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Journal of Digestive Diseases and Hepatology

Research Article

Devaliya D, et al. J Dig Dis Hepatol 04: 161.

DOI:10.29011/2574-3511.000161

Need of Hepatitis B Prevention and Healthcare Worker Safety Program in Government Hospital: Case study of L.T.M.M. College & General Hospital, Mumbai

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Citation: Devaliya D, Desai S, Patwardhan M, Baveja S, Dsouza D (2019) Need of Hepatitis B Prevention and Healthcare Worker Safety Program in Government Hospital: Case study of L.T.M.M. College & General Hospital, Mumbai. J Dig Dis Hepatol 04: 161. DOI:10.29011/2574-3511.000161

Received Date: 14 February, 2019; **Accepted Date:** 12 March, 2019; **Published Date:** 18 March, 2019

Abstract

Introduction: Healthcare Workers (HCWs) are at high risk of acquiring communicable and non-communicable disease while working in the hospital setup due to occupational injuries, high patient load accompanied by low HCWs-per-patient's ratios, shortage of trained staff, and lack of any hospital-based healthcare worker safety program. Occupational injuries and exposures to blood borne and air borne pathogens, can be prevented if HCWs comply with appropriate precautions. And similarly, with emerging new health challenge of non-communicable diseases like diabetes, hypertension, cardiovascular diseases, its important HCWs are assessed regularly considering they are the mentors for the patients.

Objectives: This paper illustrates the unique model of hepatitis B prevention and healthcare worker's safety program which incorporates complete health checkup, screening and vaccination against Hepatitis B and the health education session for HCWs to increase their knowledge about infection prevention methods

Methods: As per WHO aligned strategies on prevention of hepatitis B and healthcare worker safety, the program is a hospital based cross sectional study implemented with support of hospital infection control committee and approved by institute's ethics committee. All HCWs voluntarily participated and post their written consent, fasting blood was collected, and health related data was captured in excel for record purpose while HCWs were handed over a booklet with all health records in it. The data was analyzed in excel.

Result: Total 3606 HCWs consented to participate with majority includes nurses (31%), Doctors (30%) and Class IV workers (25%). The program detected 5 cases of Hep C, 24 cases of Hep B and among those 29 cases 25 HCWs were newly diagnosed, while 5 cases for TB were also detected. As per CDC guidelines the program ensured complete protection of 2949 HCWs out of total 3560 HCWs by confirming their good anti-HBs level (Antibody >10mIU/ml), while 1907 HCWs were immunized with at-least one Hepatitis B vaccine dose with total administration of 4199 doses. The program trained 6553 HCWs on different infection prevention and control topics. The program also found, 499 HCWs (14%) with high serum triglyceride, 140 HCWs (4%) known diabetic cases, while 322 (9%) suspected cases for diabetes, 123 HCWs (3%) with high serum cholesterol, 251 HCWs (7%) known cases for hypertension while 212 HCWs (6%) suspected cases for hypertension. 1089 female HCWs (30%) and 190 male HCWs (5%) found to be anemic. The body mass index found 983 HCWs (27%) overweight and 341 HCWs (10%) obese.

Conclusion: The study highlights the significance of Hepatitis B prevention and Healthcare worker safety program in hospital. HCWs safety program should be an integral part of all hospital to ensure safe HCWs and safe patient care.

