

# HEPATITIS B VACCINATION UPTAKE AMONG A COHORT OF NIGERIAN SURGICAL RESIDENTS

Agbugui JO, Osaigbovo EO and Ibadin EI

Department of Surgery, University of Benin Teaching Hospital, Benin City, Nigeria

**Correspondence Address:** Dr Jude Agbugui, Department of Surgery, University of Benin Teaching Hospital, Benin City, Nigeria. E- Mail: orumuah@yahoo.com Phone: +2348050526052

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## ABSTRACT

**Background and Objectives:** Transmission of Hepatitis B virus (HBV) from patients to health care personnel (HCP) can occur following occupational exposures. Vaccination is effective in disease prevention. The study aimed to determine the level of uptake of HBV vaccine among a cohort of Nigerian surgical residents.

**Method:** A cross section of Nigerian surgical residents who attended the West African College of surgeons' 2014 revision course was studied. A semi-structured questionnaire was completed by the respondents after an informed consent.

**Results:** A total of 112 residents completed the questionnaire (response rate, 88.9 %). The mean age of the respondents was  $33.7 \pm 4.5$  years. The mean duration of training was  $36.72 \pm 20.38$  months. All (100%) were aware of HBV vaccine. Full and partial vaccinations were recorded in 55 (49.1%) and 23 (20.5%) residents respectively. Thirty four (30.4%) residents had not received HBV vaccine. Only 6 of those with full HBV vaccination underwent post vaccination test. There was no difference in the means for age ( $p=0.20$ ) and duration of training ( $p=0.99$ ) between the group of residents who had received full vaccination and those with partial or no vaccination. All were aware of the risk of HBV transmission following occupational exposure though only 34 (30.4%) strictly complied with universal precaution. An accidental needle or 'sharps' injury was recorded in 100 (89.3%) residents during training. Lack of information on HBV vaccination was the major factor limiting the practice of HBV vaccination while health education was the most frequently suggested interventional factor likely to improve uptake of HBV vaccine.

**Conclusion:** The participation of Nigerian surgical residents in HBV vaccination is suboptimal. The necessary measures aimed at improving efficiency of HBV vaccination services and further sensitization of this group of doctors should be implemented.

**Keywords:** Hepatitis B Virus, Vaccination, Surgical residents

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## INTRODUCTION

Health care personnel (HCP) are at risk of occupational exposure to pathogens from their patients. This can be as a result of percutaneous or

mucosal exposure to blood and its products or to body fluids such as semen, peritoneal and vaginal fluid<sup>1,2</sup>. World Health Organisation (WHO) estimates that about 2.5% of Human immunodeficiency virus (HIV)

and 40% of Hepatitis B virus (HBV) cases in HCP globally are due to occupational exposure <sup>2</sup>.

Surgeons and surgical residents are at risk of HBV infection while performing invasive procedures. Many surgical interventions in our training institutions, especially those of emergency nature, are done on patients with unknown Hepatitis B status. Previous studies have noted the rate of accidental needle stick and 'sharps' injuries among Nigerian surgeons and surgical trainees to be between 67 – 88% <sup>3,4,5</sup>. This type of injury carries a 6-30 % risk of HBV transmission in comparison to 3 % for Hepatitis C virus and 0-3% for HIV <sup>1</sup>. Furthermore, chronic HBV infection is a known risk factor for hepatic pathologies such as liver cirrhosis and hepatocellular carcinoma <sup>6</sup>

Therefore the strict use of personal protective devices such as face masks, surgical gloves, gowns and boots according to the universal precaution protocols is advocated during surgical procedures <sup>7</sup>. In addition, immunization with HBV vaccine is recommended as an important adjunct to universal precaution <sup>8</sup>. The vaccine is safe, available and effective, providing protective response in 90-95% of fully vaccinated persons <sup>9</sup>. However, previous studies have noted a partial or non-compliance with HBV vaccination among HCP in the country <sup>10-11</sup>.

Therefore the study is aimed at determining the level of compliance with HBV vaccination, and to identify factors affecting its practice among surgical residents in Nigeria.

## **METHODS**

The study was done at the University of Benin Teaching Hospital during the 2014 revision course of the West African College of Surgeons. The two weeks programme was held in the institution in September, 2014.

Participants were surgical residents from the different training institutions in the Nigeria. These institutions included Teaching Hospitals, Federal Medical Centres as well as other accredited public and private medical institutions. The surgical residents who attended the update course formed the population studied.

The research instrument consisted of a structured questionnaire which was self-administered after an informed consent.

## **Research Instrument**

The 18 – item questionnaire was made up of 4 sections:

### **Section A**

Included items which recorded the demographic and academic information of the respondents such as age, sex, length of training and cadre.

### **Section B**

Included items which assessed the respondents' awareness and level of participation in HBV vaccination. The respondents were asked if they had received HBV vaccines, the number of doses they had received and whether they underwent post vaccination testing to confirm good immune response.

