

Standard Prevention Precautions Indicators for Hepatitis B & C Infections for Health Care Workers in Operation Theaters and Surgical Wards in Mosul Medical City

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Abstract

Background: Majority of patients of hepatitis B and C are asymptomatic and pose great danger of spreading these infections to the society and medical personnel particularly.

Aim: To determine the standard prevention precautions indicators practiced by health care workers in operation theaters and surgical wards for hepatitis B and C transmission and prevention.

Materials and Methods: This study was done in operating theaters and surgical wards in Mosul Medical City - Nineveh Health Directorate. Using cross sectional study design for a period from 1st May to 1st October 2011. Three hundred and twenty four health care workers were included. Data were collected according to the WHO standard precaution of infection prevention. Standardized questionnaire form was used including; personal history, occupational contact exposure to blood & method of transmission, vaccination status laboratory investigations and standard precautions followed.

Results: This study revealed that the participants (medical and health staff) were significantly exposed to blood and the health staff was the most frequent group ($p = 0.000$) followed by medical staff ($p = 0.001$). Two thirds of health staff had blood contact with skin abrasion were significantly more exposed than medical and service staff as a method of infection transmission ($p = 0.000$). Majority (86.4%) were vaccinated against hepatitis B and there is no significant difference among study sample according to vaccination status. The service staff had completed 3 doses of vaccination (81.3%) compared to lower fraction of medical and health staff (51.4% and 55.7% respectively) in a very highly significant way ($p = 0.000$). Health staff were more significantly enrolled with hand washing (97.4%) than medical and service staff (90.5% and 96.6% respectively), ($p = 0.044$).

Conclusion: Majority of study sample were exposed to hepatitis B & C infection. The percentage of coverage with hepatitis B vaccination is not 100%. Health staff were significantly more enrolled in hand washing than the medical and service staff.

Introduction

Hepatitis B and C is a common global health problem and is spreading rapidly in developing countries due to lack of health education, poverty and illiteracy⁽¹⁾.

Majority of the patients are asymptomatic and pose great danger of spreading these infections to the society and medical personnel particularly⁽²⁾. Both Hepatitis B and C are transmitted through blood either by percutaneous or body fluids (semen, saliva or vaginal secretion)^(3,4).

Hepatitis B virus (HBV) circulates in high titers in blood and lower titers in other body fluids and is 100 times more infectious than Human Immunodeficiency Virus (HIV) infections and 10 times more than hepatitis C virus (HCV)⁽⁵⁾. Worldwide, an estimated two billion people have been infected with the HBV, and more than 350 million have chronic liver infections⁽⁶⁾, and 170 million people are chronically infected with HCV and 3 to 4 million people get infected each year⁽⁷⁾.

Health care workers (HCWs) are at high risk of encountering needle stick injuries, blood and body fluid exposure and therefore acquiring blood borne infections especially hepatitis B and C, which may be followed by serious long term sequelae in a significant number of cases⁽⁸⁾. WHO reports, that of the 35 million health-care workers, 2 million experience percutaneous exposure to infectious diseases each year. It further notes that 37.6% of

Hepatitis B, 39% of Hepatitis C and 4.4% of HIV/AIDS in HCWs around the world are due to needle stick injuries⁽⁹⁾.

Chances of surgeons contracting hepatitis B infections are about 1%⁽¹⁰⁾. While HCV transmission to anesthetists through accidental exposure is 2% in the United States population⁽¹¹⁾. It is important that all HCWs; specially surgeons know their HBV and HCV profiles. As vaccination is available only against HBV, therefore, it should be given to those surgeon who are not immunized. The vaccine against hepatitis B has been available since 1982 which is 95% effective in preventing HBV infection and its chronic consequences, and is now incorporated in immunization schedule all over the world and it is expected that its incidence will decrease^(6,12,13). The aim of the present study is to determine the standard infection precautions indicators practiced by health care workers in operation theaters and surgical wards for HB and C transmission and prevention in Mosul Medical City.

Materials and Methods

Administrative and ethical consideration

Prior to data collection, essential official permissions were obtained from Nineveh Health Directorate.

Study setting

The study was done at operation theaters and surgical words in Mosul Medical City, Nineveh Health Directorate.

Study design

Cross section study

Study period

The study has been conducted during a period of five months extending from 1st May to 1st October 2011.

