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# A national level survey on knowledge, attitude and practices among Indian nurses on viral hepatitis

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## Abstract:

**BACKGROUND:** Despite being preventable and treatable, viral hepatitis remains a major public health problem in India. In the line of their duties, nursing professionals are constantly at risk of infection. To combat viral hepatitis, it is essential to ascertain the level of knowledge, attitude, and practices among nursing professionals.

**MATERIALS AND METHODS:** A descriptive cross-section study was conducted at a tertiary public hospital, as a nation-wide online survey after ethical clearance and participants' consent. A convenience sampling, from November 2021 to September 2022, yielded a total of 4532 nurses, nursing students and educators. A self-administered 62-item questionnaire on viral hepatitis with four sections: demographic details, knowledge (33-items), attitude (5-items), and practice (24-items) was prepared by expert panel and had a content validity and reliability >0.8. The scale was compiled onto the SurveyMonkey app, field tested before administration and widely circulated on email.

**RESULT:** The response rate of the survey was 77%. Frequency, percentage, and the odds ratio (at 95% confidence interval) were analyzed on SPSS v22.0. Majority were females (87.1%) aged <30 years (60%) with <5 years' experience (57.8%). Almost equal number worked in public or private sector and was holders of diploma (44.5%) or degree (43.8%). Overall poor knowledge (85.3%), unfavorable attitude (86.2%), and unsafe practices (55.6%) were exhibited by nurses; 42.2% encountered needle stick injury last year and 49.8% had never checked Anti-HBs titer. In the event of needle stick injury, 74.78% cleansed with soap and water; used antiseptics or washes (33.5%), placed finger in mouth (5.10%), forced wound bleed (17.3%), scrub wound (17.54%), or apply bandage (12.58%). Multivariate analysis of factors influencing knowledge of viral hepatitis was educational qualification, designation, and type of health facility.

**CONCLUSION:** As nursing professionals are constantly at risk, there is an urgent need to raise awareness about hepatitis, the post-exposure prophylaxis and vaccination status. Every healthcare facility should include training and capacity building for nurses about risk, prevention, transmission, and management of viral hepatitis, as an integral part of orientation and continuing education on-the-job; follow stringent policies; and set-up mechanisms for monitoring and follow up. Further, policymakers and statutory bodies need to ensure the standards of nursing practice and improve the health of nurses and their patients.

## Keywords:

Attitude, infection prevention, knowledge, nursing professionals, practices, vaccination, viral hepatitis

## Introduction

Despite being preventable and treatable, viral hepatitis still causes substantial morbidity and mortality worldwide. According to recent estimates, hepatitis B

or C infect about 354 million people globally and cause 1,100,000 deaths per year. Around 40 million are estimated to be chronically infected with hepatitis B and 6 to 12 million with hepatitis C in India<sup>[1]</sup> and the past decades have demonstrated an increasing trend.

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After the initial infection, viral hepatitis is often symptom free and goes undetected till significant cirrhosis, liver failure, or liver cancer develops. Thus, it is a silent, hidden epidemic and causes significant public health burden.<sup>[2,3]</sup>

The increasing burden of the disease and its silent nature warrants that viral hepatitis services have to be attributed a high priority in the healthcare system. Under the sustainable development goals,<sup>[4]</sup> one of the targets was to combat hepatitis globally. Subsequently, WHO<sup>[5]</sup> rolled out plans to eliminate viral hepatitis by 2030, setting a target of a 90% reduction in new infection and a 65% reduction in viral hepatitis-related mortality. Government of India too has committed to eliminate viral hepatitis through its flagship venture the National Viral Hepatitis Control Program.<sup>[6]</sup>

