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Original Research Article

Assessment of knowledge and practice of nurses regarding infection prevention and associated factors at Maharana Bhupal Government Hospital, Udaipur, Rajasthan, India

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ABSTRACT

Background: Healthcare-associated infections (HAIs) are common complications during medical care. Poor infection prevention practices significantly contribute to the spread of various diseases, particularly in healthcare settings. Effective infection prevention and control (IPC) measures are crucial to protect patients and healthcare workers (HCWs). This study aims to assess nurses knowledge, adherence to infection prevention and associated factors at Maharana Bhupal government hospital, Udaipur.
Methods: It was a hospital based cross-sectional study conducted among 219 nurses for a period of 3 months after IEC approval. A stratified random sampling technique with a pre-tested structured self-administered questionnaire was used to collect data. A multivariable logistic regression model was fitted to identify factors associated with the knowledge and practice of nurses regarding infection prevention.
Results: The study shows that overall knowledge and practice of nurses regarding infection prevention are 60% and 58.4% respectively. Older age, more work experience, and higher levels of education were strongly linked to both knowledge and practice of infection prevention. In-service training, access to infection prevention supplies and compliance with its guidelines were found to be associated with better practices.
Conclusions: More than half nurses had good knowledge and practices. Knowledge and practice were linked to work experience, training, and education level. Adherence to national protocols is crucial, and policy makers should offer training to improve infection prevention. Future research should include qualitative studies.

Keywords: Hospital, Nurses, Infection, Knowledge, Practice, Associated factors

INTRODUCTION

Healthcare-associated infections (HAIs) occur when patients contact infections while receiving medical or surgical treatment. These infections are prevalent complications during healthcare delivery and are frequently linked to the overuse of antibiotics, leading to the emergence of multidrug-resistant organisms.[1]

Globally, over 400 million individuals are afflicted with chronic hepatitis B virus (HBV) infection due to insufficient infection prevention measures. Annually, up to one million deaths occur as a result of HBV-related illnesses.[2]

In healthcare settings, infections have the potential to transmit from healthcare providers (HCPs) to patients, patients to HCPs, patients to patients, and HCPs to HCPs. HAIs pose a significant challenge within the global healthcare delivery system.[3]

In healthcare settings, maintaining IPC measures is essential and ongoing to protect both patients and HCWs from the spread of infectious diseases.[4]

Data collected through surveillance from 2004 to 2013 across 40 hospitals in India indicated a combined prevalence rate of 5.1 cases of central line-associated bloodstream infections (CLABSI) per 1000 central line days and 2.1 cases of catheter-associated urinary tract infections (CAUTI) per 1000 catheter days. In a study of 2019, single-centre study in India reported a pooled CLABSI rate of 4.3 per 1000 central line days.[5,6]

Over the past years, governmental efforts like Kayakalp have been directed towards enhancing and advocating for cleanliness, hygiene, waste management, and infection control practices within public healthcare facilities in India.[7]

Prior research has attempted to evaluate the understanding and implementation of infection prevention practices among HCWs and factors related to it. However, there is a gap in addressing the knowledge and practices specifically among nurses, who bear the great workload in healthcare activities, concerning infection prevention and associated factors.[8-10]

Objectives

Objectives were to assess the level of knowledge among nurses regarding infection prevention protocols at Maharana Bhupal government hospital, to assess the adherence of nurses to infection prevention practices. and to identify factors influencing nurses knowledge and practices regarding infection prevention.

METHODS

Study design

Hospital based cross-sectional study.

Study setting

Maharana Bhupal government hospital, R. N. T. medical college Udaipur, Rajasthan, India.

Study population

Nurses working in Maharana Bhupal government hospital were selected.

Sample size

It is calculated by using formula for cross-sectional study.

$N=Z^2 PQ/L^2$

Where, Z=1.96, P=Prevalence, Q=1-P, and L=Precision based on previous study by Desta et al on the level of knowledge and practices of nurses regarding infection prevention higher proportion was considered and demonstrated that the proportion of nurses with good knowledge regarding infection prevention was 84.7% with a confidence level of 95%, 5% margin of error, and 10% non-responsive rate, final sample size will be 219.[9]

Study subjects

All nurses working in Maharana Bhupal government hospital were selected.

Inclusion criteria

Registered nurses working at Maharana Bhupal government hospital, Udaipur and nurses who were present during the study period and consented to participate were included.

