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Surgeons, Hepatitis B vaccination & infection

The need for supportive health center policy: A questionnaire-based survey

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Abstract

Objective To explore the vaccination status of surgeons, to assess their knowledge of the protective role of Hepatitis B vaccine and how this might reflect on their reaction when dealing with Hepatitis B patients.

Methods In December 2011, a 2 page questionnaire was distributed to surgeons of different specialties in 10 tertiary care governmental hospitals in different regions of the kingdom of Saudi Arabia.

Results Out of 900 questionnaires distributed, 417 were completed and collected (46%). Out of these, 279 (66.9%) surgeons were completely vaccinated (3 doses received), 58 (13.9%) were partially vaccinated (1 or 2 doses received), 61 (14.6%) were not vaccinated and 19 (4.6%) did not know their vaccination status. Only 219 (52.5%) surgeons knew that the vaccine provides 95% protection and only 50 (12%) knew the correct timing for checking Hepatitis B antibody level. Surgeons with longer duration of practice were less likely to be vaccinated and less likely to follow standard precautions when operating on Hepatitis B patients (P value 0.006 & 0.000 respectively). 387 surgeons (93%) reported that they would not refuse operating on Hepatitis B patients. 233 (56%) expect their health centres to provide them with compensation if they encountered Hepatitis B infection during their practice and 307 (74%) would change their place of work to a health centre that will support them at least financially.

Conclusions Two of three surgeons had all three doses of vaccine and about half of the surgeons were not aware of the exact protection degree. The deficient knowledge of surgeons about Hepatitis B infection and vaccination was reflected on their practice. Health centre's policies should clearly provide surgeons with post-exposure supportive solutions and job re-location.

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Introduction

Hepatitis B is a disease that can cause lifelong infection to the liver, which may result in liver cirrhosis, liver cancer, liver failure and death (1). The risk of acquiring Hepatitis B virus from a Hepatitis B e antigen (HBeAg) positive source is in the order of 1 in 3 for an unvaccinated individual. In contrast, the risk of acquiring Hepatitis C through inoculation with a Hepatitis C positive source is in the order of 1 in 30 and the risk of sero-conversion following exposure to blood from Human Immune-deficiency Virus (HIV) infected patients is about 1 in 300 for percutaneous injury (2).

Lemmer grossly estimated the magnitude of the increased risk of Hepatitis in the surgical profession as follows; the risk of infection from Hepatitis during a 40 year surgical career is 30 to 40 per cent. The over-all career risk of suffering acute symptomatic Hepatitis is 10 to 20 per cent, and the career risk of fulminant hepatic failure may be as high as 0.1 to 0.5 per cent. The risk of a surgeon becoming a chronic carrier during 40 years of practice is about 4 per cent. It should be noted that these estimations of risk were based upon data collected prior to the introduction of the vaccine (3).

In 1987, the new recombinant Hepatitis B vaccine was launched with minor side effects and high degree of protection (4). Hepatitis B vaccine is 95% effective in preventing Hepatitis B infection and its chronic consequences, and it is the first vaccine against a major human cancer (1). Although surgeons' major concern is

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the post-exposure career situation, a significant underestimation of the risk and sequel of Hepatitis B infection exists between them; this is combined with poor knowledge about the importance of Hepatitis B vaccine and its protective effect.

Our primary objective was to explore the vaccination status of surgeons, to assess their level of knowledge of the protective role of Hepatitis B vaccine and finally how this reflects on their reaction when dealing with Hepatitis B patients. We thought that the best way to explore that positively in a way that stimulates surgeons' interest is by distributing a self-filled questionnaire which contains the basic information about Hepatitis B infection and vaccination as well as providing different scenarios of responses of surgeons to Hepatitis B accidental exposure.

Material and Methods

A simple 2-page self-filled questionnaire was prepared for this survey. The first part of the questionnaire was about personal data like age, gender, surgical specialty, duration of practice and centre of practice. The remaining questions were in multiple choice format and divided into 3 sections. The first section was about Hepatitis B vaccination status and knowledge about its protective role. The second section was about the reaction of the surgeon when exposed to Hepatitis B patients and the third was about health centre policy and guideline availability, implications and surgeons' safety and compensation. Before distribution, self-assessment of these questionnaires was performed by the research team. For confidentiality, the surgeons' identity was never explored during the process of distribution and collection of questionnaires as well as during data analysis.

The questionnaires were distributed and collected by the research team in 10 governmental tertiary care medical centres in different regions of the kingdom of Saudi Arabia. The centres were the largest in terms of service provided by the surgical department and being accessible to the research team; symbols were used in the questionnaires to refer to these centres to maintain confidentiality.