### **Section C**

This section included items which assessed the residents' perception of the risk of HBV infection in their routine practice. Also assessed were how often they complied with universal precaution protocols and the frequency of accidental needle / 'sharps' injury recorded in the course of training.

### **Section D**

The respondents were asked to state the factors which they perceived to be preventing the practice of HBV vaccination in their respective institutions. They were also requested to make suggestions on ways of improving the efficiency of HBV vaccination services and increased participation by surgical residents.

## **Definition of Terms**

Surgical residents referred to doctors undergoing residency training in surgery in accredited tertiary institution in the country. Doctors in the other surgery related specialties such as obstetrics and gynaecology, ophthalmology and anaesthesiology were not included. The residents were regarded as being fully immunized for HBV when they had received a minimum of 3 intramuscular injections of the vaccine at 0, 1 and 6 months interval. Partial immunization referred to the administration of 1 or 2 doses of the vaccine while residents who had not received any dose of the vaccine were regarded as not being immunized for HBV.

The questionnaire was distributed to 126 surgical residents who were present during a tea break session after obtaining consent. The collected data was entered into Microsoft excel spreadsheet and subsequently analyzed. The results were presented in the form of frequencies, means and tables. Statistical analysis was done using GraphPad 2015. Fisher's exact test was used for inferential analysis while analysis of variance (ANOVA) was used to analyze the difference in means of the continuous variables between groups of respondents. P-value < 0.05 was considered significant.

(mean= 33.7 ±4.5 years). They were made up of 107 males and 5 females. These included 103 junior residents and 9 senior residents.

The duration of training was between 12 – 96 months (mean = 36.72 ±20.38 months). All were aware of HBV vaccine. Ninety (80.4%) residents were aware of HBV vaccination services in their institution. Fifty five (49.1%) residents had received full HBV vaccination as at the time of study while 23 (20.5%) had received partial vaccination. Forty three of the residents received at least one dose of HBV vaccination prior to commencement of training while 35 started HBV vaccination thereafter. Thirty four (30.4%) residents had not received HBV vaccine. Only 6 out of the 55 that received full HBV vaccination underwent

**RESULTS**

**Table 1:** Demographic / academic characteristics and vaccination status of the residents

Variables	Full	Partial	None	P-value
<b>Mean Age (years)</b>	33.5 ±4.4	32.8 ±3.7	34.9 ±5.4	0.20
<b>Sex</b>				
-Male	51	22	34	0.35
-Female	4	1	0	
<b>Cadre</b>				
- Registrar	52	20	31	0.63
- Senior registrar	3	3	3	
<b>Training duration (months)</b>	35.8 ±21.6	36.1 ±19.7	36.5 ±20.8	0.99

A total of 112 residents completed the questionnaire (response rate, 88.9 %). The age range of the respondents was between 27 and 48 years

post vaccination test to confirm satisfactory immune response. There was no difference in the means for age and duration of training between the group of

**Table 2:** Reasons for non-compliance with HBV vaccination

Reasons	No of Residents (N=112)	Percentage (%)
Lack of Information on HBV vaccine services	63	56.3
Time Constraints	31	27.7
Difficulty in accessing vaccines	21	18.8
Unavailability of HBV vaccines	12	10.7
High Cost of vaccines	8	7.1
Fears over vaccine safety		

residents who had received full vaccination and those with partial or no vaccination (Table 1). All were aware of the risk of HBV transmission following occupational exposure. However, thirty two (28.6 %) residents perceived the risk was low while 80 (71.4%) perceived it was high. All (100%) were aware of the universal precaution protocols, however only 34 (30.4%) practiced strict compliance at all times. At least one accidental needle or 'sharps' injury was recorded in 100 (89.3%) residents since commencement of training.

Only 11 (9.8%) claimed they received formal sensitization on the need to undergo HBV vaccination at commencement of residency training. Lack of information on the activities of HBV vaccination services in the institutions was identified as the major factor limiting the practice of HBV immunization (Table 2). Health education was the most frequently

vaccination among a group of Nigerian surgical residents.

The study noted that though most surgical residents believed the risk of HBV infection is high, only about a half of them were fully vaccinated while a third had not received any dose of the vaccine as at the time of study. This appears to be unsatisfactory as surgical residents are usually the first contact with emergency surgical conditions requiring urgent intervention in the form of exposure prone invasive procedures. They usually play active roles in the management of such patients with little or no time for screening tests to evaluate patients' HBV status.

