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Research Article

Knowledge, Attitude and Practice toward Infection Prevention and Control among Primary and Secondary Care Hospital's Healthcare Staffs in Rural Area, Bangladesh: A Hospital based Cross-sectional Study

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Abstract

Infections that are connected with medical care pose a threat to public health on a worldwide scale and are linked to high rates of death and disease. Infection Prevention and Control, also known as IPC, is a field that is undervalued in Bangladesh's medical facilities. The aim of this study was to measure the knowledge, attitude, and practice of infection prevention and control among healthcare staff in primary and secondary care hospitals in several rural areas of Bangladesh. This was a cross-sectional study. This study followed the quantitative methods with close ended questionnaire. From August 6 to September 25, 2022, 1039 people were interviewed by face-to-face approach. All data were analyzed using the SPSS 16.0 version. A frequency analysis and Chi-square test were used. Overall, respondents had good knowledge and a positive response. But their practice level is not so good. 38.2% of respondents did not wash their hands before examining patients, and 42.5% did not use a face mask during patient care. Some associated factors, including older age, working experience, working shifts, and taking training, were associated with good

knowledge on infection prevention and control. People who were working the day shift (<0.001), 31–40, and more than 40 years old (<0.001), and who had taken training (<0.001), had overall good knowledge on infection prevention and control.58.6%, 58.3% and 50.6% respondents thought some obstacles respectively including lack of training, inadequate hand washing facility, lack of guideline at primary healthcare. The government and some stakeholders should initiate some necessary steps. Educational institutions should arrange campaigns and seminars about it.

Keywords: Infection prevention and control, Healthcare, Knowledge, Attitude, Practice, Bangladesh

1. Introduction

A nosocomial infection is one that the patient didn't have or wasn't showing signs of when they were admitted to the hospital or other healthcare facility. This is also called an infection that was caught at a hospital or other healthcare facility (B. Naik & Bhageerathi, 2019). Compared to high-income countries, the burden of HCAI is much higher in low- and middle-income countries (LMICs). (Savul *et al*., 2020).Up to 1.4 million people worldwide suffer from healthcare-associated illnesses at any given moment (Al-Rasheed *et al*., 2022). Health care facilities have a high prevalence of disease-causing microorganisms, which are easily transmitted from patient to patient via staff, equipment and other items (Hakizimana, 2015).

A considerable amount of health care activities, such as parenteral medicine administration, bed making, feeding, patient handling, wound dressing, etc.7, are performed by nurses, who are frequently exposed to the risk of HAIs (B. Naik & Bhageerathi, 2019). HAI diseases are frequently spread from one patient to another when HCWs fail to complete proper hand hygiene after caring for a patient and before contacting another patient (Abalkhail *et al*., 2021). Infections that are caused by blood-borne viruses, such as the hepatitis B virus (HBV), the human immunodeficiency virus (HIV), and the hepatitis C virus (HCV), offer an extremely high threat of exposure to clinical experts (HCV). Blood, biological fluids, spatters, needle-stick incidents, contaminated waterways from dental devices, particulates, and implicit transmission through surface and equipment contamination are some of the potential routes of infection transmission that can occur in a dental office. Other potential routes of infection transmission include blood, biological fluids, spatters, and needle-stick injuries (Mahdi *et al*., 2021).

In medical facilities, the prevalence of HAIs is estimated to range from 5.7% to 19.1%, according to the World Health Organization (WHO).About 42% of cases of Corona Virus Disease (2019) among healthcare workers are linked to improper use of personal protective equipment (PPE). Some metropolitan hospitals in the Kingdom of Saudi Arabia (KSA) reported 2.2% of monthly hospital infections (Abalkhail *et al.*, 2021).The frequency is claimed to be 15% among inpatients in the industrialized world, and as high as 37% among patients admitted to intensive care units (ICU). Because of poor infection control and overcrowding in hospitals, the rate is 19% higher among hospitalized people in developing countries (B. Naik & Bhageerathi, 2019).