Governmental hospitals in Saudi Arabia share the same policies regarding occupational health and staff protection; all newly employed staff should be screened for Hepatitis B and the 3-dose vaccination is provided for the non-vaccinated with post-vaccination antibody level assessment. Furthermore, standard precautions during operation on Hepatitis B patients like wearing double gloves, goggles, and minimal handling of sharp instruments are encouraged but not obligatory.

Some specialties were not targeted since their exposure to Hepatitis B infection is different based on their patients' characteristics, instrumentation and surgical field like dentists, ophthalmologists, transplant surgeons and cardiac surgeons.

It is worth mentioning that the questionnaires were initially distributed via electronic mail, but the response was extremely poor.

Statistical Analysis

The data from the collected questionnaires was transcribed into SPSS relational database. Analyses were performed using SPSS version 19.0.0. The descriptive statistics were done to determine the basic characteristics of the study population. To evaluate bi-variate association between categorical variables, we used Chi-square test. To determine the strength and directions of these associations among the variables, correlation coefficients were measured using Somer's d method and tested for their significance. $P<0.05$ was considered statistically significant.

Results

Out of 900 questionnaires distributed, 417 forms were completed and collected from all specialties giving a response rate of 46%. Some surgeons were hesitant to participate due to considerations in relation to identity exposure; this was kept in consideration during the process of collection of questionnaires and data processing. General surgeons had the highest response rate followed by obstetricians, gynecologists and orthopedic surgeons (Table 1). The surgeons' age ranged from 25 to 65 years (Mean: 33.6 yrs). Male to female ratio was 282 to 135 (68% to 32%). The duration of practice in surgery was

Table 1 Number of surgeons who responded and their specialties

Specialty	Frequency	Percent (%)*
General Surgery	177	43
Obstetrics and Gynecologists (OB/GYN)	88	21
Orthopedics	51	12
Otolaryngology	31	7
Urology	28	7
Plastic Surgery	20	5
Neuro-surgery	13	3
Pediatric surgery	6	1
Vascular surgery	3	1
Total	417	100

*The percent is from the total collected questionnaires. It is not the percent of response from each specialty.

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categorized into 3 groups; 144/417 (35%) practiced < 5 years, 110/417 (26%) practiced from 5- 10 years and 163/417 (39%) practiced > 10 years; mean duration was 10.5 years.

Surgeons' vaccination history was variable; 279/417 (66.9%) received the 3 doses of Hepatitis B vaccine (completely vaccinated), 58/417 (13.9%) received 1 or 2 doses (partially vaccinated), 61/417 (14.6%) were not vaccinated and 19/417 (4.6%) did not know their vaccination status.

Knowledge about the degree of protection provided by Hepatitis B vaccine was variable; only 219/417 (52.5%) knew that it provides 95% protection, 79/417 (18.9%) thought that the protective effect was 60%, 116/417 (27.8%) did not know the protective role of the vaccine and 3/417 (0.7%) believed that the vaccine does not protect at all. There was a significant relation between gender and knowledge about the protective effect of Hepatitis B vaccine (P value < 0.037); female surgeons were more likely to be aware of the 95% protective effect of the vaccine (62.2 % of the female surgeons compared to 47.9% of the male surgeons).

The surgeons' knowledge of the correct timing for testing antibody level post completed Hepatitis B vaccination is summarized in Table 2.

Table 2 Surgeon's knowledge about the proper timing of Anti HBs testing after completion of the 3 doses of the vaccine

Response	Frequency	Percent (%)
Every year	115	28
After any blood exposure	69	17
After 1-2 months	50	12
All of the above	89	21
None of the above	87	21
No response	7	1
Total	417	100

It was found that 370/417 (89%) of the surgeons wanted to check patients' Hepatitis B status before any surgical intervention. At the same time, 387/417 (93%) would not refuse to perform surgeries (elective and emergency) on Hepatitis B positive patients.

In Table 3 we summarized how surgeons would react when receiving a positive Hepatitis B test and if they would change their place of work to another health centre based on the availability of compensations for infected surgeons.

Table 3 Surgeon's response to different scenarios

Response	Variable	Percent (%)
When they discover their positive Hepatitis B test:		
• Hide this information and continue working as before.	41/417	10
• Hide this information and adopt a non interventional field in the same center.	102/417	24
• Involve the hospital and ask for compensation.	233/417	56
• Leave to another center that will not screen for Hepatitis B.	25/417	6
• No response	16/417	4
Moving to another health center that compensates exposed health care worker:		
• Surgeon would absolutely / may consider changing center of practice.	307/417	74
• Surgeon would never change place of work.	49/417	12
• Surgeon doesn't know.	42/417	10
• No response.	19/417	4

There were significant relations between centre of practice and multiple factors related to the surgeons' vaccination status and practice; these are summarized in Table 4. Interestingly enough, surgeons with longer duration of practice were less likely to be vaccinated and less strict in following standard precautions when performing surgeries on Hepatitis B patients.