Yet, review of reports indicates a general lack of knowledge about viral hepatitis among healthcare providers (HCPs), the general public, and the population at-risk. A review in 2022 showed that the knowledge, attitudes, and practices of nurses in relation to Hepatitis B was limited and inconsistent, that may result in increased occupational exposure, poor vaccination coverage, and high incidence of hepatitis B among nurses.<sup>[7]</sup> Another study of 4,474 nursing professionals from 292 institutions across 12 states of India found that participants had poor knowledge ( $19.3 \pm 4.4$  in pre-test) regarding viral hepatitis and its transmission which significantly ( $P$  value  $<0.001$ ) improved after a one day training ( $25.7 \pm 3.9$  in post-test).<sup>[8]</sup> The study also assessed the impact of the training, which revealed that on a regular basis 82.0% of the participants initiated the use of personal protective equipment's; 97.9% adopted safe injection practices; 83% advised about HBV vaccination, and 79.8% for family screening.<sup>[8]</sup> This can become a major roadblock in eliminating viral hepatitis. The critical role of HCPs who are at the forefront in the fight against viral hepatitis is sometimes forgotten.<sup>[9]</sup> Optimization of HCPs' capacity has to become integral to the fight for two main reasons: firstly, for HCPs to protect themselves and their patients from infection, HCPs and their patients are at risk for exposure to infected blood or body fluids and therefore vulnerable to infection. Hence, HCPs represent a high-risk population too. Globally, it is seen that prevalence of hepatitis in HCPs is higher than in the general population and risk of acquiring infection after percutaneous exposure to infected blood is also high (6-30%). India with intermediate endemicity of HBV,<sup>[1]</sup> HCPs risk for exposure is high. This occupational hazard is totally preventable by stringently following the standard universal precautions in caregiving and post-exposure prophylaxis in the event of an accidental exposure.<sup>[10]</sup>

Secondly, it enables HCPs to provide appropriate hepatitis services to patients and their contacts including identification of people at risk and test for chronic infection in patients and their contacts.<sup>[11]</sup> Improved understanding of risk factors for acute and chronic infections, lead to screening that increases identification of cases, increased use of preventive measures, increased vaccination of at-risk people, and this in turn can reduce the burden of chronic viral hepatitis.<sup>[12]</sup> HCPs lack of understanding can lead to missed opportunities to educate patients about prevention of hepatitis or sharing incorrect information or failing to provide knowledge.<sup>[9]</sup>

There is an urgent need for evidence-based strategies and programs to eliminate viral hepatitis. Studies that yield knowledge generation are required to improve standards of nursing practice and the health of nurses and their patients. Assessment of gaps in knowledge, attitude, and practices of nursing professionals can help to plan and outline actions based on scientific evidence and extensive real-world experience that can serve as a roadmap for eliminating viral hepatitis.<sup>[13]</sup> Hence, a descriptive cross-sectional study was conducted to assess knowledge, attitude, and practices of nursing professionals' regarding viral hepatitis prevention and management.

Aim of the current study was to examine the knowledge, attitude, and practices related to viral hepatitis among nursing professionals employed throughout India using an e-survey.

## Materials and Methods

### Study design and setting

CHERRIES reporting guidelines were followed for reporting this study.

Design a descriptive cross-sectional design was used with a large-scale e-survey.

### Study participant and sampling

Study participants included healthcare providers primarily nurse, nursing students, and nurse educators with different educational background. A convenience sampling was used to recruit the participants.

### Data collection tools and technique

Scale A predefined self-administered survey on viral hepatitis, modes of transmission, prevention, vaccination status, and management was designed. The literature was reviewed by an expert panel to become familiar with existing published work for constructing the survey. The multidimensional scale consisted of 62-item starting with items on demographics. The 33-item knowledge questions followed the multiple-choice format. Likert

type attitude scale with 5-items of 5 responses for each ranging from strongly disagree to strongly agree was used. The 24-items on practice had critical items on reported practices of the participants. Once the items were written, the individual items were compiled onto the SurveyMonkey app, made visually appealing, and giving clear instructions on how to complete the items. The survey had 72 items distributed on 06 pages, with items were grouped into major subject areas to aid the thought process and memory.

### Scoring

The widely adopted Bloom's cut-off points were followed to categorize the overall scores of knowledge, attitude, practice items as high/positive/good (80-100%), moderate/neutral/fair (60-79%), and low/negative/poor ( $\leq 59.0\%$ ), respectively. The validity of the tool was established by 7 experts in the field and the reliability was found to be 0.81.