With the incidence of accidental needle stick or sharps' injury of 89.3 % recorded in the study, as well as the fact that only 30.4% strictly practiced universal precaution, these group of residents can be said to be at risk of HBV infection. Therefore, a more

**Table 3:** Residents suggestions on ways of improving HBV vaccination

Factors	No of residents (N=112)	Percentage (%)
Health Education	77	68.6
Mandatory Vaccination	31	27.7
Improved availability	27	24.1
Improved affordability	24	21.4
Improved Accessibility	19	17.0
Policy change	6	5.4
Reminders / Alerts	5	4.5

suggested interventional factor likely to improve participation of residents in HBV immunization (Table 3)

## DISCUSSION

Surgical residents are at risk of being infected with HBV following accidental exposures to body fluids of infected patients. In addition to the use of personal protective materials according to the universal precaution protocols, vaccination plays a very significant role in the prevention of the disease. The study sought to determine the level of compliance with HBV

active participation in HBV vaccination should be expected. Despite good awareness of the risk of transmission of the disease following occupational exposure, the level of complete vaccination against HBV was sub-optimal. Factors such as age, duration of training, sex and cadre did not affect the practice of HBV vaccination as noted in previous studies <sup>10,12</sup>. Other studies in the country have also recorded a low level of participation in HBV vaccination among HCP. Sofola *et al* noted 37.9% compliance with HBV vaccination among 153 respondents from four dental training institutions in Nigeria <sup>13</sup>. Another study among

operating room personnel including surgeons, nurses and technicians in four tertiary institutions in Nigeria reported full vaccination against HBV in only 26.8% of 228 respondents<sup>10</sup>. Ogoina *et al* reported full vaccination in 36.2% of 290 HCP of two training institutions in north central and south south regions of the country<sup>11</sup>. These findings from the different parts of the country suggest that the participation of HCP, including doctors, in HBV vaccination is sub-optimal. Similar findings have been reported in other African countries. A study assessing the HBV vaccination status among surgeons in Ethiopia reported full vaccination only in 18.4 % of the respondents<sup>14</sup>. Another study among surgical residents in Cameroon reported a full HBV vaccination status in 24.5% of respondents<sup>12</sup>. In contrast, a study of HBV vaccination coverage among HCP with direct patient contact in the United States noted full vaccination in 74% of respondents<sup>15</sup>. The comparatively higher value may be due to better HBV vaccines services in the more advanced setting.

The perceived reason for not undergoing vaccination given by majority of the residents was the lack of information on HBV vaccination services in their respective institutions. Other reasons included unavailability, difficult access and high cost of vaccines. These findings were consistent with those of previous studies among theatre users, surgical residents and surgeons in the West African sub region<sup>10,12,14</sup>. Fear over vaccine safety was not perceived to be a reason for non-compliance by any of the respondents in the study. This is in contrast to findings from a previous study among a group of Nigerian dental surgeons that recorded fear of vaccine side effect as a reason for non-compliance in 18.2% of respondents<sup>16</sup>. This may be due to better awareness and knowledge of HBV vaccine safety among the respondents of this study.

The practice of post vaccination testing among the residents was also low as less than a tenth of those that were fully vaccinated underwent post vaccination test. This is an important part of the HBV vaccination protocol done after an interval of 1-4 months after completion of vaccination. It helps to identify those with sub optimal immune response (an antibody level between 10 and 100 mIU/ml) after completion of routine HBV vaccination. Such persons are subjected to further single booster dose of the vaccine in order to achieve the desired immune response. Poor immune response (< 10mIU/ml) may be noted in some persons usually in association with being over age 40, immunosuppression, obesity,

smoking and alcoholism. Such persons are given a repeat course of the vaccines followed by retesting 1-4 months thereafter<sup>17</sup>.

The rate of HBV infection among the respondents was not addressed in the study. However, surgeons with HBV infection are potentially at risk of transmitting the disease to their patients while performing their routine duties<sup>18,19</sup>. Also surgeons with chronic HBV infection and high viral load stand the risk of being restricted from performing invasive exposure prone procedures so as not to infect their patients<sup>19,20</sup>. Furthermore chronic infection with HBV is associated with a higher risk of other hepatic conditions such cirrhosis and hepatocellular carcinoma<sup>6</sup>. Thus necessary measures should be put in place to achieve greater participation of surgical residents and other health care personnel in HBV vaccination. These include prescreening for HBV infection prior vaccination to know HBV status and thus identify those requiring vaccination and post vaccination monitor of anti-HBs level to ensure protection persists or has waned.

Majority of the residents suggested that improving the level of information on HBV vaccination services in our training institution would lead to improved participation in future. Such health education could be in the form of sensitization programmes conducted at the time of employment. Periodic health education on prevention of HBV and other diseases such as HIV/AIDS should also be conducted. Printed materials like posters, fliers and customized stationeries carrying HBV vaccination messages should be circulated among residents in our institutions. Making HBV vaccination mandatory as suggested by a quarter of the residents would contribute greatly to better compliance. At the time of employment prior to the commencement of duties, all residents should be screened to identify those requiring vaccination. A compulsory action in this regard may be needed alongside an increased health awareness and provision of low cost vaccines.

In conclusion, the participation of Nigerian surgical residents in vaccination against HBV is suboptimal despite good awareness of the risk of disease transmission during exposure prone invasive procedures. The above coupled with the high rate of accidental needle stick and 'sharps' injury noted is a cause for concern. Thus necessary measures aimed at improving efficiency of HBV vaccination services and

further sensitization of this group of HCP should be implemented.

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