International Journal of Community Medicine and Public Health
Mudgil M et al. Int J Community Med Public Health. 2026 Jul;13(7):3843-3849
https://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20262290

Original Research Article

Evaluation of knowledge, attitude and practice among different groups of health-care workers towards the transmission of blood-borne pathogens in a tertiary care hospital in Delhi

Maansi Mudgil[1], Sabyasachi Mandal[2], Emmanuel Jabakumar[3], Sanjib Gogoi[3]*, Manoj B. Jais[3]

[1]Lady Hardinge Medical College, New Delhi, India
[2]Department of Microbiology, Pathkind National Reference Laboratory, Haryana, India
[3]Department of Microbiology, Lady Hardinge Medical College, New Delhi, India

Received: 15 May 2026
Revised: 13 June 2026
Accepted: 17 June 2026

***Correspondence:**
Dr. Sanjib Gogoi,
E-mail: drgogoisanjib24@gmail.com

ABSTRACT

Background: Healthcare workers (HCWs) are at increased risk of acquiring blood-borne infections such as HIV, hepatitis B, and hepatitis C due to occupational exposure. Assessment of knowledge, attitude, and practice (KAP) towards standard precautions is essential to reduce this risk.
Methods: This cross-sectional study included 317 HCWs (doctors, nurses, and technicians) in a tertiary care hospital. Data were collected using a structured questionnaire assessing KAP. Scores were categorized as good (≥80%), moderate (50-79%), and poor (<50%). Anti-HBs titres were estimated using ELISA. Statistical analysis was performed using chi-square test and descriptive statistics, with $p<0.05$ considered significant.
Results: Good knowledge was observed in 82.7% of doctors, 51.4% of nurses, and 10% of technicians ($p=0.001$). A positive attitude was noted in 78.7% of doctors, 76.6% of nurses, and 50% of technicians ($p=0.001$). Practice showed variability, with 79.4% completing hepatitis B vaccination; however, only 54% had assessed anti-HBs titres. Occupational exposure was reported by 50.7% of doctors, 71% of nurses, and 26.7% of technicians. Among exposed individuals, only 63% completed post-exposure prophylaxis. Unsafe practices such as needle recapping persisted in 34% of HCWs.
Conclusions: Significant gaps in KAP, particularly among technicians, highlight the need for regular training, reinforcement of standard precautions, and monitoring of vaccination and immunity status to reduce occupational risk.

Keywords: Anti-HBs titre, Blood-borne pathogens, Healthcare workers, Hepatitis B, Knowledge attitude practice

INTRODUCTION

Health care workers (HCWs) are often exposed to blood and body fluids which place them at an immense risk of acquiring different blood-borne infections namely human immunodeficiency virus (HIV), hepatitis B (HBV) and hepatitis C (HCV) virus. Percutaneous injuries (needle stick injury, sharp injury) or mucocutaneous incidents (splash of blood or body fluids) during patient care can expose HCWs to mentioned pathogens.[1] According to the World Health Organization estimation, three million HCWs experience percutaneous exposure to blood pathogens each year.[2] The risk of infection is estimated to range between 10-30%,1.8-10%, and 0.3% for hepatitis B, hepatitis C and HIV infection respectively for an exposed person.[3] It is important for HCWs to use different types of 'standard precautions'(hand hygiene, use of personal protective equipment, safe injection practices safe handling of potentially contaminated equipment or surfaces in the environment etc.) constantly

regardless of blood blood-borne infection status of the patient.[4,5]

Standard precautions practices have been widely endorsed in developed countries to protect healthcare workers from occupational exposure to blood-borne pathogens and the consequent risk of infection.[2] Although there are awareness campaigns regarding standard precautions to prevent blood-borne pathogens in developing countries, the practice remains inadequate with risk remains high among HCWs.[1] Among the mentioned blood-borne infections Hepatitis B is considered as most transmissible and the only one that can be prevented by vaccination.[6]

The purpose of this study was to evaluate and compare the level of awareness and to assess the knowledge, attitude and practice among healthcare workers regarding the transmission and prevention of blood-borne pathogens, along with evaluating their hepatitis B vaccination status and anti-HBs antibody titre.