The survey took 15-20 minutes to fill and was tried out on the target group and then revised. The pilot test helped finalize the data plan. Data were collected online from November 2021 to September 2022. A notice regarding the study was circulated widely on the social media platforms. A brief, simple letter thanking the subject and explaining the purpose of the survey, why they were chosen, and why their participation was important to the study was sent along with the consent form with the link to the survey on SurveyMonkey. No timeframe was fixed for filling the form. The participants were followed-up by telephone, if surveys were left out after being viewed or incompletely filled. The filled data sheet was checked on a regular basis. Only completed questionnaires were included for the analysis.

Data of the 4532 online survey were stored automatically. It was double checked, duplicates removed and then coded. With regard to intent to treat missing responses or avoid incomplete survey, the survey form was created on the SurveyMonkey to move sequentially to the next item, only on completion of previous item. The response rate was calculated as the number of people who answered the survey divided by the number of people to whom the survey was sent to, multiplied by 100. A response rate of 70% was considered adequate for generalizability to the target group. Hence, no statistical correction was deemed necessary.

Data were analyzed using SPSS version 22. The data were normally distributed (assessment indicated only minor skewness), subsequently analyses were conducted with *P* value set at less than 0.05 significance. Descriptive statistics like frequencies and proportions were used to summarize the data. Multivariate analyses were used to examine the relationship between the outcome

variables (mean knowledge, attitude, and practice) and selected socio-demographic factors. Adjusted odds ratios (AOR) at the 95% confidence intervals (CIs) were used as indicators of the strength of association.

### Ethical consideration

The study was reviewed by the Institutional Ethics Committee and was conducted after obtaining written informed consent from study participants. The consent stated the purpose, details of the study, and the length of survey. No personal information was collected, the collected data was anonymized, and stored in password protected files to avoid unauthorized access, and to maintain confidentiality of the participants.

## Result

### Characteristics of nursing professionals

From Table 1, results of the survey show that 60% of nursing professionals were below 30 years of age and majority were females (87.1%). Most of them were either nursing diploma (44.5%) or degree holders (43.8%). Majority (67.7%) were clinical nurses, 25.5% were currently unemployed, or students and 6.6% were educators. More than half of them (57.8%) had experience of less than 5 years as healthcare providers. Almost equal percentages of them worked in public and private institutes.

Figure 1 shows that a total 42.2% nursing professionals had encountered needle stick injury last year and around half (49.8%) had never checked their Anti-HBs titer. Majority (94.8%) reported that the information on biomedical waste disposal was widely displayed in their facility and had undergone training (82.7%) on post-exposure prophylaxis protocols. Most of them (84.5%) expressed that they had not attended any training program on viral hepatitis apart from their nursing curriculum.

### Nursing professional's knowledge about viral hepatitis

Knowledge scores [Table 2] were categorized into three categories based on modified Bloom criteria. Result shows that majority (85.3%) had low knowledge level, 13.9% had moderate, and 0.8% had high knowledge related to viral hepatitis. Overall mean knowledge score was  $15.38 \pm 3.98$ .

From Table 3, it can be seen that the domain-wise scores of knowledge were less than 50% in each domain.

### Nursing professionals' attitudes toward viral hepatitis

In terms of attitude (refer Table 2 and Figure 2), 62.8% of nursing professionals had neutral attitude, 23.4%

negative attitude, and 13.8% positive attitude. About 34.7% felt that HCPs can infect patients with hepatitis B or C even after following all necessary precautions, 25.5% stated that HCPs with HBV /HCV-positivity should not provide patient-care, 32.4% expressed that after exposure to contagious fluid/material vaccine reduces likelihood of being HBV-positive, majority (78%) agreed that HBV vaccine be made compulsory for everyone and 72.2% agreed that vaccination against hepatitis B could prevent transmission.

