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Hepatitis B infection prevention: Audit of selected healthcare facilities in the Greater Accra Region, Ghana

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SUMMARY

Introduction: The risk of occupational exposure to Hepatitis B Virus (HBV) is high among healthcare workers (HCWs), especially in developing countries like Ghana where the prevalence of HBV is high. Unfortunately, in such regions, HCW protection does not appear to be a priority, and healthcare facilities (HFs) have been reported to have unsatisfactory levels of implementing preventive strategies to protect HCWs from blood-borne infections including HBV.

Methods: A cross-sectional and Q audit was performed involving 255 HFs selected by proportional allocation and systematic random sampling. Data was collected using a structured pretested questionnaire with HF managers being the respondents. Data were analysed using IBM ® SPSS® (Statistical Package for the Social Sciences, version 21.0) where univariate, bivariate, and multivariate analysis was done with the level of significance set at <0.05.

Results: Overall adherence to recommended strategies, structures, and programs for HBV prevention among the HFs was generally low, with a mean score of 37.02 (95% CI = 33.98 −40.05). There was a statistically significant difference in the level of adherence between the HF categories ($F = 9.698$; $P = <0.001$). Being a hospital (OR = 3.9: CI = 1.68−9.29), possessing infection, prevention and control (IPC) guidelines (OR = 6.69: CI = 3.29−13.63) as well as having functional IPC committees in place (OR = 7.9: CI = 3.59−17.34) were associated with good adherence to HF-level HBV preventive strategies.

Conclusion: Overall adherence to HF-level prevention of HBV is sub-optimal. Higher-level facilities were better resourced with HBV vaccine and Hepatitis B immunoglobulin (HBIG). Adherence to HBV prevention strategies depends on the type of HF and the availability of IPC committees and their respective IPC coordinators.

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Introduction

Hepatitis B virus (HBV) infection is a global public health threat that causes significant liver-related morbidity and mortality. An estimated 15%—40% of HBV-infected patients may develop complications such as liver cirrhosis, liver failure, and hepatocellular carcinoma, which account largely for the common causes of HBV-related death globally [1]. HBV infection has an estimated worldwide prevalence of 257—291 million affected individuals who are mainly asymptomatic and are likely to transmit the infection to other susceptible persons through perinatal, sexual contact and exposure, percutaneous and mucocutaneous exposures [2].

The ability of HBV to be efficiently transmitted through percutaneous and mucocutaneous routes provides the basis for its classification as an important biological hazard to healthcare workers (HCWs). This is because they are in close contact with blood and body fluids of patients and hence are at very high risk of contracting HBV. It is estimated that 5.9% HCWs are exposed to HBV annually translating into 66,000 HBV infections in the year 2000 [3,4]. A more recent global estimate from a systematic review conducted in 2021 revealed a global seroprevalence rate of 2.3% [5]. The risk of occupational acquisition of HBV for HCWs in developing countries including Ghana is known to be significantly higher due to the high burden of HBV infection among the general population. Also the issue of protection for HCWs from HBV and other blood-borne pathogens does not feature on the list of healthcare priorities [6,7]. To address these challenges, the management and employers in healthcare facilities (HFs) have been assigned the responsibility of protecting HCWs from HBV and other blood-borne pathogens.

