCWs. For example, a prevalence of 25.7% was reported in Nigeria (8), 17.8% in Senegal(9) and 5.9% in Ghana (10). In spite of the high HBV prevalence among HCWs especially those in Africa, and strong recommendations from the World Health Organization (WHO) and many occupational health experts, immunization which is considered the most cost effective approach to preventing HBV infection among this populations is still sub-optimal. For example a systematic review and meta-analysis found only 24.7% of HCWs in Africa having received the recommended

three (3) doses of HBV vaccine (11). The consistently low vaccination coverage is likely to increase HCWs risk of occupational acquisition of the virus. In the light of this low vaccination coverage and continuous exposure to blood and body fluids, it is important to reconsider the benefits that Post Exposure Prophylaxis (PEP) against HBV can offer to HCWs as a secondary measure to reduce the risk of occupational acquisition of HBV.

Hepatitis B vaccine which provides long-term protection against HBV infection is recommended for pre and post-exposure prophylaxis. Hepatitis B Immunoglobulin (HBIG) provides a temporary form of protection which lasts for three to six months and is only indicated in certain post-exposure situations (12,13). It is recommend that an appropriate, timely and effective prophylaxis is used to mitigate HBV infection and that HBIG be administered as soon as possible, preferably within 12 - 24 hours following percutaneous or mucosal exposure to prevent seroconversion and subsequent development of complications (14 - 16).

Successful implementation of PEP management programme for HBV depends on the interplay between health facility responsibilities and responsibilities of the exposed HCW (17). The health facility has an important role of instituting an exposure reporting pathway or systems with trained individuals who would respond to HCWs with exposures in a timely manner. The availability of facility level policies and guidelines regarding the implementation of PEP coupled with appropriate stock of recommended testing supplies of PEP logistics have all been identified as major components of an effective PEP programme in a health facility (18). A clear pathway is needed for effective PEP management of exposed HCWs. First and foremost, the exposed HCW has the responsibility to report the injury or exposure, then the report is forwarded for documentation and surveillance. The next step is the comprehensive assessment of both the exposed HCW and the source patient (if known). PEP prescription and subsequent PEP initiation follows in a timely manner depending on the outcome of both exposed HCW and source assessment or evaluation. Appointments are then given for follow up after PEP use Any break experienced in this sequence of events may lead to suboptimal adherence to a successful PEP programme(17-19). This study therefore assessed the level of adherence to the various stages of PEP protocol for HBV among HCWs in Accra.

II. Material And Methods

Study Design; The study had a hospital based cross-sectional design which was undertaken in 2019 in Accra with the aim of assessing the level of adherence to the various stages of post exposure prophylaxis management for HBV. The study utilized a pretested structure instrument to gather data from consenting HCWs who were recruited from five different public health facilities in the region.

Study Setting/ Study Area

The study area was Greater Accra Region with a total population of 4010.054and a population density of 3.245km^2(20). This region has the largest distribution of health care facilities and the highest number of health care professionals compared to all other regions. Studies have shown that HCWs in this region just like those in other parts of the country suffer percutaneous and mucocutanous exposures to blood and body fluids and for that matter are at risk of blood borne infections such as Hepatitis B and C as well Human Immunodeficiency Virus (HIV) (21,22). The prevalence of HIV among HCWs in the Region is not well known but a recent study estimated HBV prevalence to be 5.9%among the population of HCWs(10) .

Study duration: The study was undertaken in the first half of the year 2019.

Sampling and Sample Size Calculation

The sample size of the study was estimated by assuming the level of adherence to each step of PEP for HBV to be 50%. The formula for estimating proportions proposed by Cochrane was used to obtain the sample size (23). Population correction, design effect and allocation for non-response were duly factored in to the estimation of the sample size.

Sample size. In all, 363 participants were estimated to participate in the study, however 340 completed questionnaires were analyzed producing a response rate of 97.3%.

Study Population/ Subjects and Selection; the population was made of male and female HCWs. Five (5) districts were selected at random from the list of 16 districts/municipals or metropolitan areas that were the political demarcations in the Greater Accra Region at the time of the study. All the health facilities in the five selected districts were stratified into five levels of care namely, Regional Hospitals, District Hospitals, Polyclinics, Health Centers and lastly Community Based Health Planning Services (CHPs).