METHODS

A cross-sectional observational study was conducted over a period of two months from November 2023 to January 2024 in a tertiary care hospital. A total of 317 healthcare workers including resident doctors, nurses and medical technologists were included in the study. All healthcare workers including resident doctors, nurses and medical technologists working in the tertiary care hospital and willing to participate in the study were included after obtaining informed consent. Healthcare workers not willing to participate were excluded from the study. Data was collected using a pre-designed proforma consisting of demographic details and a structured questionnaire to assess knowledge, attitude and practice regarding transmission and prevention of blood-borne pathogens. Each correct response was given one mark and the scores were categorized into good, moderate and poor levels based on percentage scoring. Three millilitres of venous blood was collected from participants under aseptic precautions for estimation of anti-HBs antibody titre using ELISA. An anti-HBs titre of ≥10 mIU/ml was considered protective. Data were entered in Microsoft Excel and analysed using SPSS software. Chi-square test and ANOVA were used as statistical tests to assess association between variables. A p value <0.05 was considered statistically significant.

RESULTS

A total of 317 healthcare workers (HCWs) participated in the study, comprising 150 (47.3%) doctors, 107 (33.8%) nurses, and 60 (18.9%) technicians. Among them, 142 (44.8%) were male and 175 (55.2%) were female.

Table 1: Distribution of participants on sex by designation (n=317).

Sex		Designation		
		Doctors	Nurses	Technicians
Male	F	82	24	36
	%	54.7	22.4	60.0
Female	F	68	83	24
	%	45.3	77.6	40.0

Table 2: Distribution of participants on questions related to knowledge by designation and results of Pearson chi-square test.

Questions	Response		Designation			Chi-square
			D	N	T	
Hand hygiene is not compulsory if you are using sterile gloves	True (Wrong Answer)	F	30	37	21	χ^2=8.554 p=0.014
		%	20.0	34.6	35.0	
	False (Right answer)	F	120	70	39	
		%	80.0	65.4	65.0	
Vaccination is available against all Hepatitis viruses	True (Wrong answer)	F	5	31	30	χ^2=63.127 p=0.001
		%	3.3	29.0	50.0	
	False (Right answer)	F	145	76	30	
		%	96.7	71.0	50.0	
Recapping of the needle after its use is necessary because	Other responses (Wrong answer)	F	17	20	39	χ^2=70.197 p=0.001
		%	11.3	18.7	65.0	
	It is contraindicated (Right answer)	F	133	87	21	
		%	88.7	81.3	35.0	
Major risk of transmission of HIV, HBV and HCV in hospital is due to	Other responses (Wrong answer)	F	5	13	9	χ^2=10.221 p=0.006
		%	3.3	12.1	15.0	
	Needle stick injury	F	145	94	51	

Continued.

Questions	Response		Designation			Chi-square
			D	N	T	
	(Right answer)	%	96.7	87.9	85.0	
Post Exposure Prophylaxis (PEP) for HIV should be started preferably	Other responses (Wrong Answer)	F	14	20	44	χ^2=88.977 p=0.001
		%	9.3	18.7	73.3	
	Within 2 hours of exposure (Right answer)	F	136	87	16	
		%	90.7	81.3	26.7	
Hepatitis C is most commonly transmitted through sexual route	True (Wrong answer)	F	4	13	23	χ^2=49.478 p=0.001
		%	2.7	12.1	38.3	
	False (Right answer)	F	146	94	37	
		%	97.3	87.9	61.7	
Which virus carries the maximum risk of transmission through Needle stick injury?	Other responses (Wrong answer)	F	11	22	24	χ^2=31.739 p=0.001
		%	7.3	20.6	40.0	
	Hepatitis B (Right answer)	F	139	85	36	
		%	92.7	79.4	60.0	

Table 3: Distribution of participants on questions related to attitude by designation and results of Pearson chi-square test.

