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Awareness on infection prevention measures among ward attendants in a teaching hospital

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Abstract

Introduction: Infection prevention is an essential measure of patient safety and wellbeing. The medical teams including the cleaning staffs/ward attendants are responsible for preventing infection in both patients and themselves. This study aims to find out the awareness on infection prevention measures among ward attendants working in a teaching hospital, Chitwan.

Method: A descriptive cross-sectional study was conducted among 98 ward attendants of Chitwan Medical College Teaching Hospital, Nepal, from 19 Dec 2023 to 02 Jan 2024 using non-probability convenience sampling technique to select the sample. Structured questionnaire interview was used to collect data. Data were analyzed using IBM SPSS version 20 for descriptive and inferential statistics.

Result: The study revealed that 56(57.1%) of respondents were ≥26 years of age, 73(74.5%) were female, 55(56.1%) had completed secondary education, 27(27.6%) were working in general wards, and 94(95.9%) had received infection prevention training. The study showed that 83(84.7%) of respondents had high level of awareness regarding infection prevention measures. The level of awareness was found to be significantly associated with the training received by ward attendants on infection prevention measures (p=0.011).

Conclusion: The study found that most of the ward attendants had high level of awareness regarding infection prevention measures. There were some specific areas where awareness was lacking, such as the use of sodium hypochlorite solution for disinfection, and the risk of glove tearing using petroleum-based hand lotion which can be addressed through regular training, supervision, and monitoring of infection prevention measures to ward attendants.

How to cite

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Introduction

Infection prevention and control (IPC) is a scientific approach and practical solution designed to prevent healthcare-associated infections (HAIs), a common adverse event that can arise in endemic or epidemic situations and harm millions of people in both developed and developing nations.[1,2]

Hospital acquired infections are a major cause of preventable disease and death in developing countries.[3] Recent data showed approximately 1 in 31 hospital, patients have at least one infection related to healthcare on any given day.[4] Proper knowledge and practices of health personnel regarding HAI are crucial in preventing infections as they can practice infection prevention effectively as a daily patient-centered practice.[5] Knowledge of IPC among HCWs other than physicians and nurses was lower and their role is usually underestimated. There is lack of training on infection control measures among non-medical workers, such as cleaners, with training mostly confined to hand washing and surface cleaning.[6] Hospital cleaning staffs also have an important role in infection prevention as they are on the frontline of environmental disinfection & cleaning services. Updating and strengthening the infection control practices on a regular basis is of utmost importance in any health care setting.

Although numerous studies have been explored, there is limited information on the knowledge of frontline workers, specifically attendants regarding infection prevention. Therefore, this study was conducted to find out the awareness on infection prevention measures among ward attendants in a teaching hospital, Chitwan.

Method

A descriptive cross-sectional research design was used to find out the level of awareness on infection prevention among ward attendants at Chitwan Medical College and Teaching Hospital (CMCTH), Bharatpur-10, Chitwan, Nepal, from 19 Dec 2023 to 02 Jan 2024. This is a renowned, 750 bedded tertiary care teaching hospital committed to provide best healthcare services including to both local residents and patients from different part of Nepal.

The population of this study were the ward attendants working in CMCTH. Total numbers of ward attendants were 130. The ward attendants who were available during data collection, who were willing to participate in this study, and who have more than 1 month of work experience were included in the study.

Ethical approval was obtained. Permission from hospital administration was taken. A convenience sampling technique was used to select the desired sample.

A sample size of 98 ward attendants was selected for the study. It was calculated by using the formula below:

The total number of ward attendants (N) was 130.

Required sample,

$(n_0)=Z^2p(1-p)/e^2=1.96^2x(0.477x0.523)/0.05^2=384$

Z=the statistic corresponding to level of confidence, for 95% Confidence Interval=1.96

p=proportion of awareness regarding infection prevention=47.7%[7]

e=margin of error=5%

Final sample size $n=n_0=n_0/1+(n_0-1/N)=384/1+(384-1/130)=484/3.95=98$

After getting ethical approval for data collection, the ward attendants were selected conveniently. Prior to the data collection, the researcher introduced herself to the respondents and explained the purpose of the study clearly to the respondents. Informed written consent was taken from each respondent for the participation in the research study. Respondents' dignity was maintained by giving right to reject or discontinue from the study at any time. Confidentiality was maintained by not disclosing the information of the respondents. Privacy of the respondents was maintained throughout the

study by taking interview in a comfortable and separate area involving one ward attendants at a time. The data for this study were collected within the period of 2 weeks from 19 Dec 2023 to 02 Jan 2024.