### Nursing professionals' practices related to viral hepatitis

The expressed practices of nursing professionals [refer Table 2] show that 23.9% poor practices, 31.7% had fair practices and 44.4% had good practices. The item analysis

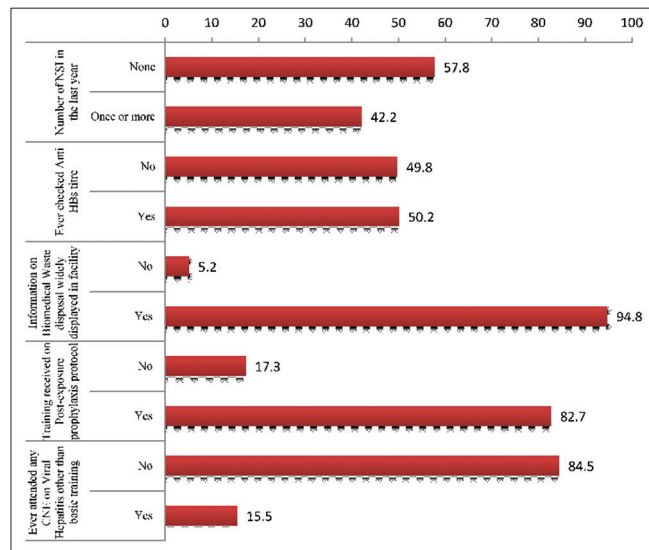


Figure 1: Characteristics of nursing professionals

of practices [refer Table 4] shows that about 6.35% of them avoid caring for patients diagnosed with hepatitis B/C and use antibiotics (10.46%) after contact with an infected patient to reduce risk. Around 37.75% nurses reported not practicing hand hygiene before and after donning or doffing of personal protective equipment (PPE) and 37.27% did not perform hand hygiene after contact with surfaces, equipments, and medical devices. About 57.2% nursing professionals reported not keeping their fingernails short. On exposure to blood, body fluids or needle stick injury, 74.78% expressed washing the site with soap and water, while use of antiseptics or skin washes by 33.5%, putting pricked finger in mouth (5.10%), squeezing wound to bleed (17.3%), scrubbing wound or exposed area (17.54%), and applying band-aid (12.58%). Surprisingly, 5.54% reported doing nothing about exposures. A 31% of nursing professionals felt no need to change the gloves between patients, as long as there is no visible contamination.

### Factors influencing knowledge, attitude, and practice related to viral hepatitis

Multivariate analysis examined the factors influencing knowledge of viral hepatitis [refer Table 5]. Educational qualification, designation, and type of health facility were found to associate with knowledge. Clinical nurses were 3.25 times more likely to have good knowledge compared to students ( $CI\ 1.95-5.39, P = 0.001$ ) and being educators were 2.26 times more likely to have good knowledge compared to students ( $CI\ 1.27-4.02, P = 0.006$ ). Nurses working in public sector were 1.42 times more likely to have good knowledge compared to those in private sector ( $CI\ 1.19-1.68, P = 0.001$ ). Where information on biomedical waste disposal available in facility 1.83 times better knowledge ( $CI\ 1.10-3.04, P = 0.02$ ), also those ever