Exclusion criteria

Nurses who were on long leave or unavailable during data collection, administrative staff or other HCWs not directly involved in patient care and participants who declined consent were excluded.

Sampling technique

Stratified random sampling technique used.

Data collection

By questionnaire filled by google form and some face-to-face interview.

A predesigned, pre-tested and semi-structured questionnaire was used to know about their knowledge and practice. Nurses' knowledge of infection prevention was assessed by 15 questions. A scoring system was utilized in which the respondents correct and incorrect answers provided for the questions were allocated "1 and 0" points, respectively.

Knowledge scores were summed up to give a total knowledge score for each respondent. Respondents who scored the mean and above were knowledgeable and those who scored below mean were not knowledgeable.

The nurses' practice regarding infection prevention was measured by 11 questions. A scoring system was utilized in which the respondents correct and incorrect answers provided for the questions were allocated "1 and 0" points, respectively. Respondents who scored mean and above were classified as good practice and those who scored below the mean were classified as poor practice.

Ethical considerations

Potential participants was informed the purpose of study and written informed consent was taken without any persuasions by investigator. Participants had freedom to execute voluntary acceptance or refusal for study at any stage. Confidentiality and importance of responses was conveyed to them. Preventive corrective measures was

informed to the subjects and attendants immediately after collecting data from them. The study was carried forward only after approval from institutional ethics committee.

Study period

After IEC approval the data was collected for 3 months from October 2024 to December 2024.

Data coding

The data collected was categorized according to different variables and further categorized data will be entered on a master chart created in MS excel 2021 (Office 365, Microsoft Company Ltd., USA).

Statistical methods used

All collected data was entered in Microsoft excel 2021 and analyzed by SPSS version 25. Descriptive statistics was used for qualitative data mean; SD will be calculated. Qualitative data rate, percent was calculated.

RESULTS

Socio-demographic characteristics of nurses

The study included a total of 219 participants. The mean (SD) age of the nurses was 41.76±9.3, predominantly aged between 31-40 years (60.7%), with a majority being female (65.8%) and nearly equal distribution between urban (50.7%) and rural (49.3%) residents. Most participants were Hindu (86.7%), followed by Jain (5%), Muslim (4.5%), and Christian (3.7%). A significant proportion held a diploma-level education (86.8%), were married (96.3%), and belonged to joint families (62.1%). In terms of work experience, 74.4% had more than 10 years of service. Most worked in the morning shift (67.1%), with 31.1% rotating through all three shifts. Notably, 90.4% had received training in infection prevention, with 87.2% having training duration less than one month. Participants were primarily employed in OPD (44.7%) and ward settings (43.8%), with only 11.4% in ICU. The vast majority were permanent staff (88.1%), and only 11.9% held contractual positions (Table 1).

Knowledge of the nurses regarding infection prevention

A majority (54.8%) correctly identified multiple common routes of transmission-direct contact, droplet, and airborne-as pathways for infection spread. Most participants (86.8%) reported awareness of safety precautions, and 89.4% confirmed the presence of an IPC team in their work area. Infection prevention guidelines were available in 95.4% of the workplaces, while personal protective equipment (PPE) was reportedly available at all times for 82.6% of participants. A significant number (91.3%) agreed that disinfection helps prevent HAIs, and 92.7% stated that chemical sterilization is routinely used for equipment. Knowledge regarding post-exposure prophylaxis (PEP) for needle-stick or body fluid exposure was high (90.4%), as was awareness about biomedical waste management (87.2%). Hand hygiene was recognized as the most effective infection prevention method by 70.8% of participants. Furthermore, 96.3% agreed that protective clothing helps minimize HAIs. Regarding handwashing practices, 56.6% cited a minimum duration of 20 sec while 37.9% preferred 60 seconds. Almost all participants (98.2%) believed that reusable medical equipment should be disinfected after each use. Lastly, 94.5% correctly identified purpose of isolation precautions as preventing the spread of infections to others. The overall knowledge of nurses about infection prevention was 60.7% (Table 2).