Sterilization is the procedure by which the likelihood of a viable bacterium being present in a pharmaceutical product is lowered to less than 10-6. The "Central Sterile Supply Department" (CSSD) is willing to take responsibility for the welcome, cleanup, arrangement, sanitization, and allocation of disinfected supplies and products in accordance with bacteriologically protected sanitization procedures under controlled circumstances with appropriate technical supervision at the lowest possible cost. This is accomplished at the most efficient level possible (Al-Rasheed *et al*., 2022; Kulkarni and Chillarge, 2015). The elimination of all organic compounds

and the elimination of all microbial load must occur prior to the sterilization procedure in order for medical devices to be successfully sterilized (Veiga-Malta, 2016). The CSSD ought to be divided into four zones so that work can flow more smoothly. The area that is used for becoming filthy and cleansing, the area that is used for assembly and packaging; the region that is used for sterilization; and the area that is used for sterile operations.

There are five basic types of workplace risks in healthcare: biological, chemical, physical, physiological, and social. Standard precautions include hand hygiene, usage of gloves, gown, mask, eye protection or face shield, etc., as well as proper handling of potentially contaminated equipment or things in the patient's environment. Therefore, strict adherence to infection prevention protocol by nurses is essential to prevent the transmission of infections among patients and healthcare personnel (B. Naik and Bhageerathi, 2019).To reduce the danger of surgical site infection, a cardiac hospital must, like other hospitals, adhere to rigorous sterilization procedures (Mahdi *et al*., 2021).

This issue is of more importance in underdeveloped nations where such principles and protocols are not properly established or recorded. Many hospitals lack infection control training programs, and several allied health care workers lack awareness (Mahdi *et al*., 2021). Our study's purpose was to highlight the current state of the use of essential IPC components in Bangladesh's primary and secondary hospitals. This survey-based study focuses on the infection control knowledge, attitude, and practice among the healthcare staff in primary and secondary hospitals in Bangladesh.

2. Materials and Methods

2.1 Study Design, Settings and Participants

This cross sectional study was conducted from 6th August 2022 to 25th September 2022 by face to face interview among 1039 healthcare people in Primary and Secondary care hospital (Akhter *et al.*, 2022). We considered hospitals which had at least 25-100 beds as primary hospital and at least 200 beds as secondary hospital. The study was conducted in Sirajganj, Khustia, Madaripur, Dhaka, Chittagong, and Pabna. The inclusion criteria was participants have to be from primary and secondary hospital and they are from rural area. The exclusion criteria include provided incomplete response.

2.2 Required Sample Size:

Sample size is calculated by the following equation.

$$\text{Sample size} = \frac{\frac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

According to this equation, convenience sample of 1039 (CI: 95%, Margin of error: 5%) healthcare staffs were included in this survey to explore the study objectives.

2.3 Questionnaire development, sampling, and data collection

The questionnaire was in English language initially. But during data collection, all questions were translated in Bangla. For data collection process, seven research assistants were recruited.

Before starting data collection they were trained. All questions were adopted from some published research article through literature review (Zaman *et al.*,2021; Sukhlecha *et al*.,2015; WHO, 2018). The questionnaire was reviewed by supervisor of this project. Lastly 1039 final responses were selected for data analysis excluding 19 incomplete responses. Data was collected from several rural areas in Bangladesh, including Sirajganj, Khustia, Madaripur, Dhaka, Chittagong, and Pabna.

2.4 Study Variables

Our outcome variables were knowledge, attitude, practice and obstacles on infection prevention and control by responding "True, False" and "Strongly agree, Agree, Neutral, Disagree, Strongly disagree" and "Always, Often, Sometimes, Rarely, Never". Demographic characteristics included gender, age, duration of working, employment status, educational background, training, working shift.

2.5 Data Analysis and Software

All data were analyzed by SPSS 16.0 version software. Pearson Chi-square test was done for identifying the significant association between participant's demographic variables and knowledge on infection prevention and control. At the 95% confidence interval, the p-value <0.05 was considered statistically significant.