The direct responsibility for the implementation of control and preventive efforts towards the prevention of such infections in a HF rests with the Infection Prevention and Control (IPC) committees and IPC coordinators. The purpose of the IPC committee is to provide leadership for all employees in the HF through policies, procedures, and evaluation processes. The IPC committee acts as a focus and authority for the dissemination of all IPC information and communicates that information in a manner that will create the safest healthcare environment [8]. The structure of IPC programs in general and especially for blood-borne infections varies from country to country. What is generally common to all is that each HF (both primary care clinics and hospitals) is required to implement and adhere to the prescribed national or local IPC guidelines and policies. At the individual HF level, the IPC program should involve the HF management, the IPC committee, and the IPC coordinator. For example, in Ghana, the Occupational Health, and Safety Policy for the Ghana Health Service (GHS), which was developed in 2010, recommends that an HF with a HCW population of 20 and above should have a functional IPC committee in place. The policy also recommends that a healthcare professional be appointed to coordinate and drive the agenda of implementation of strategies for preventing the spread of infections within the HF environment [9]. One of the major roles of the IPC committee and the IPC coordinator is to develop and to strictly apply standards and policies as well as to oversee all activities relating to IPC. All HCWs providing care to patients and who are likely to suffer exposure to blood-borne pathogens are guided by these policies, protocols, and guidelines. Such guidelines are meant to provide guidance regarding specific areas of IPC practice and are based on the best available evidence [10].

For HBV, the IPC coordinators are responsible for ensuring the availability of HBV vaccine, HBV immunoglobulin (HBIG), and maintaining the supplies for effective post exposure prophylaxis (PEP) for HCWs who may be exposed to contaminated blood and body fluids. The IPC coordinators also have the responsibility of ensuring strict adherence to HBV preventive practices outlined in the country-specific policies and guidelines [9].

In Ghana, the burden of HBV in the general population is estimated to be 12.3% or greater [11,12]. Among HCWs, a prevalence of 5.9% has been estimated [13]. Exposure to contaminated blood and body fluids is a common occurrence with a high prevalence of percutaneous exposures which carry the highest risk of HBV transmission to HCWs. Refs. [14—16] HBV vaccination coverage among Ghanaian HCWs has been estimated to be 53.4% [17]. These observations require an effective HBV prevention program that would institute structures, programs, and strategies in all HFs. Such structures include ensuring the availability of the HBV vaccine and HBIG at all levels of HF for the immediate initiation of PEP following an exposure. This requires audits in HFs to assess the level of adherence to HBV prevention practices. Although a number of studies have been done around HBV among HCWs in Ghana, (HBV vaccination coverage, risk perception, and knowledge of HBV and the prevalence of HBV), none of these studies assessed the work environment of the HCW for the level of adherence to the implementation of strategies, programs, and activities to protect HCW against HBV. This audit aimed to assess selected HFs for their level of adherence to the implementation of strategies and programs targeted at protecting HCWs from exposure and subsequent infection with HBV.

Methods

Study design

This study was a cross-sectional healthcare facility (HF)-based audit involving 255 HFs selected from eight (8) districts in the Greater Accra Region of Ghana in the first half of the year 2019. The study was a HF-level audit of procedures, availability of guidelines, and protocols. The study also included an audit of logistics and resources, the appointment of IPC coordinators and IPC committees, and self-reported training and practices of HCWs regarding HF-level prevention of HBV. Inclusion criteria were private and public HFs that provide 24-hour services to clients and which had been fully functional or operational in the past year. Inclusion in the study was limited to HFs registered by the Health Facilities Regulating Authority (HEFRA) and who report health service and morbidity data to the District Health Information Management System (DHIM) database.

Sampling

The total number of registered HFs operating in the selected districts were 546. Using this figure as the population of HFs (N), the margin of error of (e) 5%, nonresponse rate of 10%, the minimum sample size was estimated as 260 using the Yamane formula.

Sampling technique

HFs were stratified into geographical locations (districts). HFs were allocated to the selected districts using proportional allocation procedures. The list of HFs for each selected district was obtained from the District Health Information Systems (DHIMS) database and used as a sampling frame. A systematic random sampling procedure was subsequently undertaken to select HFs for the study.