Study sample

To achieve the aim of the present study 324 HCWs who are at risk of acquiring a blood borne infection i.e. occupational exposure were interviewed, refusal were excluded.

Data collection tool

For data collection a standardized questionnaire was used which included; personal data, history of blood exposure, vaccination status against hepatitis B, laboratory investigations done and questions about standard precautions used were asked about which are washing hands, use gloves ,wear eye protection, wear gowns.

Statistical analysis

The information regarding each participant was transferred into a code sheet and data entry was done using computer Pentium IV. Statistical analysis was done using SPSS package version (11).Chi-square test and odds ratio (OR) were used. P-value at a level of significance equal to or less than 0.05 was considered. Data were presented in suitable tables and figures. Percentage were calculated for the various group variables.

Results

The present study found that the prevalence of exposure to HB and C virus infection was 66.7%. Table1 shows that all participants were significantly exposed to blood and the health staff was the most frequent group followed by medical staff (54.2% and 31.5%) respectively .

Considering sex the fraction of exposed females is higher than that of the male (76.5% versus 59.8%) a difference of highly significant value ($p = 0.002$). Table2 reveals that two thirds of health staff (60.7%)

had blood contact with skin abrasions a figure which is significantly higher than that of medical and service staff (39.7% and 25.8%) respectively, ($p=0.000$).

Majority (86.4%) of study sample were vaccinated against hepatitis B with no significant difference, according to participants categories and vaccination status.

According to the doses of HB vaccine, 81.3% of the service staff had completed 3 doses of vaccination compared to lower fraction of medical and health staff (51.4% and 55.7%) respectively in a very highly significant way ($p = 0.000$), (Table 3).

Table 4 demonstrated distribution of participants according to routine laboratory investigation performed to detect HB and C status . Almost one third (37.0%) were enrolled in routine pre-vaccination laboratory HBsAg testing. A significantly high fraction of service staff were obligate to HBsAg test ($p = 0.007$), further more service staff were more significantly obligate to investigate for hepatitis C virus (52.9%)than medical and health staff (21.4% and 30.1%) respectively, ($p = 0.000$).

Table 5 reveals that health staff were significantly more enrolled with hand washing (97.4%) than medical and service staff (90.5% and 96.6% respectively) ($p = 0.044$) . Service staff were significantly used to wear protective eye glasses more than medical and health staff (36.8%, 14.3%, 7.8%) respectively, ($p = 0.000$).

On the other hand, health staff had more dressing after injury (68.4%) than medical and service staff (33.8% and 64.5%) respectively, ($p = 0.000$).

No significant difference was reported regarding the ways of waste – disposal by the service staff enrolled in the present survey, (Table 6).

Table(1): Distribution of study sample according to occupational contact with blood by sex

Categories	Exposure Status			P-value*	OR	95% C.I
	Yes (n=216)	No (n=108)	Total (n=324)			
	No. (%)	No. (%)	No. (%)			
Staff						
Medical	68 (31.5)	16 (14.8)	84 (25.9)	0.001	2.642	1.45-4.80
Health	117 (54.2)	36 (33.3)	153 (47.2)	0.000	2.36	1.46-3.82
Service	31 (14.3)	56 (51.9)	87 (26.9)	0.000	0.16	0.09-0.27
Sex						
Male	115 (59.8)	77 (40.2)	192 (100.0)	0.002	0.46	0.28-0.75
Female	101 (76.5)	31 (23.5)	132 (100.0)			

* Chi-square test was used

Table(2): Distribution of study sample according to risky methods of transmission of hepatitis B and C virus infection

Methods of Transmission	Medical Staff (n=68)	Health Staff (n=117)	Service Staff (n=31)	Total (n=216)	P-value*
	No (%)	No (%)	No (%)	No (%)	
Through Skin	61 (89.7)	108 (92.3)	31(100.0)	200(92.6)	0.190
Mucous Membrane	36 (52.9)	46 (39.3)	10 (32.3)	92 (42.6)	0.089
Blood Contact With skin abrasion	27 (39.7)	71 (60.7)	8 (25.8)	106(49.1)	0.000

* Chi-square test was used

Table(3): Distribution of study sample according to HB vaccination status and vaccination doses of HB vaccine