Questions	Response		Designation			Chi-square
			D	N	T	
Do you believe that wearing gloves is the only solution to prevent NSI	Disagree	F	135	95	48	χ^2=10.548 p=0.032
		%	90.0	88.8	80.0	
	Not Sure	F	5	3	0	
		%	3.3	2.8	0.0	
	Agree	F	10	9	12	
		%	6.7	8.4	20.0	
Do you believe that changing the gloves every time during blood collection is a waste of time?	Disagree	F	139	85	45	χ^2=18.737 p=0.001
		%	92.7	79.4	75.0	
	Not Sure	F	3	3	0	
		%	2.0	2.8	0.0	
	Agree	F	8	19	15	
		%	5.3	17.8	25.0	
Do you believe that all patients should be tested for HBV, HCV and HIV before they receive health care services?	Disagree	F	40	10	12	χ^2=16.007 p=0.003
		%	26.7	9.3	20.0	
	Not Sure	F	8	8	0	
		%	5.3	7.5	0.0	
	Agree	F	102	89	48	
		%	68.0	83.2	80.0	
Do you agree that Segregation of clinical waste is useful to prevent transmission of blood borne pathogen?	Disagree	F	1	1	3	χ^2=5.614 p=0.060
		%	0.7	0.9	5.0	
	Agree	F	149	106	57	
		%	99.3	99.1	95.0	
Do you believe PEP reduces the likelihood of being HIV positive?	Disagree	F	6	10	6	χ^2=7.096 p=0.131
		%	4.0	9.3	10.0	
	Not Sure	F	6	6	6	
		%	4.0	5.6	10.0	
	Agree	F	138	91	48	
		%	92.0	85.0	80.0	
What is your opinion on the belief that PEP is not important if the exposure is not with patient blood of known HIV/HBV positivity?	Disagree	F	87	46	15	χ^2=20.339 p=0.001
		%	58.0	43.0	25.0	
	Not Sure	F	12	10	6	
		%	8.0	9.3	10.0	
	Agree	F	51	51	39	
		%	34.0	47.7	65.0	

Continued.

Questions	Response		Designation			Chi-square
			D	N	T	
Do you believe that checking anti-Hbs titre is essential for health care professionals?	Disagree	F	0	4	12	χ^2=6.964 p=0.047
		%	0.0	3.7	20.0	
	Agree	F	150	103	48	
		%	100	96.3	80.0	
Do you believe that all forms of exposure to blood and body fluid should be reported to the concerned authority?	Disagree	F	14	2	3	χ^2=9.800 p=0.044
		%	9.3	1.9	5.0	
	Not Sure	F	7	1	3	
		%	4.7	0.9	5.0	
	Agree	F	129	104	54	
		%	86.0	97.2	90.0	

Table 4: Distribution of participants on questions related to practice by designation and results of Pearson chi-square test.

Questions	Response		Designation			Chi-square
			D	**N**	**T**	
Have you ever got screened for hepatitis B?	Yes	F	128	76	39	χ^2=13.899 p=0.001
		%	85.3	71.0	65.0	
	No	F	22	31	21	
		%	14.7	29.0	35.0	
Have you ever been exposed to any blood or body fluid or NSI while working in the hospital?	Yes	F	76	76	16	χ^2=30.991 p=0.001
		%	50.7	71.0	26.7	
	No	F	74	31	44	
		%	49.3	29.0	73.3	
If the answer to Q 2 is yes, did you take PEP after that?	Yes	F	46	39	10	χ^2=1.567 p=0.457
		%	60.5	51.3	62.5	
	No	F	30	37	6	
		%	39.5	48.7	37.5	
If you haven't taken PEP after that exposure, what was the reason for that?	Patient was not positive for HIV/HBV	F	22	20	4	χ^2=22.860 p=0.004
		%	73.3	54.1	66.7	
	I was unaware that PEP should be taken	F	5	5	0	
		%	16.7	13.5	0.0	
	PEP was not available	F	0	1	1	
		%	0.0	2.7	16.7	
	Didn't know whom to approach	F	3	11	0	
		%	10.0	29.7	0.0	
	I had fear in my mind	F	0	0	1	
		%	0.0	0.0	16.7	
If you had taken the PEP, did you complete the treatment for the prescribed period	Yes	F	37	19	4	χ^2=11.700 p=0.003
		%	80.4	48.7	40.0	
	No	F	9	20	6	
		%	19.6	51.3	60.0	
If answer to the Q 5 is NO, what was the reason for discontinuation of PEP before the prescribed duration?	Side effects were too much	F	3	6	2	χ^2=4.756 p=0.313
		%	33.3	30.0	33.3	
	Assuming that it is ok to stop PEP after few days	F	0	7	2	
		%	0.0	35.0	33.3	
	The patient turned out to be negative for HBV and HIV	F	6	7	2	
		%	66.7	35.0	33.3	