The practice of nurses regarding infection prevention

A high proportion (86.3%) reported using alcohol-based hand rubs after sample collection, and 81.7% practiced hand hygiene after contact with blood, body fluids, or contaminated items. Sharp materials were properly discarded in safety boxes by 94.5% of respondents, and 83.1% wore masks during sputum sample collection and processing. However, 43.8% admitted to recapping needles before disposal, a practice contrary to safety guidelines. Most participants (92.7%) wore gloves properly before collecting samples, and 84% used aprons when body fluid splashes were expected. Vaccination coverage for HBV was reported by 68.9% of the respondents, and 85.8% were vaccinated against other common pathogens. Notably, 23.7% admitted to eating or drinking in their work area, which poses a risk of infection transmission. Regarding decontamination practices, responses varied: 51.1% soaked contaminated equipment in 0.5% chlorine solution for 10 minutes, while 25.1% and 23.7% reported soaking for 24 hours and 1 hour, respectively. The Overall practice regarding infection prevention is 59.8% (Table 3).

Factors associated with nurses knowledge regarding infection prevention

Out of the diploma holders (n=190), 113 (59.5%) nurses demonstrated adequate knowledge, while 77 (40.5%) had inadequate knowledge. Among B. Sc. nurses (n=17), only 8 (47.1%) had adequate knowledge and 9 (52.9%) did not. In contrast, all M. Sc.-qualified participants (n=12) showed good knowledge, indicating a positive trend with increasing education level. Association between education level and knowledge was statistically significant (p=0.01).

In terms of infection prevention training, out of the 198 participants who had received training, 114 (57.6%) had good knowledge and 84 (42.4%) had poor knowledge. Among those who had not received such training (n=21), 19 (90.5%) had adequate knowledge while only 2 (9.5%) lacked it. Surprisingly, despite the expectation of training improving knowledge, a portion of untrained participants still demonstrated good awareness. Nevertheless, the

association between training and knowledge remained statistically significant (p=0.03) (Table 4).

Factors associated with nurses practice regarding infection prevention

The findings revealed a statistically significant association between having received training and better infection prevention practices (p=0.02). Among those trained (n=198), 113 (57.1%) reported good practice, while 85 (42.9%) had poor practice. In contrast, of the 21 untrained participants, only 18 (85.7%) demonstrated good practices, and 3 (14.3%) did not. These findings suggest that formal training in infection prevention contributes positively to practical compliance**,** although some untrained individuals also reported good practices, possibly due to on-the-job learning or informal mentorship (Table 5).

Table 1: Socio-demographic characteristics of nurses at Maharana Bhupal government hospital (n=219).

Variables	N	Percentage (%)
Age (in years)		
20-30	5	2.2
31-40	133	60.7
41-50	29	13.2
>50	52	23.7
Sex		
Male	75	34.2
Female	144	65.8
Residence		
Urban	111	50.7
Rural	108	49.3
Religion		
Hindu	190	86.7
Muslim	10	4.5
Christian	8	3.7
Jain	11	5
Education level		
Diploma	190	86.8
Bsc	17	7.8
Msc	12	5.5
Marital status		
Married	211	96.3
Never married	8	3.7
Type of family		
Joint	136	62.1
Nuclear	83	37.9
Working experience		
More than 10 years	163	74.4
Less than 10 years	56	25.6
Working shift		
Morning, evening, night	68	31.1
Morning	147	67.1
Evening	4	1.8
Trained in infection prevention		
Yes	198	90.4
No	21	9.6
Duration of training		
Less than 1 month	191	87.2
More than 1 month	28	12.8
Currently working in		
OPD	98	44.7
Ward	96	43.8
ICU	25	11.4
Nature of job		
Permanent	193	88.1
Contractual	26	11.9

Table 2: Knowledge of the nurses regarding infection prevention at Maharana Bhupal government hospital (n=219).