Hepatitis B Vaccination	Medical Staff (n=84)	Health Staff (n=153)	Service Staff (n=87)	Total (n=324)	P-value*
	No (%)	No (%)	No (%)	No (%)	
Status					
No	10 (11.9)	22 (14.4)	12 (13.8)	44 (13.6)	0.866
Yes	74 (88.1)	131 (85.6)	75 (86.2)	280 (86.4)	
Doses					
1 st Dose	15 (20.3)	26 (19.8)	7 (9.3)	48 (17.1)	0.111
2 nd Dose	21 (28.4)	32 (24.4)	7 (9.3)	60 (21.4)	0.009
3 rd Dose	38 (51.4)	73 (55.7)	61 (81.3)	172 (61.4)	0.000

* Chi-square test was used

Table(4): Distribution of study sample according to routine laboratory investigation (HBs Ag and HC virus)

Laboratory investigation	Medical Staff (n=84)	Health Staff (n=153)	Service Staff (n=87)	Total (n=324)	P-value*
	No (%)	No (%)	No (%)	No (%)	
(HBsAg)					
Done	24 (28.6)	52 (34.0)	44 (50.6)	120 (37.0)	0.007
Not done	60 (71.4)	101(66.0)	43 (49.4)	204 (63.0)	
HC virus					
Done	18 (21.4)	46 (30.1)	46 (52.9)	110 (34.0)	0.000
Not done	66 (78.6)	107 (69.9)	41 (47.1)	214 (66.0)	

Table(5): Distribution of study sample according to standard precautions component used by each category

	Medical Staff (n=84)	Health Staff (n=153)	Service Staff (n=87)	Total (n=324)	P-value *
	No (%)	No (%)	No (%)	No (%)	
Standard prevention precautions					
Washing hands	76 (90.5)	149 (97.4)	84 (96.6)	309 (95.4)	0.044
Surgical Gloves	83 (98.8)	145 (94.8)	82 (94.3)	310 (95.7)	0.256
Gowns	76 (90.5)	133 (86.9)	73 (83.9)	282 (87.0)	0.441
Mouth & Nasal Mask	62 (73.8)	91 (59.5)	57 (65.5)	210 (64.8)	0.086
Protective eye Glasses	12 (14.3)	12 (7.8)	32 (36.8)	56 (17.3)	0.000
Preventive precautions at the time of injury or exposure**					
Washing site	63 (92.6)	111 (94.9)	29 (93.5)	203 (94.0)	0.824
Sterilization	58 (85.3)	108 (92.3)	29 (93.5)	195 (90.3)	0.240
Dressing	23 (33.8)	80 (68.4)	20 (64.5)	123 (56.9)	0.000

* Chi-square test was used

** no. of exposed = 216

Table(6): Waste-disposal practices followed by service staff

Waste-Disposal Practices	Yes (n=31)	No (n=56)	Total (n=87)	P*-value	OR	95% C.I
	No (%)	No (%)	No (%)			
Safety Box	30 (96.8)	51 (91.1)	81 (93.1)	0.315	2.94	0.43-19.69
Yellow Disposable Pocket	27 (87.1)	52 (92.9)	79 (90.8)	0.373	0.52	0.13-2.06
Black Disposable Pocket	29 (93.5)	50 (89.3)	79 (90.8)	0.510	1.74	0.37-7.99
disposal Burn	25 (80.6)	52 (92.9)	77 (88.5)	0.087	0.32	0.9-1.17

* Chi-square test was used

Discussion

The Occupational Safety and Health Administration (OSHA) estimates that 5.6 million workers in the healthcare industry and related occupations are at risk of occupational exposure to blood borne pathogens. The National Institute for Occupational Health and Safety (NIOSH) has estimated that 600,000 to 800,000 needle stick and other percutaneous injuries occur annually in hospitals in USA. The estimated combined medical and work productivity costs in 2004 was 188.5 million Dollars . Worldwide it has been estimated that in 2000 alone, percutaneous injuries led to 16,000 cases of hepatitis C, 66,000 cases of hepatitis B, and 1000 cases of HIV ⁽¹⁴⁾ .

A cross-sectional study design was carried out to achieve the aim of the present study. This type of study is carried out as viewing a snapshot of the population at a certain point in time. Note that in this

type of approach, the cases of disease or criteria of interest that are identified *prevalent* cases ⁽¹⁵⁾.