Keywords: Education; HCWs; Noncommunicable-Communicable Disease; Program; Safety; Vaccine

Introduction

Health Care Workers (HCWs) are defined as all paid and unpaid persons working in health-care settings who have the potential for exposure to patients and/or to infectious materials, including body substances, contaminated medical supplies and equipment, contaminated environmental surfaces, or contaminated air. HCWs might include (but are not limited to) physicians, nurses, nursing assistants, therapists, technicians, emergency medical service personnel, dental personnel, pharmacists, laboratory personnel, autopsy personnel, students and trainees, contractual staff not employed by the health-care facility, and persons (e.g. clerical, dietary, housekeeping, laundry, security, maintenance, administrative, billing and volunteers) not directly involved in patient care but potentially exposed to infectious agents that can be transmitted to and from HCWs and patients [1,2]. HCWs are at high risk of acquiring communicable and non-communicable disease while working in the hospital setup considering factors like occupational injuries, high patient load accompanied by low HCWs-per-population ratios, shortage of trained staff, and lack of any hospital-based healthcare worker safety program. HCWs are at a high risk of exposure to blood and body fluids. Needle stick injuries, cuts and splashes are common occupational accidents exposing health care providers to different blood borne pathogens. Transmission of hepatitis B virus, Human Immune Deficiency Virus (HIV), and Hepatitis C Virus (HCV) has been related to injuries and frequency of exposure. According to World Health Organization (WHO), 2.5% of HIV cases, 40% of both HBV and HCV cases worldwide are the result of occupational exposure among health care workers. [3]. The annual proportion of HCWs exposed to blood-borne pathogens was 5.9% for HBV worldwide and 40%-65% of such infection occurred due to occupational exposure [4]. Adherence to standard precautions, awareness about Post Exposure Prophylaxis (PEP) is poor in developing countries among HCWs and documentation of exposures is suboptimal [5].

India with world's highest prevalence rate of tuberculosis makes HCWs at high risk of infection. A study reports nearly half of the HCWs taking care of tuberculosis patients suffers from latent tuberculosis. [6] Lifestyle diseases such as stroke, cancer, heart disease and diabetes are by far the leading causes of mortality in the world. In India, 10% of adults suffer from hypertension while the country is home to 25-30 million diabetics [7]. HCWs plays an influencing role in the prevalent population affected with noncommunicable diseases as unfortunately they sacrifice their own health for the wellbeing of people by getting exposed to various hazards at work place and not giving much attention to selfcare. Hence this study presents a unique model on Prevention of Hepatitis B and HCWs safety, implemented in a Mumbai corporation based tertiary hospital called L.T.M. M. College and General Hospital.

Objective

- This paper illustrates the unique model of hepatitis B prevention and healthcare worker's safety program which incorporates complete health checkup, screening and vaccination against Hepatitis B and the health education session for HCWs to increase their knowledge about infection prevention methods.
- Complete Health checkup and screening of HCWs for non-communicable and communicable disease
- Immunization and protection of HCWs against Hepatitis B & C infection
- Education and sensitization on infection prevention and safety measures among HCWs.
- Referral support and contact tracing.

Ethical Consideration

All the HCWs participated, were explained the purpose of the program and assured confidentiality. Written informed consent was taken before taking blood and recording detailed health. information. Ethical clearance was obtained from the Institutional Ethics Committee. And a MOU was signed with the hospital infection control committee chair person and conveyer to implement and conduct such program for the HCWs safety.

Method

Americares India Foundation a nonprofit organization working for healthcare worker safety in a tertiary government hospital implemented a unique model on staff's safety for 4 years' period (Jan 15- Dec 18). The model is aligned with the WHO strategies for occupational safety of HCWs which broadly includes Health & Infection Surveillance, Hepatitis B Immunization and protection, Infection control Training & Education and Contact tracing (Figure 1).

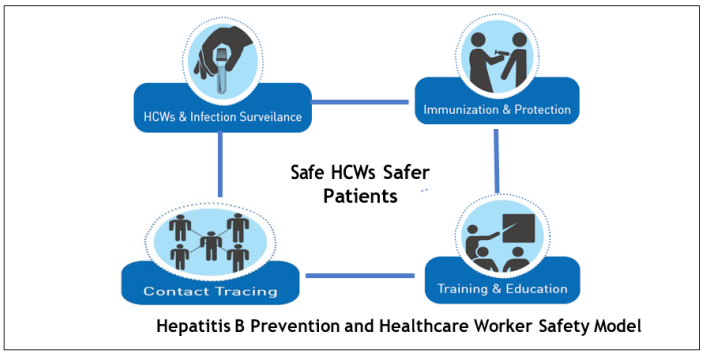

Figure 1: Hepatitis B Prevention and Healthcare Worker Safety Model.