HCWs were proportionally allocated to the five selected facilities and within each health facility, systematic random sampling procedure was used to select participants from each professional category following a proportional allocation to each professional category or cadre.

Inclusion Criteria; the study was restricted to HCWs who were 18 years and above, had worked in their respective facilities for six months and above and belonged to the professional category of Nurses/Midwives, Doctors, Laboratory staff, Orderlies or Sanitation workers, Anesthetists and Physician Assistants (PAs).

Research Instrument and Data Collection.

Data were collected using a pretested research instrument that had close ended questions and had 25 items in all. The questions mostly had response options of 'yes' or 'no' and few others gave participants the chance to give their own responses. The questionnaire elicited responses on sociodemographic data such as sex, occupational category, duration of work, age, educational level etc. The questionnaire also elicited information on history of exposure in the past 12 months to the study, the type of exposure, reporting of the most resent exposure, availing oneself for evaluation after exposure, use of PEP and availing oneself for post PEP assessment. The data was obtained through self-administered interview which lasted for 30-40 minutes. The HCWs were engaged in their respective health facilities. The purpose of the study and its procedures were clearly explained to them. The opportunity was given for clarifications to be made and interested participants provided written informed consent to be part of the study.

Statistical Procedure and Data Analysis

Data was coded, summarized and analyzed using Statistical Package for Social Sciences (SPSS) version 21 software (SPSS Inc., Chicago, IL). The number of participating HCWs who suffered the most recent exposures within the past 12 months, reported their exposures (most recent) and used PEP were counted and reported using descriptive statistics. Adherence to the five (5) steps in the PEP management pathway was measured by calculating the proportions of HCWs who reported exposures, proportion of reporting HCWs were assessed for eligibility to use PEP, the proportion of eligible HCWs who actually used PEP and finally, the proportion of PEP users who returned for follow up tests/ assessments. Levels of adherence were categorized based on 'poor' (≤50%), 'intermediate or fair' (51-74%) and 'good' (≥75-100) (24–26). Chi- square test of significance procedure was undertaken to identify factors significantly associated with exposure reporting. A p-value of <0.05 in the bivariate analysis was considered significant.

III. Result

Results presented in *Table 1.0* shows that majority of the respondents were females (74.1%, 252/340) with the mean age being 34.5 years, Most of the participants 70.6%, (240/340) had attained tertiary level education. Nurses and midwives formed 47.6% (162/340) of the participants with doctors forming 20.3% (69/340) and anesthetists being the least professional group 4.4%, (15/340). Majority representing 76% (260/340) of the HCWs had less than 10 years working experience. A total of 155/340 (45.6%) worked as providers in critical units (e.g. Labor ward, theatre) where blood and body fluid exposures are much more likely, whilst 54.4% (185) provided care at less critical units or departments.

Table 1.0 Background characteristics of respondents(N=340)

	VARIABLE	FREQUENCY	PERCENT (%)
Sociodemographic factors	**Age group**		
	21-30	127	37.4
	31-40	153	45.0
	41-50	43	12.6
	51-60	17	5.0
	Sex		
	Male	88	25.9
	Female	252	74.1
	Cadre of staff		
	Doctor	69	20.3
	Nurse/midwife	162	47.6
	Anesthetist	15	4.4
	Laboratory Staff	40	11.8
	Orderly	35	10.3
	Physician Assistant (P.A.)	19	5.6
Occupational factors	**Duration of employment**		
	<10 Years	260	76.5
	≥10 Years	80	23.5
	Work unit		
	Critical	155	45.6
	Non-Critical	185	54.4

Facility Type		
CHPS**	19	5.6
Health Centre	28	8.2
Polyclinic	56	16.5
District Hospital	80	23.5
Regional Hospital	157	46.2
Training		
Trained in BB IPC*	274	80.6
Not Trained	66	19.4

*BBIPC blood borne infection prevention and control **Community Based Health Planning Services

Adherence to exposure reporting among HCWs

The results presented in *Table 2.0* reveal that exposure to blood and body fluids via percutaneous and per mucous routes were recorded in 11.2% (38/340) of the HCWs within the past twelve months prior to the study. The study recognized the fact that multiple exposures could have occurred within the period under review and that HCWs may have responded differently to each exposure incident and for that matter the study only measured or assessed adherence to the most recent exposure that the HCW experienced. Needle stick injuries formed the majority of 28 (73.7%) of all the exposures. Exposure reporting which was identified as an important element for PEP utilization was assessed in the population of exposed HCWs. Out of the 38 HCWs who sustained exposures, 76.3% (29/38) self-reported the exposure incident giving, the overall exposure reporting prevalence of 76.3% indicating a good level of adherence to reporting recommendations.