Table 1: Demographic characteristics of respondents

Variables	Level	Number	Percent
Gender of respondents	Male	431	41.5
	Female	607	58.5
Age of respondents	Less than 20 years old	152	14.6
	21-30 years old	612	59.0
	31-40 years old	240	23.1
	More than 40 years old	34	3.3
Duration of working	less than 1 year	259	25.0
	1-5 years	482	46.4
	5-10 year	204	19.7
	More than 10 years	93	9.0
Employment status	Permanent	774	74.7
	Temporary	262	25.3
Qualification	Diploma	510	49.1
	Bachelor	209	20.1
	Masters	172	16.6
	Others	147	14.2
Taking training on infection prevention and control	Yes	529	51.0
	No	509	49.0
Working shift	Day	363	35.0
	Night	57	5.5
	Both	618	59.5

3. Results

3.1 Demographic characteristics of respondents

The demographic characteristics of study participants are presented in **Table 1**. Total 1039 respondents were participated in our study. Total female respondents were 58.5% and male respondents were 41.5%. Maximum respondents were 21-30 years old aged (59.0%). Most of the respondent's working experience was 1-5 years (46.4%). As per this study 74.7% participants were permanent worker and almost half of them were diploma holder (49.1%). 20.1% were bachelor completed. Among all respondents 51% were taking training on infection prevention and control and 59.5% were working both day and night shift.

Table 2: Knowledge on infection prevention control of respondents

Variables	Level	Number of respondent	Percent
Dirty needle and sharp materials can transmit disease causing agents.	True	1013	97.5
	False	26	2.5
Needles should be bent or broken after use.	True	1000	96.2
	False	39	3.8
Hepatitis B causing agent can be transmitted with dirty needles and sharps.	True	948	91.2
	False	91	8.8
Hepatitis C causing agent can be transmitted with dirty needles and sharps.	True	919	88.5
	False	120	11.5
AIDS/HIV causing agent can be transmitted with dirty needles and sharps.	True	1012	97.4
	False	27	2.6
Tuberculosis causing agent can be transmitted with dirty needles and sharps.	True	683	65.7
	False	356	34.3
Malaria causing agent can be transmitted with dirty needles and sharps.	True	557	53.6
	False	482	46.4

3.2 Knowledge on infection prevention control of respondents

The knowledge of respondents on infection prevention and control are presented in **Table 2**. Overall knowledge level of all respondents were good. Almost all participants were known dirty needle and sharp can transmit infection and Hepatitis B, Hepatitis C, AIDS/HIV causing agent can be transmitted by those materials. On the other hand, participants did not know that tuberculosis and malaria causing agent can be transmitted with dirty needles and sharps. This estimate were respectively 65.7% and 53.6%.

Table 3: Attitude on infection prevention and control of respondents

Variables	Level	N	%
Standard precautions prevent infection at healthcare facility.	Strongly agree	688	66.2
	Agree	351	33.8
	Neutral	0	0.0
	Disagree	0	0.0
	Strongly disagree	0	0.0
There is no need to wash hands after	Strongly agree	122	11.7

touching patient surroundings.	Agree	157	15.1
	Neutral	87	8.4
	Disagree	422	40.6
	Strongly disagree	251	24.2
Using gloves while patient care is a useful strategy for reducing risk of transmission of microbes.	Strongly agree	526	50.6
	Agree	447	43.0
	Neutral	59	5.7
	Disagree	7	0.7
	Strongly disagree	0	0.0
In absence of standard precautions, health care facilities can be the source of infection and disease epidemics.	Strongly agree	403	38.8
	Agree	575	55.3
	Neutral	61	5.9
	Disagree	0	0.0
	Strongly disagree	0	0.0
There is high risk of occupational infection among health workers.	Strongly agree	466	44.9
	Agree	493	47.4
	Neutral	67	6.4
	Disagree	13	1.3
	Strongly disagree	0	0.0

3.3 Attitude on infection prevention and control of respondents

Respondent's attitude on infection prevention and control are presented **Table 3**. 66.2% respondents were strongly agree on standard precautions prevent infection. But maximum respondents were disagree about washing hands after patient caring. Half of the participants were strongly agree and almost rest of the participants were agree about usefulness of using gloves. 38.8% and 55.3% respondents were respectively strongly agree and agree with the statement that In absence of standard precautions, health care facilities can be the source of infection and disease epidemics. Almost half of the participants were agree on risk of occupational infection among health workers.