HCWs & Infection Surveillance

It includes complete health checkup of HCWs based on consultation and medical history. It includes screening of blood for hepatitis B, C and anti-HBs titers, and also blood sugar, triglycerides and cholesterol. Anthropometric measurement including height, weight and BMI calculation was also conducted under this program. The HCWs voluntarily participated in the program and post briefing of the program, a written consent was taken to collect blood and screening. To ensure the confidentiality of participants, all HCWs were designated with unique HCWs number. A special booklet was designed for HCWs which records all their health information during program and it was handed to each HCWs personally post consultation and blood reports. The surveillance activity recorded their personal & family medical history with physical checkup, assess their alcohol intake, screened HCWs for non-communicable disease (Anemia, Diabetes, Hypertension, Obesity) and communicable disease (Tuberculosis, Hepatitis B and C), assessed their complaints and accordingly they were referred to proper outpatient department for further investigation and treatment. Elisa kits were used for screening of Hepatitis B & C. Screening for TB was based on sign and symptoms found in HCWs in past 2-3 weeks. The reports with individual HCWs booklet was given to HCWs with one to one counselled and later they were followed up for referral. The infection surveillance includes recording and tracking the treatment and infection status among patients taking care in intensive care units of medicine, surgery, other departments through a designed booklet based on recommended hospital guidelines of India.

Immunization & Protection

HCWs are at major risk to blood borne infection like Hepatitis B & C due to occupational hazards. The program's 2nd component includes immunization for hepatitis B based on history of vaccine dosage intake, HbsAg & Anti Hbs reports. The program followed CDC guideline for immunization of HCWs [5]. Pre and post vaccination of HCWs, anti-Hbs titers were recorded to ensure complete protection of HCWs. In-case of non-responded, repeat 3 vaccination dosage was administrated with consultation of gastroenterology department. The immunization activity was a voluntary among HCWs, which was administrated with pre-counselling. Post vaccination, HCWs signature/ thumb impression was taken for record purpose. The vaccine's pro & cons were shared to each HCWs through one to one counselling. Regular reminders for pending doses were given to HCWs through telephonic call. The program ensured documented vaccine intake and anti-HBs level record for HCWs.

Training & Education

Training HCWs on safety measures and standard precautions was conducted to ensure their safety and efficiently delivering safe patient care. The program included multiple approach to train the HCWs, considering their busy schedule and patient load. The approach included

(a) In-ward training session at their work station through a flipchart or poster and demonstration on Hand hygiene, personal protective equipment, post exposure prophylaxis, Hepatitis, Needle and Sharp safety, Bio Medical waste, Gloves usage, Safety first etc.,

(b) HCWs specific training session, which includes special separate training session on Infection prevent and control for specific HCWs like Resident Doctors, Nurses, Class IV etc.

(c) Celebrating World Health Days like world Tuberculosis Day, world Hepatitis Day, world Diabetes day etc through series of activities to make awareness and sensitize HCWs on various health issues.

Contact Tracing

This included counselling, screening and protecting family members of HCWs found positive for hepatitis B and C. The surveillance activity helped in detecting new and known positive HCWs who ignored their infection status due to lack of knowledge or wrong attitude and put their family and patients at risk of transmitting infection. HCWs were counselled on their infection status and post their consent family members were screened and vaccinated for hepatitis B. The program ensured complete confidentiality of all HCWs and on their positive infection status. Positive HCWs were referred to gastroenterology department for further investigation and treatment.