Table 2.0 Exposure to blood and body fluids and exposure incident reporting

Variable	Frequency	Percent (%)
Exposure in last 12 months		
Yes	38	11.2
No	302	88.8
Type of Exposure		
Percutaneous	28	73.7
Per mucous	10	26.3
Reported most recent exposure/12months		
Yes		
No	29	76.3
	9	23.7

Variations in exposure reporting was observed across the various categories of HCWs as well as the various levels of health care.Table 3.0 shows that exposure reporting was highest and universal (100%) among anesthetists, laboratory staff and PAs. Doctors were the category that reported considerably lower number of exposure reporting i.e. (66.7%) compared to the other categories of HCWs. Reporting was also observed to be much higher in trained HCWs; 77.4% (24/31) than their untrained counterparts. Males reported more exposures; 77.8% (7/9) than females. Exposure reporting was observed to increase with increasing level of health care as the Regional Hospital recorded the highest reporting rate of 100%. This relationship was statistically significant (p-value of < 0.05) in a bivariate analysis. The analysis was limited to bivariate level due to the limited or small number of observations in the various groups.

Adherence to Evaluation or Assessment for PEP among HCWS

Out of the 29 HCWs who reported their exposure incidents, all except one were evaluated or assessed for the eligibility to receive PEP, giving an overall evaluation rate of 96%. This score is high according to the adherence scale for this study.

Adherence to PEP Use

The results as presented in *Fig1.0* indicate that PEP for HBV was used by seven (7) individuals out of 10 HCWs who were evaluated and were eligible to receive PEP, giving PEP use rate of 70.0%, an indication of an intermediate or fair level of adherence to PEP use among the population of HCWs surveyed. Cost for PEP in 5(71.4%) of the Exposed HCWs who benefited from PEP were borne by the facilities where they worked. Three (3) HCWs who were eligible to use PEP could not use PEP due to unavailability or cost involved in getting vaccine and or immunoglobulin.

Adherence to Timeliness of PEP Use

All the eligible 100% (7/7) HCWs who used PEP initiated PEP averagely within 24-48 hours and none of the HCWs requiring PEP initiated beyond 72 hours. This gave 100% timeliness of PEP initiation among the exposed HCWs who used PEP.

Adherence toPost PEP Evaluation and Follow-up

All the (7/7) HCWs who used PEP returned for first follow-up after 6 months, giving adherence to follow up rate of 100%. The flow diagram in Fig1.0 below shows PEP for HBV steps and level of adherence to recommendations at each step.

Table 3.0 Adherence to exposure reporting by sociodemographic and occupational variables

Variable	Exposure (12month)	Reported an Exposure Yes(n=29)	No (n=9)	Reporting Rate	χ^2 or Fisher's Exact	P-Value
Cadre of staff						
Doctor	9	6(66.7)	3(33.3)	66.7		
Nurse/Midwife	16	12(75.0)	4(25.0)	75.0		
Anaesthetist	1	1(100.0)	0(0.0)	100.0	2.133	0.939
Laboratory Staff	1	1(100.0)	0(0.0)	100.0		
Orderly	8	6(75.0)	2(25.0)	75.0)		
P.A*.	3	3(100.0)	0(0.0)	100.0		
Overall	**38**	**29.0**	**9.0**	**76.3**		
Facility Type						
CHPS	1	0(0)	1(100)	0		
Health Centre	6	1(16.7)	5(83.3)	16.7	17.990	<0.001**
Polyclinic	7	5(71.4)	2(28.6)	71.4		
Dist. Hospital	10	9(90.0)	1(10.0)	90.0		
Reg. Hospital	14	14(100)	0(0.0)	100.0		
Training						
Trained	31	24(77.4)	7(22.6)	77.4	0.113	0.736
Not trained	7	5(71.4)	2(28.6)	71.4		
Work unit/DPT**						
Critical	14	12(85.7)	2(14.3)	85.7	1.083	0.298
Non critical	24	17(70.8)	7(29.2)	70.8		
Age						
21-30	9	7(77.8)	2(22.2)	77.8		
31-40	19	15(79)	4(21.0)	79.0	1.896	0.654
41-50	6	5(83.3)	1(16.7)	83.3		
51-60	4	2(50)	2(50.0)	50.0		
Sex						
Male	9	7(77.8)	2(22.2)	77.8	0.140	0.906
Female	29	22(75.9)	7(24.1)	75.9		