Knowledge assessment

Overall, 58.3% of HCWs demonstrated good knowledge regarding blood-borne pathogen transmission and prevention. Doctors showed significantly higher levels of good knowledge (82.7%) compared to nurses (51.4%) and technicians (10%) (p=0.001). Significant differences among professional groups were observed for awareness

regarding availability of hepatitis vaccines, needle recapping practices, risk of transmission through needle-stick injury, timing of HIV post-exposure prophylaxis (PEP), transmission routes of hepatitis C, and the pathogen carrying the highest risk of transmission following needle-stick injury ($p<0.05$ for all variables).

Attitude assessment

A positive attitude towards prevention of blood-borne pathogen transmission was observed in 78.7% of doctors, 76.6% of nurses, and 50% of technicians. Most participants agreed that segregation of clinical waste is useful in preventing transmission of blood-borne pathogens (95-99.3%). Additionally, 92%, 85%, and 80% of doctors, nurses, and technicians respectively believed that PEP reduces the likelihood of HIV infection following exposure. Significant differences in attitude were observed across professional groups regarding glove use, changing gloves between procedures, importance of anti-HBs titre assessment, reporting exposures, and the necessity of PEP when the source patient's infection status is unknown ($p<0.05$).

Practice assessment

Practice-related findings showed substantial variation among participants. Screening for hepatitis B had been performed by 85.3% of doctors, 71% of nurses, and 65% of technicians ($p=0.001$). Occupational exposure to blood, body fluids, or needle-stick injury was reported by 50.7% of doctors, 71% of nurses, and 26.7% of technicians ($p=0.001$). Among exposed HCWs, only 56.5% reported receiving PEP, and among those who initiated PEP, only 63.2% completed the prescribed course.

DISCUSSION

Knowledge

In our study, doctors demonstrated higher knowledge (82.7%) compared to nurses (51.4%) and technicians (10%) (Table 2). This is lower than the findings of Adinma et al, where 97% of doctors and 92% of nurses had good knowledge, and Asmr et al, where knowledge levels ranged from 86-93% among healthcare workers.[7,8] The markedly low knowledge among technicians in our study highlights lack of structured training and limited emphasis on infection control practices in this group.

Majority of healthcare workers correctly identified needle stick injury as the most common mode of transmission, which is consistent with findings by Beltrami et al, who reported occupational exposure as the primary source of blood-borne infections among healthcare workers.[9]

Knowledge regarding post-exposure prophylaxis (PEP), particularly timing of initiation, was significantly lower among technicians (26.7%) compared to doctors (90.7%) and nurses (81.3%). In comparison, Mathewos et al reported that only 50.8% of healthcare workers were aware of correct timing of PEP initiation.[10]

Awareness regarding unsafe practices such as needle recapping was also poor among technicians (35%) compared to doctors (88.7%) and nurses (81.3%). Jain et al reported that needle recapping accounted for 68.3% of needle stick injuries, highlighting its major role in occupational exposure.[11]

These differences may be attributed to the fact that training programs on standard precautions are more commonly conducted for doctors and nurses, whereas technical staff are often not included.

Attitude

With regard to attitude, 78.7% of doctors, 76.6% of nurses and 50% of technicians demonstrated a positive attitude (Table 3). This is higher than the findings of Abalkhail et al, where 61.5% of healthcare workers showed positive attitude, but lower than Al-Ahmari et al, where 88.2% of primary healthcare workers demonstrated positive attitude.[12,13]

Most participants in our study agreed on the importance of personal protective equipment and reporting exposure incidents. About 87.3% of healthcare workers agreed that PEP reduces the risk of acquiring infection, which is higher than the 55% reported by Aschale et al.[14]