Data Collection & Analysis

All the HCWs health record were documented in the newly designed HCWs booklet, which was later entered in the excel for internal record purpose. The blood reports documentation was done in a register and excel, while acknowledgement of reports received was taken in registers. The data on HCWs education and training was documented in a training register post each training session. All the data was entered in excel and later analyzed with their confidentiality maintained completely.

Results

Demographic Profile

The hospital-based staff safety program registered 3606 HCWs participation, which includes Nurses (31%), Doctors (30%), Class IV (25%), Technician (7%) and Administration staff (7%) (Figure 2). The age wise distribution shows 2014 HCWs (56%) from 18-30yrs age group, 601 HCWs (17%) from 31-40 years age group, 597 HCWs (17%) from 41-50yrs age group, while in-case of sex wise distribution shows 2253 (62%) female HCWs and 1353 (38%) male HCWs (Table 1).

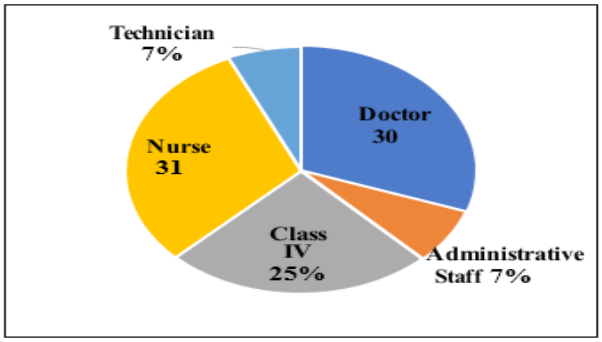

Figure 2: Participation of HCWs as per categories

Age in year	Male (%)	Female (%)	Total (%)
18-30	607 (30%)	1407 (70%)	2014 (100%)
31-40	317 (53%)	284 (47%)	601 (100%)
41-50	227 (38%)	370 (62%)	597 (100%)
51-60	196 (52%)	182 (48%)	378 (100%)
Above 60	6 (38%)	10 (62%)	16 (100%)
Total	**1353**	**2253**	**3606**

Table 1: Age-Sex wise distribution of HCWs.

The program reported major participation of Class IV workers (25%), Nurses (31%) includes nursing student & staff nurses, Doctors (30%) includes undergraduate doctor, resident doctors, professors, associate/assistant professor rest includes admin staff (7%) and technicians (7%).

Alcohol and Tobacco Addiction

Among 3606 HCWs, 3319 HCWs (92%) had no alcohol addiction while 270 HCWs (7.5%) consumes occasionally as a light drinker (weekly 2 drinks) while only 17 HCWs (0.5%) reported to be heavy drinker (weekly more than 4 drinks) (Table 2). In-case of tobacco addiction, 3419 HCWs (94.8%) had no addiction to any forms of tobacco while 60 HCWs (1.7%) and 125 HCWs (3.5%) reported to have addiction in form of smoke (like cigarettes) and smokeless (like chewing tobacco) respectively. Only 2 HCWs (0.1%) had addiction to both forms of tobacco (Table 3).

Alcohol intake	HCWs	% of HCWs
Non-Drinker	3319	92%
Light Drinker	270	7.50%
Heavy Drinker	17	0.50%
Total	**3606**	**100%**

Table 2: Alcohol intake practice among HCWs.

Tobacco intake	HCWs	% of HCWs
No	3419	94.80%
Smoke	60	1.70%
Smokeless	125	3.50%
Both	2	0.10%
Total	**3606**	**100%**

Table 3: Tobacco intake practice among HCWs.

Communicable Disease Assessment of HCWs

Due to occupational hazards, the risk of communicable disease is high among HCWs. Out of 3560 HCWs, 24 HCWs (0.6%) detected positive for Hepatitis B which majorly includes Class IV due to daily exposure to bio medical waste. While 5 HCWs (0.1%) diagnosed with Hepatitis C infection. The program as a part of surveillance, diagnosed 5 HCWs with tuberculosis (Table 4).