Variables	N	Percentage (%)
What are the common routes of infection transmission in hospitals?		
Direct contact, droplet, airborne	120	54.8
Droplet	28	12.8
Airborne	27	12.3
Direct contact	44	20.1
Knowing about safety precautions?		
Yes	190	86.8
No	29	13.2
Presence of IPC team in your working area?		
Yes	196	89.4
No	23	10.6
Availability of infection prevention guidelines in the work area?		
Yes	209	95.4
No	10	4.6
Availability of PPE at all times?		
Yes	181	82.6
No	38	17.4
Do you agree disinfection prevents HAI		
Yes	200	91.3
No	19	8.7
Chemical sterilization technique used for all equipment		
Yes	203	92.7
No	16	7.3
Know about PEP while exposed to body fluid or needle-stick injuries of HIV-infected patients?		
Yes	198	90.4
No	21	9.6
Do you know about biomedical waste management?		
Yes	191	87.2
No	28	12.8
What is the most effective method for preventing the spread of infections in a hospital setting?		
Hand hygiene	155	70.8
Environmental cleaning	52	23.7
PPE	12	5.5
How often should hand hygiene be performed?		
Before and after patient contact	187	85.4
Before aseptic tasks	16	7.3
Before and after patient contact, before aseptic tasks, after exposure to body fluids	16	7.3
Are protective clothing minimizes hospital-acquired infection?		
Yes	211	96.3
No	8	3.7
What is the recommended duration for handwashing with soap and water?		
At least 20 seconds	124	56.6
At least 40 seconds	12	5.5
At least 60 seconds	83	37.9
How often should reusable medical equipment be disinfected?		
After each use	215	98.2
Weekly	4	1.8
What is the purpose of isolation precautions?		
To prevent the spread of infections to other patients and HCWs	207	94.5
To treat infection	8	3.7
To diagnose infection	4	1.8

Table 3: Practice of the nurses regarding infection prevention at the Maharana Bhupal government hospital (n=219).

Variables	N	Percentage (%)
Do you wash hands with alcohol-based hand rub after taking a sample?		
Yes	189	86.3
No	30	13.7
Do you wash hands immediately after coming into the contact with blood, body fluids, or the contaminated items?		
Yes	179	81.7
No	40	18.3
Do you discard sharp materials in a safety box?		
Yes	207	94.5
No	12	5.5
Do you wear a mask during sputum sample collection and processing?		
Yes	182	83.1
No	37	16.9
Do you recap needles before disposal?		
Yes	96	43.8
No	123	56.2
Do you wear your gloves properly before collecting samples?		
Yes	203	92.7
No	16	7.3
Are you vaccinated for HBV?		
Yes	151	68.9
No	68	31.1
Do you wear an apron when blood or body fluid splash is expected?		
Yes	184	84
No	35	16
Do you eat or drink in your work area?		
Yes	52	23.7
No	167	76.3
How long to soak contaminated medical equipment in 0.5 percentages chlorine solution?		
For 10 min	112	51.1
For 1 hour	52	23.7
For 24 hour	55	25.1
Are you vaccinated for common pathogens?		
Yes	188	85.8
No	31	14.2

Table 4: Factors associated with nurses knowledge regarding infection prevention.

Variables	Knowledgeable	Not knowledgeable	P value
Education level			
Diploma (n=190)	113	77	0.01
B. Sc. (n=17)	8	9	
M. Sc. (n=12)	12	0	
Trained in infection prevention			
Yes (n=198)	114	84	0.03
No (n=21)	19	2	

Table 5: Factors associated with nurses practice regarding infection prevention.

Training in infection prevention	Good practice	Poor practice	P value
Yes (n=198)	113	85	0.02
No (n=21)	18	3	
Total	131	88	

DISCUSSION

This study shows that the overall knowledge of nurses about infection prevention was 60.7%, whereas 59.8% of nurses had good practice in infection prevention.

The overall level of knowledge in the present study was found to be slightly higher than that reported by Tafere et al who documented a knowledge level of 59.4% among nurses at Debre Tabor comprehensive specialized hospital in Ethiopia.[11] This variation could be attributed to differences in study setting, participant demographics, healthcare infrastructure, and data collection tools. Similarly, the practice level reported in our study was also higher compared to their finding of 53% practice adherence, indicating possible improvements in IPC compliance in better-equipped or differently managed healthcare environments.

The current findings are also consistent with the study conducted by Biniyam et al in Addis Ababa, where 66% of HCWs demonstrated good infection prevention practices.[12] That study further identified several significant predictors of good IPC practices including knowledge, positive attitudes, awareness of standard operating procedures (SOPs). These determinants align closely with our own results, where training and education levels were found to be significantly associated with IPC knowledge and behavior, reaffirming the importance of enabling infrastructure and capacity-building efforts.

In a hospital-based study by Vinodhini et al in Chennai, the infection control practices among nurses were found to be moderately adequate at 59%, which is lower than the practice levels observed in our study. This again highlights the variability in IPC compliance across different regions and health systems and supports the need for standardized national IPC training protocols.[13]

Interestingly, Gulilat et al reported an overall knowledge score of 84.5% among HCWs in Bahir Dar, Ethiopia, which is higher to the findings of our study.[14] However, despite the high knowledge levels, only 54.2% reported safe IPC practices, pointing toward a common challenge in healthcare settings: the gap between knowledge and actual implementation. This underscores the importance of not only training but also consistent monitoring and supportive supervision to ensure that knowledge is translated into safe and sustained practices.