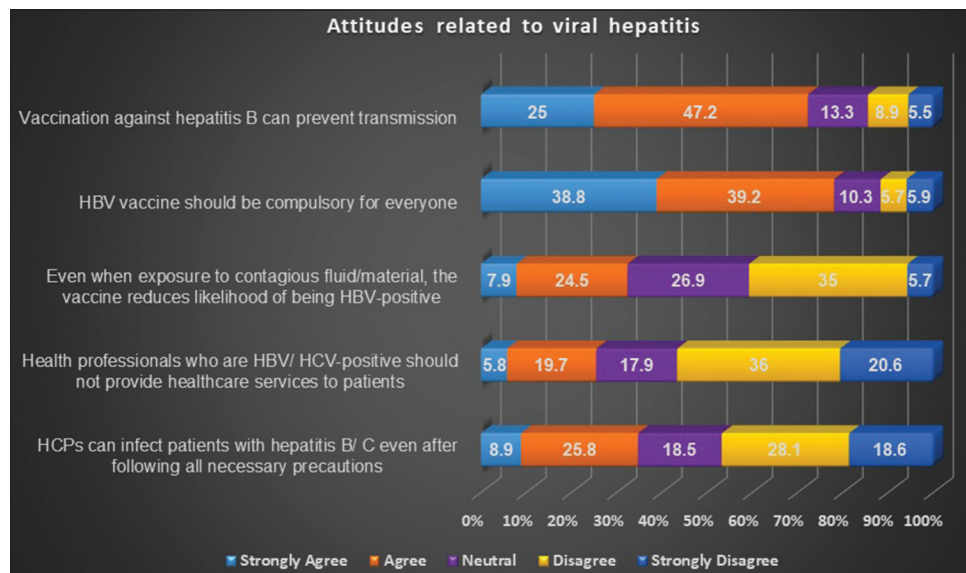


Figure 2: Attitudes of nurses towards viral hepatitis

**Table 1: Demographic characteristics of nursing professionals**

Demographic Characteristics		Frequency	n=4532 Percentage
Age in complete years	<30	2751	60.7
	30-45	1665	36.7
	>45	116	2.6
Gender	Male	583	12.9
	Female	3949	87.1
Qualification	ANM	189	4.2
	GNM	2017	44.5
	BSc Nursing	1983	43.8
	Higher degree in Nursing	343	7.6
Designation	Currently unemployed/students	1163	25.7
	Clinical Nurses	3068	67.7
	Educators	301	6.6
Years of experience as HCP	<5	2621	57.8
	5-10	919	20.3
	10-15	868	19.2
	>15	124	2.7
Type of health facility	Private	2043	45.1
	Public or Government	2489	54.9

**Table 2: Knowledge, attitude, and practice of nursing professionals regarding viral hepatitis**

Variables	Levels	Frequency	Percentage	Mean	SD	n=4532 Mean Percentage	
Knowledge	Low (Score 0-60)	3866	85.3	15.38	3.98	46.61	
	Min-Max	Moderate (Score 61-80)	632				13.9
	0-33	High (Score 81-100)	34				0.8
Attitude	Negative (Score 0-60)	1059	23.4	17.39	3.15	69.58	
	Min-Max	Neutral (Score 61-80)	2847				62.8
	5-25	Positive (Score 81-100)	626				13.8
Practice	Poor (Score 0-60)	1083	23.9	18.02	3.97	75.09	
	Min-Max	Fair (Score 61-80)	1438				31.7
	0-24	Good (Score 81-100)	2011				44.4

**Table 3: Domain-wise knowledge of nursing professionals regarding viral hepatitis**

Domains	Range	Mean	SD	Mean Percentage	n=4532 Rank
General (Min-Max score: 0-4)	0-4	1.50	0.97	37.49	IV
Transmission and Clinical manifestations (Min-Max score: 0-6)	0-6	2.99	1.28	49.86	I
Diagnosis and Treatment (Min-Max score: 0-9)	0-9	4.25	1.45	47.22	III
Infection Prevention and Control (Min-Max score: 0-14)	0-14	6.64	2.16	47.44	II

trained about the post-exposure prophylaxis protocol had 1.37 times better knowledge ( $CI\ 1.08-1.74, P = 0.009$ ). No factors were seen influencing attitude and practice.

## Discussion

The current e-survey examined the knowledge, attitude, and practices related to viral hepatitis among 4532 nursing professionals employed across India. Some of the critical elements included: majority of nursing professionals had poor knowledge and unfavorable attitude toward viral hepatitis; and the expressed practices were unsafe in more than half.

The overall knowledge about viral hepatitis among majority of nursing professionals (99.2%) was inadequate (poor-moderate). Most published surveys showed that knowledge about the diseases is sparse<sup>[14]</sup>; study among 4920 nurses showed lack of awareness of various aspects of hepatitis; another reported average knowledge among nurses.<sup>[15]</sup> Several other studies<sup>[16-23]</sup> too documented that various HCPs lacked adequate knowledge about viral hepatitis. The deficient knowledge may be attributed to the fact that most of them (84.5%) had not attended any continuing education on viral hepatitis apart from their nursing curriculum, and not cognizant of its prevalence rates in the Indian population.