Categories of HCWs	HCWs diagnosed positive for		
	Hepatitis B	Hepatitis C	Tuberculosis
Doctors	2	-	2
Nurses	1	3	2
Class IV	15	1	-
Admin staff	5	-	-
Technician	1	1	1
Total	24	5	5

Table 4: Number of HCWs diagnosed with Hepatitis B, C and Tuberculosis as per categories.

Immunization of HCWs

A total 3560 HCWs sample were processed for Anti HBs level before vaccination, out of which 1796 HCWs (51%) reported low Anti HBs level (antibodies <10 mIU/ml) while 1764 HCWs (49%) reported good level of anti HBs level (antibodies >10 mIU/ml) (Table 5). As per CDC guideline, based on pre-vaccination anti HBs level and vaccine dosage history, 1907 HCWs (53%) was administrated with at-least 1 or more dosage of hepatitis B vaccine with total administration of 4199 doses (Table 6). The program ensured complete protection of 2949 HCWs out of total 3560 HCWs by confirming their good anti-HBs level. All the dosage taken by HCWs was documented in a personalized HCWs booklet, distributed personally to each HCWs along with other blood reports.

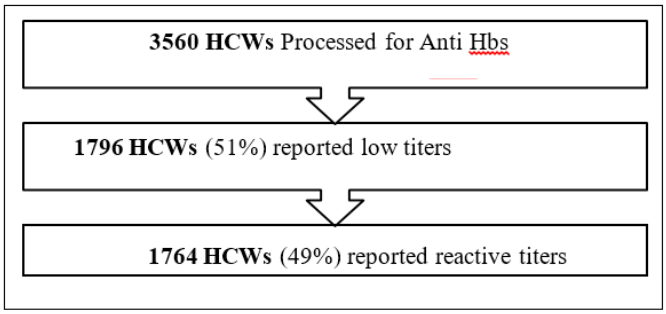

Table 5: Number of HCWs with Anti Hbs levels.

Serial Number	Vaccine Dose	No of Dosage
1	Dose 1	1401
2	Dose 2	1298
3	Dose 3	1500
Total Dosage		**4199**
Total unique HCWs vaccinated: 1907* (*Vaccinated with at-least / more than 1 dose)		

Table 6: Hepatitis B immunization status.

Training and Education of HCWs

The program undertook multiple approach to train and educated HCWs on standard precaution and infection prevention control practices. The program trained 3657 HCWs on different topics through inward education session, which majorly targeted to Class IV workers and nurses. The inward education session includes 378 demonstrative sessions to reach out 3657 HCWs. While 3560 HCWs was given one to one counselling on Hepatitis B & C while sharing with them their blood reports. While special HCWs specific session were organized for staff nurses, student nurses, resident doctors, class IV workers. The HCWs specific session trained 2896 HCWs on infection prevention and control practices. The program ensured to make mass awareness and sensitization on various health issues through celebration of various world health days.

Contact Tracing

Among 29 positive HCWs for Hepatitis B & C, the program contact traced 19 HCWs families who were counselled, screened, immunized. Out of 19 families, among 3 family members, the program found total 5 members' positive for Hep B. While 5 HCWs diagnosed with TB were counselled on safety measures to avoid transmission of infection to other population.

Body Mass Index

Body mass index was calculated based on their weight and height recorded during surveillance. In-case of doctors, 30% found to overweight while majority 55% doctors were normal weight and 8% found to be obese. Among 1105 nurses, 18% were underweight, 45% normal weight, 25% overweight and 13% found to be obese nurses. In-case of 900 Class IV workers, 45% normal weight, 38% over weight, 12% obese and 5% underweight. Similarly, Admin staff and technicians, appx 45% normal weight, 40% overweight and 5- 10% were under weight and Obese (Table 7).