Limitations

The study, conducted solely at Maharana Bhupal government hospital, may not be generalizable to the broader population of healthcare professionals across Rajasthan due to its single-site design. Self-reported data may introduce recall bias, as participants could provide socially desirable responses, potentially affecting the study's validity. Additionally, time and resource constraints limited the sample size to the available nurses during the data collection period.

CONCLUSION

This study concludes that while the overall knowledge and practices of nurses regarding IPC were satisfactory, there remain critical areas requiring improvement. Factors such as higher education levels and prior training were significantly associated with better awareness and adherence to standard precautions. However, regular in-service training programs, improved monitoring mechanisms, and reinforcement of infection control protocols are recommended. Ensuring, visibility of IPC guidelines in the workplace, and strengthening the role of infection control teams can further enhance compliance. Additionally, promoting higher education and fostering a culture of safety among nurses will be essential in sustaining long-term improvements in infection prevention practices. Overall, these findings underscore the importance of continuous training and strict adherence to IPC protocols in minimizing hospital-acquired infections (HAIs).

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REFERENCES

1. WHO. Global report on infection prevention and control.
2. Alawaini KA, Omar NA, Alhush HS, Alazabi EA. Carried hepatitis B among Libyan patients who attended the Al Zawia street hospital. GSC Biolog Pharmaceut Sci. 2020;13(1):062-6.
3. Njue PM, Cheboi KS, Oiye S. Adherence to healthcare waste management guidelines among nurses and waste handlers in Thika sub-county-Kenya. Ethiop J Health Sci. 2015;25(4):295-304.
4. Hageman JC. Infection prevention and control for Ebola in health care settings-West Africa and United States. MMWR supplements. 2016;65.
5. Allegranzi B, Bagheri Nejad S, Combescure C, Wilco G, Homa A, Liam D, et al. Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. Lancet. 2011;377(9761):228-41.
6. Singhal T, Shah S, Thakkar P, Naik R. The incidence, aetiology and antimicrobial susceptibility of central line-associated bloodstream infections in intensive care unit patients at a private tertiary care hospital in Mumbai, India. Indian J Med Microbiol. 2019;37(4):521-6.
7. Ministry of Health and Family Welfare. Guidelines for implementation of “Kayakalp” initiative. New

Delhi: Ministry of Health and Family Welfare, Government of India. 2018.
8. Geberemariyam BS, Donka GM, Wordofa B. Assessment of knowledge and practices of healthcare workers towards infection prevention and associated factors inhealthcare facilities of West Arsi District, Southeast Ethiopia: a facility-based crosssectional study. Arch Pub Health. 2018;76:1-11.
9. Desta M, Ayenew T, Sitotaw N, Tegegne N, Dires M, Getie M. Knowledge,practice and associated factors of infection prevention among healthcare workers in Debre Markos referral hospital, Northwest Ethiopia. BMC Health Serv Res. 2018;18(1):1-10.
10. Assefa J, Diress G, Adane S. Infection prevention knowledge, practice, and its associated factors among healthcare providers in primary healthcare unit of Wogdie District, Northeast Ethiopia, 2019: a cross-sectional study. Antimicrob Resist Inf Control. 2020;9(1):1-9.
11. Tafere TZ, Belachew TB, Feleke DG, Adal GM. Assessment of knowledge and practice of nurses regarding infection prevention and associated factors at Debre Tabor Comprehensive Specialized Hospital, Northwest Ethiopia. Front Public Health. 2024;11:1225570.
12. Sahiledengle B, Gebresilassie A, Hiko D, Getahun T. Infection Prevention Practices and Associated Factors among Healthcare Workers in Governmental Healthcare Facilities in Addis Ababa, Ethiopia. Ethiop J Sci. 2018;28(2):177.
13. Vinodhini K, Bhoomadevi A. Study on infection control practices among healthcare workers in a speciality hospital, Chennai. Pollution Res. 2016;35(3):549-55.
14. Gulilat K, Tiruneh G. Assessment of Knowledge, Attitude and Practice of Health Care Workers on Infection Prevention in Health Institution Bahir Dar City Administration. Sci J Publ Health. 2014;2(5):384-93.

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