*Physician Assistants ** Department

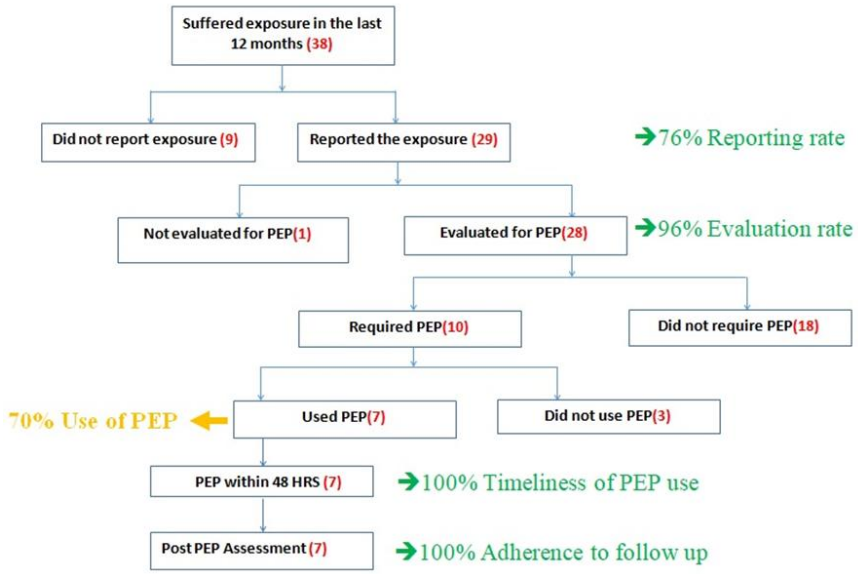

Fig 1.0 Flow diagram indicating Summary of adherence to stages in HBV PEP management pathways.

IV. Discussion

Adherence to Exposure Reporting among HCWs.

This study was designed to assess the level of adherence to PEP among six categories of HCWs in the southern part of Ghana. The study found that, exposure incidents were duly reported by 29 HCWs out of the total of 38 individuals who sustained exposures in the past twelve months preceding the study giving an overall exposure reporting rate of 76.3% indicating a good level of adherence according to the adherence scale adapted for this study. This finding is in contrast to what has been previously suggested that exposures to blood and body fluids has been historically under reported (27). For example, low reporting rates of 30.8%, 37.0 and 24% have been reported in others studies involving HCWs (27- 29).

The study also found a statistically significant difference between exposure reporting and the five facility levels with the regional hospital demonstrating the highest exposure reporting rate. The exposure reporting rate being reported by this study is similar to overall exposure incident reporting rate of 73.1% reported in a university hospital in Switzerland where facility climate conditions were assessed to be conducive in promoting exposure reporting (31). In that study, it was suggested that resources and information about reporting procedures as well as continuous education were health facility factors contributing to the high reporting rate.

The implications of this finding is worth reassessing given the fact that the least reporting rate was observed among HCWs working at the CHPS and health center levels where poor facility influence in HBV prevention among HCWs is likely to be inadequate. Inferring from the results, HCWs working at such lower level facility levels would continue to be at risk of HBV infection until structures and programs are streamlined and work environment becomes safer and much more conducive for HCWs to report their exposures and ultimately adhere to the steps of PEP management protocols for HBV.