Body Mass Index (BMI) category	Doctors	Nurses	Class IV	Admin Staff	Technician	Total
Underweight: < 18.5.18.5 to 24.9.	68 (6%)	196 (18%)	49 (5%)	26 (10%)	12 (5%)	351 (9%)
Normal weight: 18.5 to 24.9.	605 (55%)	497 (45%)	403 (45%)	113 (43%)	108 (45%)	1727 (48%)
Overweight: 25 to 29.9.	331 (30%)	271 (25%)	344 (38%)	104 (40%)	96 (40%)	1146 (32%)
Obese: 30 or more.	92 (8%)	141 (13%)	104 (12%)	21 (8%)	24 (10%)	382 (11%)
Total	1096 (100%)	1105 (100%)	900 (100%)	264 (100%)	241 (100%)	3606 (100%)

Table 7: Body Mass Index status of HCWs as per their categories.

Non-Communicable Disease Assessment of HCWs

Among 3606 HCWs, 499 HCWs (14%) had serum triglyceride level above the normal range. The prevalence of diabetes among HCWs was found to be 4%, while 322 HCWs (9%) found to be suspected diabetic due blood sugar detected to be higher than the normal level. The serum cholesterol level was on higher range for 123 HCWs (3%). The prevalence of hypertension was found to be 7% among HCWs with additional 212 HCWs (6%) had blood pressure higher than 120/80 mmHg. Out of total HCWs as per sex, 1089 (48%) female HCWs and 190 (14%) male HCWs had hemoglobin below the normal level to be suspected as anemia (Table 8). The above HCWs with abnormal range were counselled and referred to consent outpatient department for further investigation and treatment.

Sr. No.	Indicators	HCWs with abnormal range
1	S. Triglyceride (Normal Range: 60-150 mg%)	499 (14%)
2	Fasting Blood Sugar (Fasting 60-110 mg%)	322* (9%) 140**(4%)
3	S. Cholesterol (Normal Range: 150-250 mg%)	123 (3%)
4	Hypertension (Normal Range: 120/80 mmHg)	212* (6%) 251** (7%)
5	Anemia (Hbs) (Female: 12-15 g/dl) (Men: 13-17 g/dl)	Female: 1089 (48%) Male: 190 (14%)
*New suspected cases. ** Known diagnosed cases.		

Table 8: Assessment of HCWs for different Non-communicable disease.

Discussion

The program analyzed more than 90% HCWs are not addicted to alcohol or tobacco but appx 10% HCWs had either of the addiction, which is a need of concern as being a HCWs they influence the patient seeking care from them. Although the prevalence of tobacco use was still low when compared with other such studies on addiction in India among HCWs [8]. Sex-wise data shows, female HCWs are in predominant as the hospital had nursing students & nurses as a major chunk of HCWs besides female in other categories too.

Hepatitis B is the most transmissible but vaccine preventable infection. The risk of contracting Hepatitis B to HCWs (HCWs) is four-times greater than that of general adult population as they are in daily contact with blood & body fluids [9]. In the scenario, where the vaccination status is not well documented, and more than half of the injuries goes unreported, knowing the immune response of vaccine becomes imperative. The present program found 51% of 3560 HCWs with low protection (Anti Hbs level below 10 mIU/ml) for hepatitis B, in-spite of the fact, the hospital was running a voluntary vaccination drive for HCWs. Even among those, who had history of received 3-HBV (hepatitis B vaccine) doses, 29% HCWs were non- responsive (Anti Hbs <10mIU/ml) stressing the need for periodic testing of post vaccination Anti Hbs level among HCWs. The immunization activity under the present program, followed the CDC guideline for HBV immunization and vaccinated 1907 HCWs with 4199 doses. India has second largest pool of HBV carrier among the world with majority of them undiagnosed, which carries high risk to infection transmission. The surveillance activity diagnosed 24 hepatitis B positive HCWs and 5 hepatitis C positive HCWs. While the contact tracing of their family member revealed total 5 hepatitis B positive among 3 families of positive HCWs. Therefore, the program stresses on the need for protecting the HCWs from bloodborne infection by raising awareness, vaccination, monitoring of Anti Hbs levels and record maintenance. Similarly, in- case of TB, the program helped in diagnosing 5 new cases of TB among HCWs, which is although much below the India's rate of incidence of TB infection. The major reason for low case detection was the fact the surveillance was a one-time participation by majority of HCWs, and the stigma attached with the disease. How-ever, it is important to note is, appx 121 HCWs reported to have suffered from TB in their medical history, which stresses the need for awareness, training and safety measures among HCWs to prevent airborne infections.