Data collection

A pretested structured tool was designed per the requirements outlined in the Occupational Health and Safety Policy (OHSP) Guideline of the Ghana Health Service (GHS) [7] regarding the prevention of blood-borne infections such as HBV. This tool comprised 21 items in a questionnaire where multiple choice and dichotomous questions were used. The main themes of the tool included: (a) organising training sessions on IPC for staff (b) availability of policy documents and guidelines for the implementation of IPC practices within the HF (c) availability of an IPC committee and coordinators as well as evidence of implementation of safety and IPC programs (d) availability of logistics and resources for HBIG and HBV vaccine in the HF and finally (e) compulsory screening of new employees and vaccination program for HCWs. The questionnaire was largely self-administered in that most of the HF managers self-administered the tool whereas few others allowed the employee to be interviewed by the researcher.

Data analysis

Data were analysed using SPSS ® Version 21. Descriptive as well as inferential statistics were performed. Adherence to preventive practices at the HF was measured by assessing the availability of protocols, logistics, resources or procedures in the HF. Availability was scored as '1' and non-availability or absence of the indicator was scored as '0'. Total percentage scores were computed for all facilities. The performance was categorised into three levels 'poor' for scores ($\leq$50%), 'intermediate or fair' for scores between (51−74%) and 'good' for scores ($\geq$75−100) [18,19].

Analysis of the variance procedure was done to compare the mean scores of the various levels of HFs. For further statistical procedures, HF-level adherence scores were dichotomized into 'good adherence' and 'poor adherence' and subsequently used for bivariate (chi-square or Fisher's exact) and multivariate (binary logistic regression) analysis with a level of significance set at <0.05.

Results

Healthcare facility (HF) characteristics

A total of 255 completed questionnaires were analysed out of the estimated 260 giving a response rate of 98 %. HFs representing four levels of HF ranging from Community Based Health Planning Services (CHPs) to regional hospitals participated in the study. Clinics and polyclinics form the majority HFs of 147 (57.6%) followed by health centres 61 (23.9%). CHPs compounds/zones as well as hospitals formed the minority of the participating HFs. Privately owned HFs comprised the majority with 164 (64.3%) followed by government or public HFs with 75 (29.4%). Christian Health Association of Ghana HFs were in the minority. A total of 233 (91.4%) of the participating HFs had received at least one supportive supervisory visit from Ghana Health Service District or regional officers within the past year whereas the remaining 22 (8.6%) had not been supervised during the period (Table I).

Table I
Healthcare facility (HF) characteristics.

Healthcare facility (HF)	Frequency	Percentage (%)
Healthcare facility (HF) level		
Community Based Health Planning Services	23	9.0
Health centre	61	23.9
Clinic/Polyclinics	147	57.6
Hospitals	24	9.5
Healthcare facility (HF) ownership		
Government/Public	75	29.4
Private	164	64.3
[a]Quasi-Government Health Institution	11	4.3
Christian Health Association of Ghana (CHAG)	5	2.0
Infection Prevention and Control (IPC) Written Action Plan		
Available	20	7.8
Unavailable	235	92.2
Monitoring visits in the past 12 months		
At least one visit	233	91.4
No visit	22	8.6

[a] The Quasi-Government Health institutions comprise government institutions, agencies and departments where the main service focus is not healthcare but which do provide some healthcare services.

Availability of key logistics/resources for HBV prevention

The HFs were assessed for the availability of key resources needed for HBV infection prevention. HBIG which is a major resource for post-exposure prophylaxis was readily available in 66 (25.9%) out of the 255 HFs surveyed. HBIG availability increased with increasing levels of HFs as hospitals recorded the highest availability of 24.2% followed by polyclinics with 22.4%. HBV vaccine, which is a resource for both pre and post-exposure management of HBV was available in 93 (36.5%) out of the 255 HFs. HBV vaccine availability was lowest at CHPS and health centres and highest at the hospitals with 58% of hospitals having HBV vaccine on site. Documentation of the PEP procedure for HBV, which also provides evidence of PEP use, was available in 149 (58.4%) HFs and the distribution of PEP procedures followed the same pattern as HBIG and HBV availability (Table II).