A structured interview schedule was developed by researcher herself to collect the desired data. A total of 6-7 respondents were interviewed per day. Each respondent was interviewed for 20-25 minutes. The content validity of the research instrument was established by consulting with the research advisor and subject experts.

The level of awareness was obtained by summing the scores of all questions answered by ward attendants and converted into percentage. Each correct option was given '1' score, & incorrect /don't know option with '0' score. The level of awareness was categorized on the basis of Bloom's cut-off point as: High level of awareness: ≥80 %, Moderate level of awareness: 60-79%, Low level of awareness: <60%.[8] The data was analyzed using Microsoft Excel for descriptive as well as inferential statistics.

Result

Out of 98 ward attendants (n=98), majority 56(57.1%) were aged more than 26 years, with a median age of 26 years and interquartile range 7years. The minimum and maximum age were 20 years and 51 years respectively. Most were female 73(74.5%). Education levels showed 55(56.1%) had secondary education (9-12), 29(29.6%) basic education (up to 8), and 14(14.3%) no education. Moreover, 27(27.6%) were working in general wards and majority of them 73(74.5%) have work experience of more than 6 months. Regarding training, almost all of the respondents 94(95.9%) had received training on infection prevention measures, only 4(4.1%) of the respondents had taken training of more than 1 day and 60(61.2%) of the respondents had attended infection prevention training within this 6 months, Table 1.

In addition, all the respondents 98(100%) answered correctly to each statement that hand hygiene is washing hands with soap and water or using an alcohol-based hand rub, perform hand hygiene before and after any procedure, wash hands if wearing gloves for/after any procedure, and remove personal accessories before handwashing. Among them, 83(84.7%) responded correctly that handwashing should be done for 40-60 sec with soap and water, and 70(71.4%) of them answered correctly that hand rubbing with hand sanitizer is done for 20-40 sec, Table 2.

Additionally, cent percent answered correctly 98(100%) to each statement that wearing PPE is an infection control measure, gloving is done while exposing to blood or bodily fluids, wear utility gloves for own safety, same pair of gloves using for multiple patients, remove dirty gloves before handling doors, & windows, and wear disposable aprons to prevent clothes soiling. Only 29(29.6%) responded correctly that using petroleum-based hand lotion increases the risk of glove tearing, Table 3.

Likewise, all respondents 98(100%) answered correctly that visible dust is removed before disinfection of surfaces. Regarding preparation of NaClO, 58(59.2%) answered correctly about the concentration of NaClO solution to disinfect the used equipment, 32(32.7%) about disinfecting soiled linen and clothes, and more than half 68(69.4%) about mopping the floor in the wards. Most of the respondents 78(79.6%) answered correctly that covering blood or body fluids spillage with 1% concentrated disinfectant for 10 minutes, Table 4.

Regarding waste disposal, all of the respondents 98(100%) answered correctly to each statement that improper waste segregation increases health hazards, proper waste segregation involves different color-coded bins, the broken vials, and ampoules are considered sharp waste, disposal of needles and sharps, transport waste on a separate trolley, wear PPE during waste handling, transport waste through a separate corridor, and empty waste bins in the early

morning and after the peak usage hours in the evening. None of the respondents answered correctly for 3 days storage limit for biomedical waste, Table 5.

There was no statistically significant association between level of awareness on infection prevention measures and age (p=0.166), sex (p=0.200), educational status, working area (p=0.106), and work experience (p=1.000). However, the level of awareness tends to be associated with training on infection prevention (p=0.011), Table 6.

Most of the respondents 83(84.7%) had high level of awareness whereas, 15(15.3%) had moderate level of awareness regarding infection prevention measures.

Table 1. Work-related characteristics of ward attendants, n=98

Variables	n	%
Working area		
OPDs	4	4.1
Emergency	6	6.1
Critical area	25	25.5
General Ward	27	27.6
Others*	36	36.7
Work experience (Median=12 m, IQR= 60-7.8m, Min=1.5 m, Max=156 m)		
< 6 months	25	25.5
≥ 6 months	73	74.5
IP training received		
Yes	94	95.9
No	4	4.1
Training period (n=94)		
1day	90	91.8
>1day	4	4.1
Duration since training received (Median=6 m, IQR=11 m, Min=0.23 m, Max=72 m) (n=94)		
< 6 months	34	34.7
≥ 6 months	60	61.2

*Others=cabin, administration, lift/corridor, operation theatre, central sterile service department