**Table 4: Item analysis of expressed practices contributing to viral hepatitis prevention**

Practice Item	Response	Yes		n=4532 No	
		Frequency	Percentage	Frequency	Percentage
Measures taken by you to reduce the risk of hepatitis infection due to occupational hazards	I ensure wearing of PPE	2741	60.48	1791	39.52
	I always perform hand hygiene	3153	69.57	1379	30.43
	I dispose bio-medical waste in color-coded bins/containers	3079	67.94	1453	32.06
	I avoid caring for patients with hepatitis B	288	6.35	4244	93.65
	I use antibiotics after contact with an infected patient	474	10.46	4058	89.54
To reduce the transmission, you perform hand hygiene	I am vaccinated against hepatitis B	2673	58.98	1859	41.02
	Before and after contact of each patient	3610	79.66	922	20.34
	After contact with environmental surfaces and equipment/medical devices	2843	62.73	1689	37.27
	Before and after donning and doffing PPE	2821	62.25	1711	37.75
	I perform hand-hygiene as is convenient	852	18.8	3680	81.2
Measures will you take if you are exposed to blood, body fluids or needle stick injury	Keeping fingernails short/avoid artificial nails, nail extenders, and nail decorations	1849	40.8	2683	59.2
	I perform hand-hygiene as and when I remember	497	10.97	4035	89.03
	Use antiseptics or skin washes	1518	33.5	3014	66.5
	Thorough washing site with soap and water	3389	74.78	1143	25.22
	Put pricked finger in mouth	231	5.10	4301	94.90
	Squeeze wound to bleed it out	784	17.3	3748	82.70
	Scrub the wound or area of exposure	795	17.54	3737	82.46
Advices you give to family members of hepatitis B and C positive patients	Apply band-aid	570	12.58	3962	87.42
	Don't do anything	251	5.54	4281	94.46
	Family screening for hepatitis B and C	3428	75.64	1104	24.36
	Vaccination against hepatitis B	3095	68.29	1437	31.71
You do not change gloves between patients as long as there is no visible contamination	Anti-HBs titer check	2352	51.9	2180	48.10
	No special advice is required to be given	78	1.72	4454	98.28
		3128	69.0	1404	31

Furthermore, nursing professionals with higher educational qualifications were found to have better knowledge regarding hepatitis as observed in other studies too.<sup>[24]</sup> Nurses working in the clinical areas were found to have better knowledge as compared to student nurses (OR3.25, CI 1.95-5.39,  $P = 0.001$ ). In line with a study,<sup>[14]</sup> those employed in government sector had better knowledge than those in private sectors (OR 1.42, CI 1.19-1.68,  $P = 0.001$ ). Additionally, nurses who had ever been trained or informed on post-exposure prophylaxis protocol had better knowledge (OR 1.37, CI 1.08-1.74,  $P = 0.009$ ), as did those who were provided informational material on specific waste disposal in their health facilities (OR 1.83, CI 1.10-3.04,  $P = 0.02$ ). The finding attributes to the fact that clinical experience as well as regular update trainings raise knowledge.<sup>[8,14]</sup> In the context of viral hepatitis, all healthcare personnel, including nursing professionals, are considered high risk. Their capacity to care for individuals with viral hepatitis may be hampered by a lack of understanding among the Nurses. Moreover, an inadequate understanding can induce stress and anxiety when caring for people who are considered infectious as was the case during the initial stages of the COVID-19 pandemic,<sup>[25-27]</sup> affecting the quality of care provided by healthcare staff. It is

therefore critical that nursing professionals' receive effective training and continuing education programs for updated information on viral hepatitis so that they can support their patients' education and information needs appropriately.