Adherence to Evaluation and Assessment for PEP

The study found 28 out of the 29 HCWs who reported their exposures, making themselves available to be assessed for eligibility to use PEP, giving evaluation rate of 96.6%. This indicates a good level of adherence to evaluation for PEP. This is consistent with findings from a teaching hospital in Ghana where a rapid assessment system coupled with clear facility policy was in place and evaluation of HCWs for PEP was observed to be efficient and beneficial (21). Even though evaluation of both exposed HCW and source patient is an important step in the PEP management pathway, initiation of PEP is not to be delayed by availability of results of both source patient and exposed HCWs (32) However, this step in the PEP management pathway should not be missed to ensure that exposed HCWs requiring PEP receive PEP in a timely manner, exposed HCWs do not receive PEP unnecessarily, and also the source patient has the opportunity to be offered counseling and enrolled into care appropriately if found to be infected with HBV. It is important that health facilities establish systems that are clear and efficient with the abundance of free testing and counseling services to allow for all exposed individuals to be evaluated for the need to benefit from PEP. Not all exposed HCWs are eligible to use PEP. Therefore, in resource-poor settings like Ghana where the cost of HBV vaccine and HBIG are brooked by the exposed HCW, an efficient evaluation of HCWs exposed to HBV could identify those who actually require PEP and therefore reduce the unnecessary financial cost of HBV vaccine and HBIG to HCWs who are already seroprotected.

Adherence to PEP Use among Exposed HCWs

This study also found that 70% of those who were eligible to use PEP for HBV actually used PEP indicating an intermediate or moderate level of PEP usage. Only 3(30%) of the HCWs failed to use PEP despite the urgent need. Other studies have equally reported moderate or intermediate level of PEP use among diverse populations. Specifically, for occupational exposures, another study reported a similar intermediate level of PEP use among Nigerian HCWs with 65.8% of those requiring PEP actually used PEP (33). A systematic review and meta-analysis measuring adherence to PEP use for both occupational and non-occupational exposures also found 62.60% of adherence to PEP use (34). In this present study however, unavailability of the HBV vaccine and HBIG were reported as being the barriers to PEP use among the individuals who failed to use PEP. This finding confirms the assertion that the health facility has an important role to play by streamlining systems and making logistics available for effective PEP management (18).

Adherence to Post PEP Evaluation

In this present study, all the HCWs who used PEP returned for 6 months' follow-up visits indicating a good level of adherence. This finding is consistent with reports from a large teaching hospital in Ghana where a rapid assessment system was in place and over 80% of exposed HCWs who used PEP reported for their first 6 months' follow-up visits (21). It has been observed that the efficacy of post exposure treatment correlates positively with the completion of follow-ups (35) and hence the importance of such follow-up visits cannot be

overemphasized. At such follow-upvisits**,** HCWs are assessed for the possibility of seroconversion following exposure and subsequent PEP treatment. Both psychological and physical support are provided for affected HCW to cope with the consequences of the exposure should seroconversion to HBsAg (+) occur. Given the numerous benefits associated with post PEP use follow-ups and for HCWs to derive the full benefit of PEP use, systems in the various facilities need to be streamlined to allow for follow-up testing and evaluations as well as policies to manage HCWs who may be seroconverted even after PEP use.

V. Conclusion

Adherence to the five steps or pathways under PEP for HBV was good on average among the study population. Exposure reporting which is the first and an important step in the PEP management pathway has significant association with the type of facility where the HCW works. Therefore, Health facilities with adequate logistics and clear exposure reporting protocols and pathways can utilize this good level of adherence to prevent HBV infections among HCWs especially in areas where unsatisfactory gains have been made in achieving high HBV vaccination coverage.

References

[1]. Zuckerman AJ. Hepatitis Viruses. S. B, editor. Medical Microbiology. 4th edition. Taxas: University of Taxas Medical branch; 1996. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21413272

[2]. Te HS, Jensen DM. Epidemiology of Hepatitis B and C Viruses: A global overview. Clin Liver Dis. 2010;14(1):1–21. Available from: http://dx.doi.org/10.1016/j.cld.2009.11.009

[3]. Schweitzer A, Horn J, Mikolajczyk RT, Krause G, Ott JJ. Estimations of worldwide prevalence of chronic hepatitis B virus infection : a systematic review of data published between 1965 and 2013. Lancet. 2015;386(10003):1546–55.