Table 2. Awareness regarding handwashing among ward attendants, n=98

Statements	Correct response	
	n	%
Hand hygiene can be done by washing hands with soap and water or using an alcohol-based hand rub.	98	100.0
Perform hand hygiene before and after any procedure.	98	100.0
Wash hands if wearing gloves for/after any procedure.	98	100.0
Remove personal accessories like ring, bangles, etc. before handwashing.	98	100.0
Rub hand following 7 different steps for handwashing.	97	99.0
Wash hand with soap and water for 40-60 sec.	83	84.7
Rub hand with hand sanitizer for 20-40 sec.	70	71.4

Table 3. Awareness regarding use of personal protective equipment among ward attendants, n=98

Statements	Correct response	
	N	%
Wearing PPE is an infection control measure.	98	100.0

Gloving is done while exposing to blood or bodily fluids.	98	100.0
Wear utility gloves for own safety.	98	100.0
Sterile gloves should not be worn during cleaning process.	90	91.8
Same pair of gloves not used for multiple patients.	98	100.0
Remove dirty gloves before handling doors, and windows.	98	100.0
Turn gloves inside-out while removing.	94	95.9
Applying petroleum-based hand lotion increases the risk of glove tearing.	29	29.6
Wear disposable aprons to prevent soiling of clothes from patient's blood and body fluids.	98	100.0
Mask cannot be lowered around the neck and then brought back over the mouth and nose for reuse.	73	74.5
Cloth mask is not as effective as a surgical mask.	73	74.5
Sequence for removing a soiled PPE is removing gloves, goggles/face shield, gown and mask.	86	87.8

Table 4. Awareness regarding cleaning and disinfection among ward attendants, n=98

Statements	Correct response	
	n	%
Clean floor in non-critical areas every 6-8 hours.	84	85.7
Clean floor in critical areas every 3-4 hours.	80	81.6
Visible dust is removed before disinfection of surfaces.	98	100.0
Use 0.1% NaClO solution to disinfect the used equipment.	58	59.2
Use 0.05% NaClO solution for the disinfection soiled linen and clothes.	32	32.7
Use 0.5 % of NaClO solution for mopping the floor in the wards.	68	69.4
Clean surgical instruments with soap and water before immersing in NaClO solution for disinfection.	96	98.0
Immerse equipment, linen, gown for 10 minutes in chlorine solution for disinfection.	94	95.9
Cover spillage of blood or body fluids with 1% concentrated disinfectant for at least 10 minutes.	78	79.6

NaClO=sodium hypochlorite

Table 5. Awareness regarding waste disposal among ward attendants, n=98

Statements	Correct response	
	n	%
Improper waste segregation increases health hazards.	98	100.0
Segregating health care waste into different color-coded bins.	98	100.0
Broken vials, and ampoules are included as sharp waste.	98	100.0
Discard needles syringe and sharp instrument in a punctured proof bucket.	98	100.0
Discard plastic bottles, cans, empty cold drink bottles in a black container.	97	99.0
Transport hazardous/infectious waste and non-risk waste on a separate trolley.	98	100.0
Trolley used to hold and transport biomedical waste cannot be used for other purposes.	97	99.0
Wear protective clothing during waste-handling operations.	98	100.0
Transport waste through a separate service corridor.	98	100.0
Empty waste bins in the early morning before daily activities, and after the peak usage hours in the evening.	98	100.0

Table 6. Association between level of awareness and selected variables among ward attendants, n=98

Variables	Level of awareness		$\chi 2$	p-value
	High n(%)	Moderate n(%)		
Age (in years)				
<26	33(78.6)	9(21.4)	2.125	0.166

≥26	50(89.3)	6(10.7)			
Sex					
Male		19(76.0)	6(24.0)	-	0.200[f]
Female		64(87.7)	9(12.3)		
Educational status					
Illiterate		14(100.0)	0	-	NA
Literate		69(82.1)	15(17.9)		
Working area					
Critical area		24(96.0)	1(4.0)	-	0.106[f]
Others*		59(80.8)	14(19.2)		
Work experience (in months)					
<6		21(84.0)	4(16.0)	-	1.000[f]
≥6		62(84.9)	11(15.1)		
IP training received					
Yes		82(87.2)	12(12.8)	-	0.011[f]
No		1(25.0)	3(75.0)		

*Others=cabin, administration, lift/corridor, operation theatre, central sterile service department; ƒ=Fisher's exact test, NA=not applicable, $\chi 2$=chi-square

Discussion

In present study more than half of the respondents (57.1%) were ≥26 years of age, were females (74.5%), secondary level schooling (56.1%) with almost all of the respondents (95.9%) had received training on infection prevention measures from hospital and had attended (61.2%) training. Majority (84.7%) had high level of awareness. This finding is contradicted to finding of the study in which less than half of the cleaners (47.7%) had good knowledge of IPC.[7] The finding in this study is also contradicted to finding of a study which revealed that ward attendants do not have sufficient knowledge on infection prevention.[9] Almost all of the respondents in the current study had received training and this could be the major reason contributing to the differences in the findings with other studies.