In the present study, only 13.8% of the nursing professionals had an overall positive attitude toward prevention and control of viral hepatitis. Some of the other striking findings regarding HBV vaccination were: only 32.4% of nurses felt that HBV vaccine was effective in preventing HBV following exposure to infected fluid or material; however, 72.2% agreed that vaccination is an important preventive measure against hepatitis B transmission; and 78% agreed that everyone must compulsorily receive the HBV vaccine. The lack of adequate knowledge among the majority of HCPs in this study may have contributed to their negative attitudes concerning viral hepatitis.

In terms of their reported practices, this study revealed surprising results with only 58.98% of nursing professionals vaccinated against HBV, and 49.8% were not sure of their immunization status, despite being aware of availability and having access to vaccination.

**Table 5: Multivariate analysis of the predictors of knowledge of nursing professionals**

Variables		Odds Ratio	95% CI		n=4532 P
Age	<30	Ref			
	>30	0.86	0.67	1.09	0.218
Gender	Male	Ref			
	Female	1.25	0.99	1.59	0.063
Years of experience	<5 years	Ref			
	5-10 years	0.90	0.71	1.15	0.409
	10 years and above	1.03	0.77	1.39	0.818
Education qualification	ANM	Ref			
	GNM	2.38	1.27	4.48	0.007
	BSc Nursing	4.29	2.28	8.06	<0.001
	MSc Nursing and above	5.05	2.51	10.17	<0.001
Designation	Currently unemployed/students	Ref			
	Clinical Nurses	3.25	1.95	5.39	<0.001
	Educators	2.26	1.27	4.02	0.006
Institute	Private	Ref			
	Government	1.42	1.19	1.68	<0.001
Specialty	Mono specialty	Ref			
	Multi-specialty	1.18	0.98	1.42	0.087
Functional IPC committee in hospital	No	Ref			
	Yes	1.23	0.95	1.59	0.123
Posters displayed regarding specific waste disposal container	No	Ref			
	Yes	1.83	1.10	3.04	0.02
Ever trained/informed about the Post-exposure prophylaxis protocol	No	Ref			
	Yes	1.37	1.08	1.74	0.009

Similar findings were published,<sup>[23]</sup> where only 44% of HCPs demonstrated an overall favorable attitude while only 23.4% had received at least one dose of vaccine. Other studies also showed comparable results with unfavorable attitudes toward HBV vaccination and low coverage rate.<sup>[22,24,28,29]</sup> Such unfavorable attitudes can be detrimental to nurses' them self, in that they can be negligent or careless; and for patients they care, neglecting the need to get vaccinated. There may be many reasons for refusing to vaccinate, apart from the unfavorable attitude of nurses. Further researches are needed to explore the potential obstacles to HBV vaccination. The authors of the current study stress the steadfast and immediate necessity for a nationwide drive against hepatitis B vaccination among all healthcare professionals, to meet<sup>[5]</sup> WHO recommendations on HBV vaccination. Besides, tests that may be used to determine everyone's immunization status must be made available in addition to the vaccination itself. Healthcare facilities must be held accountable for making sure that all healthcare workers are inoculated against hepatitis B and that they all maintain the necessary records describing the specifics of each employee's immunization and vaccination history. Furthermore, retaining such information should be made a mandatory requirement for any healthcare facility seeking accreditation. We must learn from the devastating COVID-19 pandemic, in which the goal of mass immunization against Coronavirus was met owing to the determined efforts of the authorities in

power. A similar campaign must be launched to attain 100% coverage of hepatitis B immunization among healthcare providers.

On an item-wise analysis of attitude, other significant conclusions were drawn from the findings: 25.5% felt that HCPs who were HBV and HCV-positive should not provide healthcare services to patients and 34.7% asserted that HCPs can transmit hepatitis B and C even after taking all reasonable precautions. Contrary to this attitude, a vast majority of the nursing professionals (93.65%) did not report any hesitancy in caring for hepatitis B or C patients. However, these findings are inconsistent with the results of several studies done across the globe, which found that in healthcare settings, negative attitude took the form of being overly cautious, postponing or avoiding procedures, task-shifting, and violations of confidentiality.<sup>[30-33]</sup> This contradicting attitudes might be partly due to social desirability where nursing professionals selected options that were professionally and socially acceptable.