HF-level systems, structures, and programs for HBV prevention

Occupational health and safety policy of the GHS which is the policy that mandates all HFs to undertake preventive practices for HBV was available in 68 (26.7%) HFs.

Table II
Assessment of healthcare facility (HF) level systems, structures and resources for HBV prevention.

Assessment of healthcare facility (HF) level adherence	No	Yes
Availability of essential logistics and resources for HBV prevention at the healthcare facility (HF)		
Hepatitis B vaccine available	162 (63.5%)	93 (36.5%)
Immunoglobulin for HBV available	189 (74.1%)	66 (25.9%)
Systems, structures, programs to support prevention of HBV infection at HF		
PEP Protocol for HBV written and available	212 (83.1%)	43 (16.9%)
Documentation for exposure reporting available	106 (41.6%)	149 (58.4%)
Screening of newly employed staff and compulsory vaccination undertaken	173 (67.8%)	82 (32.2%)
OHS Policy available	187 (73.3%)	68 (26.7%)
Training on blood-borne infections is done periodically for staff	94 (36.9%)	161 (63.1%)
PPE protocols available to guide staff on the use of PPE	152 (59.6%)	103 (40.4%)
IPC coordinator or practitioner appointed	162 (63.5%)	93 (36.5%)
Active IPC committee functional	169 (66.3%)	86 (33.7%)

Minimum score: 0.00, Maximum score: 10.00, Mean score: 3.702, SD: ±2.458.
OHS-Occupational health and safety; PPE-Personal protective equipment; IPC-Infection prevention and control; PEP-Post exposure prophylaxis.

Most HFs 161 (63.1%) undertook staff training in blood-borne infection prevention. The majority of HFs gave a negative response to the other 8 questions (Table II).

Overall HF-level adherence to HBV preventive strategies

The majority of the HFs 192 (75.3%) had percentage scores below 50%, indicating poor or suboptimal adherence to HF-level preventive practices. For HBV prevention, 47 (18.4%) HFs scored within the intermediate level of adherence category with percentage scores between 51 and 74%. An optimum or good level of adherence with percentage scores of 75% and above was observed in 16 (6.3%) HFs that were surveyed (Figure 1).

Comparison of mean adherence scores between HFs

The overall mean adherence score was 37.02 which is an indication of overall poor adherence to preventive practices HFs. The mean score was highest for hospitals (57.08) followed by health centres with a mean score of 40.33. CHPs zones were the least adhering category. An analysis of the variance procedure revealed a statistically significant difference in the percent mean scores obtained by the various HF types ($F = 9.698$; $P = <0.001$) (Table III).

Factors associated with good HF adherence

Multivariate analysis revealed a statistically significant difference between higher and lower-level HFs in terms of adherence at the HF-level HBV prevention programs. The higher-level HFs had 3.9 times higher odds of having good adherence than lower-level HFs (aOR = 3.94: CI = 1.68—9.29). Also, HFs having the OHSP and those with functioning IPC committees demonstrated higher odds of good adherence to HBV prevention modalities at the HF- level (aOR = 6.7: CI = 3.29—13.63) and (aOR = 7.9: CI = 3.59—17.34) respectively (Table IV).

Discussion

This study was an HF-level audit that sought to assess adherence to HBV prevention protocols at a range of HF levels. The audit focused on the assessment of the availability of key logistics/resources needed at the HF to prevent occupational