The current study revealed that there was significant association between level of awareness and training on infection prevention measures (p=0.011). This finding is similar to the finding of the study in which respondents who attended training were approximately 10 times more likely to be knowledgeable about infection prevention measures compared to those who had never attended training (p=0.003).[10]

The current study revealed that there was no statistically significant association between level of awareness with age, sex, level of education, working area and work experience. The result is similar to the finding of the study which also revealed no significant association between level of knowledge and age, work, and level of education.[11]

In the current study, all of the respondents (100%) correctly answered for the statements about hand hygiene be performed before and after procedure, and personal accessories like ring, bangles, etc. should be removed before handwashing. This finding is almost similar to the findings of the study in which 94% of the respondents responded correctly to the necessity of hand hygiene before and after any procedure, and all of the respondents (100%) responded correctly to necessity of removing personal accessories before handwashing.[9]

The present study showed that most of the respondents (84.7%) answered correctly regarding duration of handwashing whereas the other study showed that only 21.4%

respondents answered correctly regarding duration of handwashing. The difference might be due to lack of training in the later study.[12]

Regarding the use of PPE, all of the respondents answered correctly that wearing PPE is an infection control measure. The finding is supported by the study where almost all (93.41%) respondents answered the statement correctly.[13]

This study showed that all of the respondents correctly answered that it is necessary to remove dirty gloves before handling doors, windows, & other materials. This awareness is crucial for infection prevention. This finding aligns with a study in which 85% of the respondents also demonstrated awareness regarding importance of removing gloves before handling surfaces.[9]

All of the respondents (100%) in current study correctly answered that gloving is recommended while exposing to blood or bodily fluids. This finding closely correlates with the findings of the study where each study showed that most of the respondents (87%) demonstrated correct awareness.[14,15]

Similarly, all of the respondents (100%) responded correctly that same pair of gloves cannot be used for the care of multiple patients. This finding is supported by the studies where most of the respondents (88%) answered correctly to above statement.[14,15] Contradictory to these findings, a study showed that only 61.7% respondents answered correctly to above statement.[16] The lack of training on infection prevention, and availability of infection prevention guidelines in the working department might be the contributing factors to this difference.

In this study, almost all respondents (95.9%) answered correctly that the equipment, linen, gown should be immersed for 10 minutes in chlorine solution for disinfection. This finding is similar to the findings of the study where, 88.6% of the respondents answered correctly to the same statement.[10]

Regarding waste disposal, all of the respondents (100%) answered that improper waste segregation increases the risk of health hazards. This finding is consistent with the study which showed cent percent awareness among the respondents.[17]

The present study revealed that all of the respondents (100%) were aware regarding disposal of needles and sharp instrument in punctured proof bucket. The finding aligns with the findings of the study which showed that 88.6% and 81.8% of the respondents were respectively aware regarding correct disposal of needles and sharps.[18,19] Though knowledge appears excellent, institutions should maintain regular reinforcement training and monitoring to ensure sustained compliance with sharp disposal protocols.

Conclusion

Majority of the ward attendants had high level of awareness on infection prevention measures and had trainings. Certain areas like use of sodium hypochlorite solution for disinfection, time for hand washing, and risk of glove tearing using petroleum-based hand lotion had low awareness. Regular training may enhance awareness and further help minimize hospital acquired infections.

Author contribution

Concept design: All; Literature review: All; Data collection and analysis: All; Draft manuscript: All; Final manuscript and accountability: All

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Conflict of interest

None

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Supplementary material

The data and supplementary material that support the findings of this study are available from the corresponding author upon reasonable request.

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Questionnaire/tools

Structured questionnaire on "Awareness on Infection Prevention Measures among Ward Attendants"

Code No.: …… **Date of data collection:** ……..……..

Direction: The researcher will read the question for the respondents and will fill the blank space or select appropriate answer in right column responses, for example a or b (in part 1) and y or ✓ (for yes, no or don't know) in appropriate column.