The expressed practices too revealed gaps in the standard infection control practices, with 37.75% of the nursing professionals failing to practice hand hygiene prior to donning or doffing PPE; 37.27% failed to do so following contact with surfaces, equipment, or medical devices; and 57.2% did not trim their fingernails. Nearly, 70% expressed that when there is no obvious contamination,

it was not necessary to change the pair of gloves between patients. These poor practices among the nurses under study may be justified by their inadequate knowledge and unfavorable attitude. Several earlier studies discovered a strong relationship between insufficient understanding, a negative attitude, and ineffective practices.<sup>[8,14]</sup> Knowledge, attitude, and practices are all interconnected. Knowledge about a condition contributes to the development of positive attitudes, and individuals' cognition and attitudes about a disease influence practices to some extent.

In the current study, in the event of needle stick injury (NSI), the practices included: cleansing of site with soap and water by 74.78%; use of antiseptics skin washes (33.5%) and placing pricked finger in mouth (5.10%), forcing wound bleeding (17.3%), scrubbing exposed area (17.54%), or applying bandage (12.58%). Additionally, 5.54% did nothing in response to exposures and above findings were reported among nurses.<sup>[15]</sup> Even though just a small percentage of nursing professionals reported inappropriate practices, they must be avoided as they increase the risk of transmission of deadly viruses.<sup>[12]</sup> Hence, the study recommends training for the nurses on prevention and management of NSI. Furthermore, one-time training may not be sufficient; nursing professionals must attend conferences, seminars, and other educational program on hepatitis and its prevention on a regular basis to keep their skills and knowledge up to date.

This result dovetailed a lack of difference between knowledge, attitude, and practices of nurses as it was deficient in all these areas. Nursing professionals were among the most vulnerable as in the line of duty, they frequently encounter accidental contact with infected blood or body fluids via muco-cutaneous or percutaneous pathways. Ignorance about viral hepatitis and negligence in use of standard precautions in patient care increases risk for contracting viral hepatitis.<sup>[34]</sup> Additionally, negative attitudes have a number of deleterious effects impairing patients' screening, diagnosis, and treatment.<sup>[33]</sup> Thus ignorance, misconception and negligence about hepatitis can impede prevention and treatment efforts.

### Strengths and recommendation

This strength of the study lies in its large sample from 31 states and union territories of India reported at 95% confidence interval around the data. The pretested questionnaire was valid and reliable. Response rate was 77%, a rate considered good for e-survey research. There were no incentives provided to nurses to take part in survey. The CHERRIES guidelines were followed in reporting the study.

Limitation of the study the main limitation is, a self-reported questionnaire was used and participants may have provided socially-professionally acceptable responses. The fact that nurses voluntarily participated; those who were motivated self-selected themselves into the study. As a result, the attitude and practices may not be typical of all nurses nationwide. In addition, a possible bias as a result of the non-response rate of 23% may be considered.

## Conclusion

Substantial gaps were seen in nurses' knowledge, attitudes, and practices on hepatitis. The inadequate adherences to guidelines warrant periodic training and monitoring. As nursing professionals are always at risk, there is an urgent need to increase awareness, post-exposure prophylaxis and raise vaccination status. Further, healthcare organizations across India need to ensure strict compliance of standard precautions, availability of vaccines, PPE, and PEP during all working hours. Establishment of dedicated monitoring unit within the hospital could be a step in the right direction.

### Participant's consent

Informed consent of the participants was obtained at the time of data collection as the first page of the survey included a brief paragraph about the participation in the study and consent.

### Ethics committee clearance

This research was undertaken as a part of outreach activity. However, ethical clearance was obtained from Institute Ethics Committee (IEC) of ILBS via no. IEC/2021/84/MA05.

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### Conflicts of interest

There are no conflicts of interest.

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