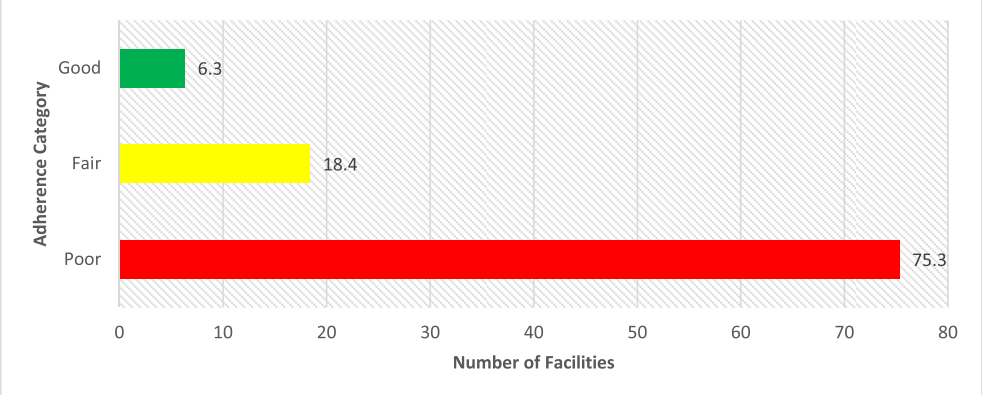

Figure 1. Levels of adherence to healthcare facility (HF) level HBV preventive practices.

Table III
Adherence score by healthcare facility (HF) level.

HF types	N	Mean	Std. Deviation	Std. Error	95% confidence interval for mean	
					Lower bound	Upper bound
CHPS	23	22.61	14.84	3.10	16.19	29.03
Health centre	61	40.33	22.95	2.94	34.46	46.21
Clinic	147	34.63	24.56	2.026	30.63	38.63
Hospital	24	57.08	23.87	4.88	47.01	67.16
Total	**255**	**37.02**	**24.59**	**1.54**	**33.98**	**40.05**
				***F**	**Sig.**	
				9.698	<0.001*	

*F-statistic.

transmission of HBV. The study also assessed the availability of protocols, programs, and laid down structures at the HF-level targeted at preventing exposure of HCWs to HBV and subsequent infections. This study found that the majority of HFs did not have the essential logistics (HBV vaccine), HBV Immunoglobulin (HBIG) needed for pre and post-exposure prophylaxis for HBV at the HFs. This finding is a concern since there is evidence to show that the lack of availability of HBV vaccine and HBIG in the HF may be a barrier to HCWs undertaking preventive practices [20]. Evidence from systematic review and meta-analysis suggested a low HBV vaccination coverage in Africa [21]. This is likely result in unvaccinated HCWs who require the immediate initiation of HBIG and HBV vaccine for PEP following exposure to blood and body fluids, may experience an undue delay in initiation of PEP or fail to use PEP entirely due to the lack of availability of the HBV vaccine and HBIG in the HF.

This present study found sub-optimal HF organisational commitment to the protection of HCWs from exposure and subsequent infection with HBV. For example, most of the HFs did not have IPC coordinators appointed by the HF management to drive IPC programs. Secondly, IPC committees were barely formed in the HFs or given the mandate to promote IPC programs in the HFs. This observation is not compliant with the directives outlined in the Occupational Health and Safety Guideline of the Ghana Health Service (GHS) which mandates all HFs with a healthcare workforce of 20 and above to compulsorily have functional IPC committees and IPC coordinators to promote and coordinate HBV prevention programs as well as other occupational health and safety programs at the HF level [22].

This present study found that written protocols on PEP for HBV were unavailable or not conspicuously placed in the immediate work environment of the HCWs. It has been established that the availability of healthcare protocols and guidelines in the immediate environment of employees is essential to provide standardisation in the day-to-day operational activities of HCWs at the HF. This is because the protocols and guidelines provide clarity when dealing with issues and activities that are critical to the health and safety of both patients and HCWs [23]. The availability of protocols and guidelines serves the purpose of continuous communication of occupational health and safety information to HCWs and this is crucial in sustaining positive health and safety culture in an organisation [24].

Our audit observed an overall sub-optimal adherence to HF level preventive practices with an overall mean score of 37.02. This observation is not new. Specifically, for blood-borne infection prevention, a recent study also found suboptimal adherence to preventive strategies among selected facilities in Kenya [25]. The poor adherence observed at the HF level in this present study is consistent with findings from a South African study that also reported suboptimal adherence to health and safety protocol. In that study, the absence of occupational health and safety protocols and the insufficient dissemination of these protocols were reported as also observed in this study.