[4]. Hou J, Liu Z, Gu F. Epidemiology and prevention of hepatitis B virus infection. Int J Med Sci. 2005;2(1):50–7.

[5]. Prüss-Üstün A, Rapiti E, Hutin Y. Estimation of the global burden of disease attributable to contaminated sharps injuries among health-care workers. Am J Ind Med. 2005;48(6):482–90. Available from: http://www.ncbi.nlm.nih.gov/pubmed/16299710

[6]. Atlaw D, Sahiledengle B, Tariku Z. Hepatitis B and C virus infection among healthcare workers in Africa: a systematic review and meta-analysis. Environ Health Prev Med. 2021;26(1):1–14.

[7]. Auta A, Adewuyi EO, Tor-anyiin A, Aziz D, Ogbole E, Ogbonna BO. Health-care workers' occupational exposures to body fluids in 21 countries in Africa: systematic review and meta- analysis. Bull World Heal Organ. 2017;95:831–41.

[8]. Bello AC. Prevalence of hepatitis B virus markers in surgeons in Lagos, Nigeria. East Afr Med J. 2000;77(5):283–5.

[9]. Romieu I, Sow I, Lu S, Laroque G, Prince- David M, Romet- Lemonne JL. Prevalence of hepatitis B markers among hospital workers in Senegal. J Med Virol. 1989;27(4):282–7.

[10]. Senoo-Dogbey. Distribution of serological markers of hepatitis B virus infection among health care workers in Ghana 1. Int J Occup Saf Heal. 2021;11(2):100–7.

[11]. Auta A, Adewuyi EO, Kureh GT, Onoviran N, Adeloye D. Hepatitis B vaccination coverage among health-care workers in Africa: A systematic review and meta-analysis. Vaccine [Internet]. 2018;36(32):4851–60. Available from: https://doi.org/10.1016/j.vaccine.2018.06.043

[12]. Chang MH, Chen DS. Prevention of hepatitis B. Cold Spring Harb Perspect Med. 2015;5(3):a021493.

[13]. Centre for Disease Control and Prevention. Guidance for evaluating health-care personnel for hepatitis B virus protection and for administering postexposure management. MMWR Recomm Rep [Internet]. 2013;62(RR-10):1–19. Available from: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6210a1.htm%5Cnhttp://www.ncbi.nlm.nih.gov/pubmed/24352112

[14]. Beekmann SE, Henderson DK. Occupational Exposures among Healthcare Workers: New Methods for Prevention and Recommended Postexposure Prophylaxis for HIV and Hepatitis B and C. Curr Treat Options Infect Dis [Internet]. 2015;7(1):28–38. Available from: http://link.springer.com/10.1007/s40506-014-0036-y

[15]. Centers for Disease Control and Prevention. Postexposure Prophylaxis. 2016 [cited 2017 May 5]. Available from: http://www.cdc.gov/hepatitis/HBV/PEP.htm%0ANC

[16]. Country of Los Angeles Public Health Immunization Program. Hepatitis B immuno globulin. Vol. COM-PR-71. 2015. p. 5–6. Available from: http://publichealth.lacounty.gov/ip/providers/B71.htm

[17]. Boden LI, Petrofsky Y V., Hopcia K, Wagner GR, Hashimoto D. Understanding the hospital sharps injury reporting pathway. Am ournal Ind Med. 2016;118(24):6072–8.

[18]. Courtenay-Quirk C, Selenic D, Lahuerta M, Kassa G, Murrman M, Bock N. Development of an intervention to increase occupational postexposure prophylaxis in Sub-Saharan Africa. J Assoc Nurses AIDS Care [Internet]. 2016;27(5):727–30. Available from: http://dx.doi.org/10.1016/j.jana.2016.06.004

[19]. World Health Organization. Guidelines on post-exposure prophylaxis for HIV and the use of co-trimoxazole prophylaxis for HIV-related infections among adults, adolescents and children: recommendations for a public health approach. Switzerland; 2014.

[20]. Ghana Statistical Service. 2010 Population & Housing Census: Accra Metropolitan District Analytical Report. 2014.