Gender and specialty had no significant relation with vaccination status or with following standard precautions when operating on Hepatitis B patients. Also, there was no significant relation between vaccination status of surgeons and following standard precautions when operating on Hepatitis B patients or their response to an accidental prick during operative procedure (Table 4).

Discussion

Around half of the distributed questionnaires were completed. However, this low response rate is reported in the literature for similar studies (5-7). The higher response observed by the general surgeons, obstetricians and orthopedic surgeons (Table 1) does not reflect a true higher response to the survey; it is related to the higher staff volume in these specialties. At the time of questionnaire collection, we noticed increased interest among surgeons, some were stimulated to read about Hepatitis B infection and vaccination guidelines and others actually visited the staff health clinic asking for the vaccine.

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Table 4 Summary of the relations that were studied in the survey and its significance

Relations between	P value	Correlation coefficients	
		Somer's d value	P value
Center of practice and			
• Vaccination status of surgeons.	0.007	-0.012	0.754
• Following standard precautions* while operating on Hepatitis B patient.	0.001	-0.083	0.025
• Reaction of surgeons to their own Hepatitis B positive status.	0.000	0.135	0.001
Duration of practice and			
• Vaccination status of surgeons.	-0.006 †	-0.128	0.002
• Following standard precautions* while operating on Hepatitis B patient.	-0.000 †	-0.210	0.000
• Reaction of surgeons to their own Hepatitis B positive status.	0.098	0.039	0.388
Gender and			
• Vaccination status of surgeons.	0.201	-0.066	0.153
• Following standard precautions* while operating on Hepatitis B patient.	0.187	0.001	0.987
Specialty and			
• Vaccination status of surgeons.	0.683	0.044	0.283
• Following standard precautions* while operating on Hepatitis B patient.	0.999	0.009	0.827
Vaccination status and			
• Response to accidental prick during operative procedure.	0.083	0.041	0.359
• Following standard precautions* while operating on Hepatitis B patient.	0.854	-0.025	0.546
• Refusing to perform lifesaving procedures on Hepatitis B patients.	0.345	-0.038	0.344

*Standard precautions: wearing double gloves, goggles, minimum sharp instruments handling, †A significant inverse relation (the longer the duration of practice the less is the number of vaccinated surgeons and following standard precautions during surgery will be less). P-value <0.05 was considered statistically significant.

Hepatitis B infection is 10 times more frequent among surgeons than in the general population (8). The risk of infection is primarily related to the degree of contact with blood in the work place and also to the Hepatitis B e antigen (HBeAg) status of the source person. Generally, surgeons underestimate the risks of percutaneous exposure while operating, the risk of becoming infected with Hepatitis B virus if exposed, and the degree of protection provided by the vaccine (5;7). Surgeons with longer duration of practice were less likely to be vaccinated and less strict in following standard precautions when operating on Hepatitis B patients (Table 4). It was reported that prior Hepatitis B exposure was greater among older surgeons whether by clinical exposure or by antibody testing (5). This could be explained by a lower perception of risk by the older surgeons, given their long disease free practice. Moreover, some of them expressed fear over the actual safety of the vaccine due to their knowledge of an earlier vaccine that they believed was unsafe. Younger staff should understand the risk of Hepatitis B infection in order not to be influenced by their senior's behavior.

Different factors can be linked to the reluctance of some surgeons in obtaining Hepatitis B vaccine in spite of its availability at no cost in all governmental health care centres; probably the most significant one is the lack of knowledge about its protective effect since only around half knew that it provides 95% protection. In contrast, being vaccinated did not significantly correlate with being less cautious during surgery (P value 0.854) which could be explained by the surgeons' knowledge that the vaccine is not 100% protective or fear of acquiring other infections like HIV and Hepatitis C. Our study also showed that there was a significant relation between the centre of practice and vaccination status as well as following standard precautions when operating on Hepatitis B patients (Table 4). This reflects the diversity of the governmental health centres in terms of strict application of vaccination rules and precautious measures.

Surgeons who did not check their antibody level are falsely reassured about their immunity against Hepatitis B infection since they may have low antibody levels (<10 mIU/ml) and considered non-responders. In our study (Table 2), only around one of ten surgeons knew the proper time for checking their HB antibody level, which is 1-2 months after completion of the 3 doses of the vaccine.