This study found a statistically significant difference in the level of adherence to HBV preventive protocols and HF type with hospitals recording the highest adherence scores. Also, HF level was seen to have statistically significant association with good adherence to HBV preventive programs with hospitals having higher odds of adhering optimally to HBV prevention programs. This observation is similar to results reported from Tanzania where hospitals were reported to have had higher odds of readiness and therefore performed better than lower-level HFs. [26]. A high level of responsibility and accountability at the management level of the hospital in addition to regular management meetings were identified as factors contributing to the high performance of the hospitals in the Tanzanian study. In this present study, the complexity of healthcare delivery at the hospital level, where more invasive procedures

Table IV
Factors associated with healthcare facility (HF) level adherence to HBV preventive practices.

Variable	Levels of adherence		Crude estimates			Adjusted estimates		
	Poor (n = 192)	Good (n = 63)	OR	95% CI	*P*-value	OR	95% CI	P-value
HF Level								
Hospitals	125 (65.1)	46 (73.0)	1.5	0.772–2.73	0.248	3.9	1.68–9.29	0.002
Others	67 (34.9)	17 (27.0)	1.0			1.0		
IPC Coordinator[a]								
Available	163 (84.9)	39 (38.1)	9.1	4.79–17.39	<0.00	6.7	3.29–13.63	<0.001
Not Available	29 (15.1)	24 (61.9)	1.0			1.0		
IPC committee								
Available	44 (22.9)	42 (66.7)	6.7	3.609–12.53	<0.00	7.9	3.59–17.35	<0.001
Not available	148 (77.1)	21 (33.3)	1.0			1.0		

[a] IPC-Infection Prevention and Control.

are undertaken and where there is a larger workforce population at a high level of potential exposure to blood and body fluids may have necessitated the stocking of HBV vaccine and HBIG in the hospitals. On the other hand, the availability of HBV vaccine and HBIG in the hospitals could have been for other reasons such as the prevention of perinatal transmission of HBV or vaccination of patients, or other at risk groups such as travellers, rather than specifically for HCW protection.

The presence of IPC committees and IPC coordinators has been found in this study to be associated with good adherence to HF-level IPC procedures for HBV. Other studies conducted elsewhere described the important roles of the IPC committee and IPC coordinators in promoting the occupational health and safety of employees [27]. The importance of IPC committees and IPC coordinators to promote effective IPC programs in healthcare institutions has been reported by other authors [28].

Conclusions

This HBV IPC audit assessed the consistency of the approach to HBV IPC in HF. Audits of IPC practice a key part of IPC programs. This audit demonstrated HFs and their service practices and procedures and provided an opportunity to review safety standards in the work environment of HCWs. The audit revealed that higher-level HFs such as hospitals had more resources for HBV IPC, with HBV vaccine and HBIG for pre and post-exposure prophylaxis against HBV infection. Systems programs and structures aimed at preventing occupational transmission of HBV among HCWs were largely inadequate. Overall adherence to HF-level HBV prevention strategies among HFs in the Greater Accra Region is therefore suboptimal.

Institutions having oversight responsibilities over HFs should provide technical support to ensure that IPC committees are formed, and that their respective IPC coordinators are empowered to drive all HBV IPC interventions within the HFs, especially for HFs at the lower levels of the healthcare delivery system in Ghana.

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Ethics statement

Ethical approval for the conduct of this study was obtained from the research and ethics review committee of the Ghana Health Service *(GHS ERC 006/08/17)*. Permission was also obtained from all the facility heads. Written informed consent was obtained from each study participant after the nature, purpose, and procedures of the study were thoroughly explained to them.

Conflict of interest

The authors declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.infpip.2023.100284.

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