[21]. Tetteh RA, Pharm FPC, Nartey ET, Lartey M, Chb MB, Mantel-teeuwisse AK, et al. Outcomes of a postexposure prophylaxis program at the Korle-Bu Teaching Hospital in Ghana : A retrospective cohort study. J Int Assoc Provid AIDS Care. 2015;14(6):544–52.

[22]. Lori JR, McCullagh MC, Krueger A, Oteng R. Sharps injuries among emergency department nurses in one tertiary care hospital in Ghana. Int Emerg Nurs [Internet]. 2015;28:14–9. Available from: http://dx.doi.org/10.1016/j.ienj.2015.11.007

[23]. Cochran WG. Sampling Techniques. New York: John wiley & sons New; 1977. 1–100 p. Available from: https://archive.org/details/Cochran1977SamplingTechniques_201703

[24]. Shokoohi M, Karamouzian M, Mirzazadeh A, Haghdoost A, Rafierad AA, Sedaghat A, et al. HIV knowledge, attitudes, and practices of young people in Iran: Findings of a national population-based survey in 2013. PLoS One. 2016;11(9):1–15.

[25]. Said N, Ab Hamid MR, Tarmizi LA, Azizan NA. HIV Knowledge, Attitude and Perception in situation of University. Environ Proc J. 2018;3(7).

[26]. Thanavanh B, Kasuya H, Sakamoto J. Thanavanh Knowledge , attitudes and practices regarding HIV / AIDS among male high school students inLao People's Democratic Republic. 2013;16:12–7.

[27]. Juan CPT, Mc CD, Lucas L, Mc AJ, Words K. Health care worker follow-up compliance after occupational bloodborne pathogens

exposure: A brief report. AJIC Am J Infect Control [Internet]. 2016;44:1738–40. Available from: http://dx.doi.org/10.1016/j.ajic.2016.04.243

[28]. Engin DÖ, İnan A, Ceran N, Demir ZA, Dağli1 Ö, Karagül1 E, et al. Occupational exposures among healthcare workers: A teaching hospital sample. J Microbiol Infect Dis. 2015;4(2):64–8.

[29]. Kassa G, Selenic D, Lahuerta M, Gaolathe T, Liu Y, Letang G, et al. Occupational exposure to bloodborne pathogens among health care workers in Botswana: Reporting and utilization of postexposure prophylaxis. Am J Infect Control. 2016;44(8):879–85. Available from: http://dx.doi.org/10.1016/j.ajic.2016.01.027

[30]. Pervaiz M, Gilbert R, Ali N. The prevalence and underreporting of needlestick injuries among dental healthcare workers in Pakistan: A systematic review. Int J Dent. 2018;2018:1–14.

[31]. Voide C, Darling KE, Kenfak-Foguena A, Erara V, Cavassini M, Lazor-Blanchet C. Underreporting of needlestick and sharps injuries among healthcare workers in a Swiss University Hospital. Swiss Med Wkly. 2012;(February):1–7.

[32]. Word Health Organization. Post-exposure prophylaxis to prevent HIV infection. World Health Organization. 2014. p. 1–3. Available from: http://www.who.int/hiv/pub/prophylaxis/guidelines/en/

[33]. Adebimpe WO. Knowledge and practice of health care workers towards post exposure prophylaxis in the era of low and stable HIV prevalence in Southwestern Nigeria. Bull Fac Pharmacy, Cairo Univ. 2018;56(1):104–8.

[34]. Ford N, Irvine C, Doherty M, Vitoria M, Baggaley R, Shubber Z. Variation in adherence to post-exposure prophylaxis by exposure type: a meta-analysis. In: 20th International AIDS Conference, July 20-25, 2014, Melbourne, Australia [Internet]. 2014. p. 95. Available from: https://www.who.int/hiv/pub/posters/who_pep_poster_exposure.pdf?ua=1

[35]. Behrman AJ, Shofer FS, Green-McKenzie J. Trends in bloodborne pathogen exposure and follow-up at an urban teaching hospital: 1987 to 1997. J Occup Environ Med. 2001;43(4):370–6.

Senoo-Dogbey Vivian Efua. "Adherence to post exposure prophylaxis for Hepatitis B virus among health care workers in Accra, Ghana." *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, 10(05), 2021, pp. 52-59.