In this study, about nine of ten surgeons reported that they wanted to check patients' Hepatitis B status before any surgical intervention. At the same time, roughly the same amount would not refuse to perform surger-

ies (elective and emergency) on Hepatitis B positive patients. Knowing the patient's Hepatitis B status makes the surgeon as well as the whole managing staff more cautious during their work and will minimize the panic state that usually happens when accidentally pricked. The policy of routine checking of patients' Hepatitis B status before surgery is not available in all governmental hospitals. Interestingly enough, it was observed that in centres with no such policy, higher numbers of vaccinated surgeons exist. Another way of heightening the surgeons' safety is to fully implement barrier protection for communicable diseases (standard precautions) for all patients, thereby also protecting against HIV and other communicable diseases. This principle was introduced in 1985 (9).

The risk of developing clinical Hepatitis if the blood is both Hepatitis B surface antigen (HBsAg) and HBeAg positive is around one in four to one in three; this risk drops to significantly below one in ten if the blood is HBsAg positive and HBeAg negative (10). So HBsAg positive carriers pose a very low risk of infectivity and should not be prevented from carrying out invasive procedures (8;11;12). Moreover, the risk of transmission from health care worker to patient is considerably low; an estimated risk of a HBeAg positive surgeon transmitting Hepatitis B to a patient during an invasive procedure was under one fourth of a percent (13). However, there were some reports of transmission of Hepatitis B to patients from an e Ag negative surgeon (11;14).

In some of Saudi Arabia's governmental health centre policies, HBsAg positive employees are not permitted to perform exposure prone procedures. In our survey, one of ten surgeons would hide a newly discovered positive test result, and continue working as before, thereby posing a risk (Table 3). One in four would change to another non-interventional career, but still hide a positive test result.

About half of the surgeons expected the health centre to provide them with alternative solutions like job-relocation and financial compensation, but unfortunately no such policies exist. These responses correlated significantly with the centre of practice (Table 4), which again reflects how policies applied and how protective measures followed differently in governmental centres. Health centres share the responsibility of providing a safe working atmosphere. In case of accidental exposure of health care workers with a resultant carrier or diseased state, there is no applied policy that supports the exposed staff in terms of providing an alternative job (non-interventional) with re-training programs or financial compensation. This created a sense of insecurity among surgeons; just below one in ten reported that they might actually refuse operating on Hepatitis B patients, even for life saving procedures.

In our study, about three out of four of the surgeons expressed an interest or at least thought about moving to another place of work where they could be compensated for work-inflicted exposure (Table 3). This response reflects a state of poor satisfaction with their current work atmosphere and protective policies and it carries a significant message to health centres to review their old policies in that regard.

Loss of career is a major concern for surgeons acquiring Hepatitis B infection during their practice and unless an appropriate policy is established in every health centre, surgeons may start refraining from treating Hepatitis B patients.

Conclusion

Although this study was conducted in tertiary care centres with available written policies and practice guidelines about risk of infections to health care workers, surgeons' knowledge about Hepatitis B infection and vaccination was incomplete in a way that reflected on their adherence to vaccination and following protective rules during surgeries. Two of three surgeons had all three doses of the vaccine and about half of the surgeons were not aware of the exact protection degree of the vaccine.

About nine of ten surgeons wanted to check patients' Hepatitis B status before any surgical intervention. However, around the same amount would not refuse to do the procedure if Hepatitis B was detected.

We recommend that vaccination must be available to all risk-prone health care workers at their initial employment and contract renewal with anti-Hepatitis B level documentation. Also, an educational program should be regularly and repeatedly conducted about Hepatitis B infection and the importance of vaccination with clear guidelines to health care workers in cases of accidental exposure.

Adherence to occupational health policies and guidelines has to be monitored to provide a safe environment for the health care workers and the patient.

Health centre policies should clearly address situations when health care workers acquire an infectious disease during their practice; the effect on surgeons' career has to be clearly emphasized with provision of different solutions and job re-location to help in maintaining safety, privacy and appropriate income.

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Contribution Details

MB, MAK, SAQ, SAA, AA, HAA and MO prepared the questionnaire. MAK, SAQ, SAA, AA and HAA distributed and collected the questionnaire. MB, MAK and MO managed the data. The statistical analysis was performed by MO. The data analysis and manuscript concept was done by MB, MAK, SAQ, SAA, AA, HAA, MO. MB wrote the manuscript. MB, MAK, SAQ, SAA, AA, HAA and MO revised and edited the manuscript Pre-submission and MB, MAK, SAQ, SAA, AA, HAA and MO revised and edited the manuscript post-submission. Revision of statistical analysis was done by MO

Competing Interests: None declared.

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