Because of the difficulties in preventing and controlling blood borne infection in developing countries, this study will be considered useful in preventing the occurrence of hepatitis B and C as blood borne infection among health care workers in operation theaters and surgical wards in Mosul Medical City - Nineveh Health Directorate.

This study was conducted from 1st May to 1st October 2011, included 324 HCWs, who are at risk of acquiring a blood borne infection because of occupational exposures. Those refusing sharing in this study were excluded. Data were collected from participants about components of standard precautions and their use. Considering every person (or staff) as potentially infected and susceptible to infection; HCWs were informed about the purpose

of the study and their agreements were taken before data collection.

Most recent data from 2006 in the USA revealed that the overall rate for percutaneous sharp object injuries was 16.88 per 100 occupied beds per year for non-teaching hospitals and 44.32 injuries per 100 occupied beds per year for teaching hospitals. Most exposure incidents occurred in an operating room (35.2 %), a patient room (24.6 %), the emergency department (9.6%), a critical care unit (7.4 %), outpatient clinics or offices (7 %) and a procedure room (3.5 %)⁽¹⁶⁾.

In the present study it was found that 216 out of 324 participants were exposed to blood borne infection which represent about two third of participants (66.7%). The most frequent exposure observed was among health staff (54.2%) and medical staff who were exposed to blood (31.5%) while only (14.3%) of service workers were observed to be exposed. These figures were more than that recorded by a case-crossover study done by Fisman et al.⁽¹⁷⁾, at 2007 in which nurses report the most frequent exposures (36.3%), followed by house officers (15.7%), attending physicians (13.3%), surgery attendants (7.8%), phlebotomists (4%), and non-laboratory technologists (4.2%). Long work hours and sleep deprivation among medical trainees result in fatigue, which is associated with a threefold increase in the risk needle stick injuries.

According to the doses of HB vaccine, 17.1% vaccinated participant were got only one dose of vaccine, 21.4% were got two doses of vaccine while completely vaccinated participants were 61.4%.

Health care workers fall into high risk groups .In the present study non vaccinated participants form 13.6%. This considered a high fraction; two factors the results :the negative attitudes toward vaccination benefits and the recall bias which influence the end results.

A descriptive cross sectional study done to assess the current Hepatitis B vaccination status and knowledge of standard prophylaxis against blood borne infections in selected group of health care workers at Pakistan Institute of Medical Sciences. Vaccination status of the study group was not very satisfactory, as only slightly more than half were completely vaccinated (57.6%).While almost one fourth were either not vaccinated (24%) or partially vaccinated (18.3%)⁽¹⁸⁾.

In the present study almost one third of participants (37.0%) were enrolled in routine pre-vaccination laboratory HBsAg testing. A significantly high fraction of service staff were obligate to HBs Ag test ($p=0.007$), Regarding Hepatitis C routine investigation, service staff were significantly more enrolled in such tests compared to other categories ($p=0.000$). The low figure of medical and health staff most probably due to their awareness of isolation from work if they get positive result of HBs Ag .

Distribution of study sample according to standard precautions component used by each category reveals that 95.4% performed hand washing. Health staff were significantly more enrolled with hand washing (97.4%) than medical and service staff (90.5% and 96.6%) respectively ($p = 0.044$). Moreover, service staff were significantly used with protective eye glasses than medical and health staff (36.8%, 14.3%, 7.8%) respectively, ($p = 0.000$). Hospital administrations have strict rules and follow up service staff about wearing the protective eye devices.

Considering wearing surgical gloves and gowns there was no difference among the study sample and we report good percent on obligation to wear these protective barriers reach about 95.7% and 87.0% respectively.

Conclusions

The current study concluded that the majority of study sample exposed to hepatitis B &C (occupational blood born) infection. The percentage of coverage with hepatitis B& laboratory investigation (HBs Ag) the pre-vaccination test were not 100%. There were no significant difference among study sample regarding standard precautions except for wearing protective eye glasses which was more prevalent among service staff and wound dressing which was common among health staff.

Following components of standard precautions plan by health care worker whom at risk of acquiring a blood borne infection is mandatory. Beside, establishing infection control committee in each hospital is badly needed, further more raising health care workers awareness through health education about importance of vaccination and recording cards by regular distribution of posters and leaflets.

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