As per CDC, to prevent occupational hazard, training of staff is a pivotal component for any safety program. The multiple approach adopted under the program helped in training more than 6553 HCWs on unique topics like bloodborne disease, standard precautions, post exposure prophylaxis and infection prevention topics. As a part of evaluation, the program documented significant positive change in HCWs knowledge post training sessions. There was 70% increase in knowledge on hepatitis B modes of transmission, 22% increase in awareness on correct Hand Hygiene steps, 51% increase in knowledge on tuberculosis control measure in hospital, 47% increase in knowledge on correct bio-waste disposal practices.

Obesity is assuming epidemic proportions worldwide. It is

also becoming a common health problem in Indian population. The present program found 32% HCWs like doctors and class IV overweight and 11% obese with majority of them includes nurses. The blood investigation for triglyceride level was found to be higher in 14% HCWs, while cholesterol was found higher among 3% of HCWs. The prevalence of Diabetes and hypertension was found to be 4% and 7% respectively among 3606 HCWs while additional new 9% and 6% HCWs were found to be suspected for Diabetes and hypertension, which showcase the rise trend of non-communicable disease among HCWs also. The level of hemoglobin was found low among 30% female HCWs and 5% male HCWs. The anemia among female was found to be at par with the national data [10]. The program emphasis the need on behavior change drive among HCWs to motivate them to adopt healthy life style, undergo regular check-up, follow proper diet to prevent non-communicable diseases among HCWs to be a mentor and role model for the patients and public.

The program ensured major participation of various types of HCWs working in the hospital. Especially nurses and class IV workers, who are at high risk to communicable and non-communicable disease. Class IV workers being with poor education background and nor trained, its important they are engaged in the program to ensure their safety and safe environment and patient care. The HCWs safety program was successful in engaging with different departments and their heads to sensitize them on the importance of the program from the perspective of HCWs safety. Such engagements with head of departments, helped in enforcing a culture among its staff to get assessed for health check-up and get protected themselves at the beginning of their careers itself. The program highlights there is a need from hospital management to make a policy level changes to continue such program for benefits of HCWs and patient safety. It also stresses the need to replicate this unique initiative among other hospitals specially the government hospital where HCWs safety is generally ignored for multiple reasons.

Limitation

The study includes documentation of health information given by the HCWs as a part of personal and family history, so there might be bias or limitation in the data shared by the HCWs as a part of health profile.

One of the greatest limitations of the study was program duration. Results were based on the point of interaction with HCWs over the period of 4 years, which may vary over different periods of time.

Conclusion

The present study showed that HCWs are at risk of developing communicable and non-communicable diseases. Being a mentor for patients and delivering an important role of health care, there is a need to create awareness among the HCWs about the importance of physical activity, dietary modification, occupational hazards, safety measures and standard precautions. The study highlights the significance of Hepatitis B prevention and Healthcare worker safety program in hospital and such hospital-based safety program should be an integral part of all hospital to ensure safe HCWs and safer patient care.

Acknowledgement:

Americares India Foundation acknowledges the financial grant support from Bristol-Myers Squibb Foundation and the additional support provided by the LTMMC & G hospital for implementation and supporting with professional guidance.

Conflict of Interest:

The authors declare no conflicts of interest.

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