Part I

Socio-Demographic and Organtinational related Information

S.N.	Questions	Responses
1.	What is your age? (in completed year)	_____
2.	What is your gender? a. Male b. Female	
3.	What is your education level? a. No formal education b. Basic education (up to 8 class) c. Secondary education (9 to 12) d. More than secondary and above	
4.	Which is your present working area? a. Maternity ward b. Medical ward c. Surgical ward d. Paediatric ward e. ICU/CCU/MICU f. Emergency ward g. OPDs h. If others, please specify……	
5.	What is your total work experience?	……months/years
6.	Have you had training/course regarding infection prevention measures? a. Yes b. No	
7.	If yes, then please specify the training period?	…….days
8.	How long has it been since you have attended the training regarding IP measures?	…..days/months/y

Part II

Questionnaire related to Infection Prevention Measures

S.N.	Statements	Yes	No	Don't Know
Handwashing				
9.	Hand hygiene can be done by washing hands with soap and water or using an alcohol-based hand rub.			
10.	Hand hygiene must be performed before and after any procedure.			
11.	It is necessary to wash hands if you are wearing gloves for/after any procedure.			
12.	Personal accessories like ring, bangles, etc. should be removed before handwashing.			
13.	We should follow 7 different steps for hand rubbing to keep our hand clean and germs free.			
14.	The minimal time needed for hand washing with soap and water is 40-60 sec.			
15.	The minimal time needed for hand rubbing with hand sanitizer is at least 20-40 sec.			
Personal Protective Equipment				
16.	Wearing gloves, mask, and protective eye wear is an infection control measure.			
17.	Gloving is recommended if you are going to be exposed to blood or bodily fluids.			
18.	Utility gloves are worn for your own safety.			
19.	Sterile gloves should be worn while attending cleaning process. *			
20.	The same pair of gloves can be used for the care of more than one patient.*			
21.	Dirty gloves should be taken out before handling doors, windows, & other materials.			
22.	Gloves should be turned inside-out while removing.			
23.	There is an increased risk of glove tearing when wearing them after applying hand lotion containing petroleum.			
24.	Disposable aprons are worn to prevent soiling of clothes from patient's blood and body fluids.			
25.	Mask can be lowered around the neck and then brought back over the mouth and nose for reuse. *			
26.	A cloth mask is as effective as a surgical mask in preventing respiratory infections.*			
27.	The recommended sequence for removing a soiled PPE after use is removing gloves, goggles/face shield, gown and mask.			
Cleaning and Disinfection				
28.	The floor should be cleaned at least every 6-8 hours in non-critical areas.			
29.	The floor should be cleaned every 3-4 hours in critical areas.			
30.	Visible dust shall be completely removed before disinfection of surfaces.			
31.	It is recommended to use 0.1% sodium hypochlorite solution (100 ml of 12% sodium hypochlorite solution mixed with 11.9 liter water) to disinfect the used equipment such as dressing sets, kidney tray, etc.			
32.	It is recommended to use 0.05% sodium hypochlorite solution (50 ml of 12% sodium hypochlorite solution with 12 liter water) for the disinfection soiled linen and clothes.			

33.	It is recommended to use 0.5 % of sodium hypochlorite solution (500 ml of 12% sodium hypochlorite solution with 11.5 liter water) for mopping the floor in the wards.			
34.	The surgical instruments after use, should be cleaned with soap and water first and then should be immersed in sodium hypochlorite solution for disinfection.			
35.	Equipment ,linen ,gown should be immersed for 10 minutes in chlorine solution for disinfection.			
36.	Spillage of blood or body fluids should be covered with 1% concentrated disinfectant for at least 10 minutes.			
Waste Disposal				
37.	Improper waste segregation increases the risk of health hazards for individuals handling the waste.			
38.	The most appropriate way of segregating the category of health care waste is sorting out the waste into different color-coded bins.			
39.	Broken vials, and ampoules are included as sharp waste.			
40.	Syringe with needles and sharp instrument should be discarded in punctured proof bucket.			
41.	Waste such as plastic bottles, cans, empty cold drink bottles are discarded in black container.			
42.	Hazardous/infectious waste and non-risk waste should be transported on a separate trolley.			
43.	The trolley used to hold and transport biomedical waste cannot be used for other purposes.			
44.	Protective clothing (gloves, apron, boots) should be worn during all waste-handling operations.			
45.	The recommended route for transport of waste from the ward/units to disposal area is through a separate service corridor.			
46.	The waste bins are typically emptied in the early morning before daily activities begin, and also in the evening after the peak usage hours.			
47.	The maximum time for which biomedical waste can be stored is 3 days.			

*Negative questions