However, a considerable proportion of participants (58% doctors, 43% nurses and 25% technicians) believed that PEP is not required if the source patient is not known to be infected. Similar findings were reported by Aschale et al, indicating a persistent misconception among healthcare workers.[14]

Workload was identified as a major barrier, particularly among nurses, where 74.8% reported difficulty in adhering to infection control practices due to time constraints. Similar observations have been reported in previous studies.[12,13]

Practice

Practice of standard precautions showed considerable variation. Hand hygiene compliance was high (>90%), which is comparable to findings by Ataro et al, where majority of healthcare workers reported good hand hygiene practices.[15]

Hepatitis B vaccination coverage in our study was 79.4%, which is higher than the 49.6% reported by Batra et al.[16] However, only 54% of participants had assessed their anti-HBs antibody titre, indicating poor monitoring of immunity status. Among those tested, 80% had protective antibody levels.

Occupational exposure was reported by 50.7% of doctors, 71% of nurses and 26.7% of technicians. Similar trends were observed by Asmr et al, where a significant proportion of healthcare workers reported exposure to blood and body fluids.[8]

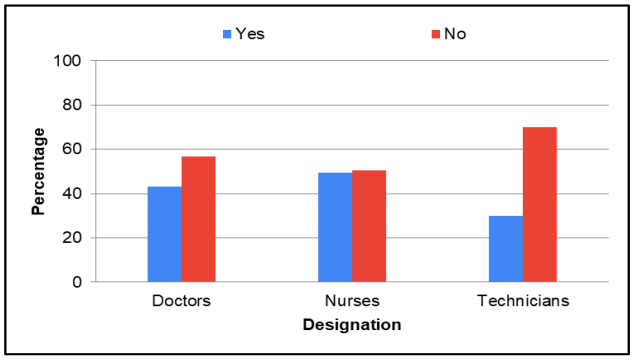

Figure 1: Percent distribution of participants based on whether they checked their anti-HBs titre value, categorized by designation.

Among exposed individuals, only 63% completed post-exposure prophylaxis. The most common reason for discontinuation was that the source patient tested negative. Similar findings have been reported by Aschale et al, where adherence to PEP was suboptimal.[14]

Unsafe practices such as needle recapping were still observed in 34% of healthcare workers. Studies by Rais et al, Smith et al and Hanafi et al have also reported needle recapping as a major contributor to occupational injuries, with incidence ranging from 19-68%.[11]

Training on biomedical waste management and standard precautions was mostly limited to initial induction, with absence of refresher training. Begum et al[15] demonstrated that structured training significantly improved knowledge and practice ($p<0.0001$). Notably, adherence to standard operating procedures was inconsistent, particularly among nurses, where 76.5% reported inability to follow protocols due to workload.

This study was conducted in a single tertiary care hospital, which may limit the generalizability of the findings to other healthcare settings. The assessment of knowledge, attitude and practice was based on self-reported responses and may be subject to recall and reporting bias. As this was a cross-sectional study, causal relationships could not be established. Additionally, actual compliance with standard precautions was not assessed through direct observation.

CONCLUSION

The present study highlights that although healthcare workers demonstrate relatively adequate knowledge and positive attitude towards transmission and prevention of blood-borne pathogens, significant gaps persist in implementation of safe practices, particularly among technical staff. Variations observed among different categories of healthcare workers indicate the need for targeted and structured interventions. Hepatitis B vaccination coverage was satisfactory; however, inadequate monitoring of anti-HBs antibody titres and suboptimal adherence to post-exposure prophylaxis reflect deficiencies in compliance with standard guidelines. Continued unsafe practices such as needle recapping further emphasize the gap between knowledge and practice.

Overall, strengthening training, surveillance and institutional support systems is necessary to bridge the gap between knowledge and practice and to reduce occupational exposure to blood-borne pathogens among healthcare workers.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee Lady Hardinge Medical College, New Delhi (Approval No. LHMC/IEC/2023/48)

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Cite this article as: Mudgil M, Mandal S, Jabakumar E, Gogoi S, Jais MB. Evaluation of knowledge, attitude and practice among different groups of health-care workers towards the transmission of blood-borne pathogens in a tertiary care hospital in Delhi. Int J Community Med Public Health 2026;13:3843-9.