Table 5: Practice on infection prevention and control of respondents

Variables	Level	Number	Percent
Washing hands before examining patients	Always	642	61.8
	Often	263	25.3
	Sometimes	100	9.6
	Rarely	32	3.1
	Never	2	0.2
Wearing goggles during procedures.	Always	151	14.5
	Often	225	21.7
	Sometimes	212	20.4
	Rarely	185	17.8
	Never	266	25.6
Wearing medical gown during procedures.	Always	849	81.7
	Often	109	10.5
	Sometimes	73	7.0
	Rarely	8	0.8
	Never	0	0.0

Using gloves while examining all patients.	Always	486	46.8
	Often	340	32.7
	Sometimes	162	15.6
	Rarely	35	3.4
	Never	16	1.5
Using face mask while examining possibly infective patients.	Always	598	57.6
	Often	237	22.8
	Sometimes	148	14.2
	Rarely	51	4.9
	Never	5	0.5

3.4 Practice on infection prevention and control of respondents:

Table 05 presents the practice level of participants on infection prevention and control. Only 61.8% respondents always washed their hands before examining patients. Most of the respondents did not wear goggles during procedures regularly. Maximum participants always wear medical gown during procedures. Almost half of the respondents always used gloves while examining all patients. 57.6% participants always used face mask while examining possibly infective patients.

Table 04: Obstacle on infection prevention and control of respondents

Variables	Level	N	%
Lack of training on infection control guidelines.	Not important	173	16.7
	Important	609	58.6
	Very important	257	24.7
Lack of personal protection.	Not important	120	11.5
	Important	445	42.8
	Very important	474	45.6
Inadequate hand washing facility.	Not important	167	16.1
	Important	606	58.3
	Very important	266	25.6
Lack of guidelines at primary health care center.	Not important	150	14.4
	Important	526	50.6
	Very important	363	34.9
Shortage of health workers.	Not important	175	16.8
	Important	487	46.9
	Very important	377	36.3

3.5 Obstacle on infection prevention and control of respondents:

Some obstacles on infection prevention and control and respondent's thinking on that are represented in **Table 4**. Here some obstacles have been included such as lack of training on infection control guidelines, lack of personal protection, inadequate hand washing facility, lack of guidelines at primary health care center and shortage of health workers. Maximum participants thought that these are the obstacles and they thought implementations of these factors are very important to enhance infection prevention and control.

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Table 6: Chi-square test for evaluating the association between respondent's age and their knowledge

Dependent variable : Age		<20	21-30	31-40	40<	Total	p
Total N (%)		N(%)=152 (14.6)	N(%)=612 (59.0)	N(%)=240 (23.1)	N(%)=34 (3.3)	N(%)= 1038	
Dirty needle and sharp materials can transmit disease causing agents.	True	145 (95.4)	604 (98.7)	230 (95.8)	34 (100.0)	1013 (97.6)	**0.016**
	False	7 (4.6)	8 (1.3)	10 (4.2)	0 (0.0)	25 (2.4)	
Needles should be bent or broken after use.	True	139 (91.4)	591 (96.6)	235 (97.9)	34 (100.0)	999 (96.2)	**0.005**
	False	13 (8.6)	21 (3.4)	5 (2.1)	0 (0.0)	39 (3.8)	
Hepatitis B causing agent can be transmitted with dirty needles and sharps.	Trgue	122 (80.3)	558 (92.1)	235 (97.9)	29 (85.3)	944 (91.5)	**<0.001**
	False	30 (19.7)	48 (7.9)	5 (2.1)	5 (14.7)	88 (8.5)	
Hepatitis C causing agent can be transmitted with dirty needles and sharps.	True	122 (80.3)	523 (85.5)	240 (100.0)	34 (100.0)	919 (88.5)	**<0.001**
	False	30 (19.7)	89 (14.5)	0 (0.0)	0 (0.0)	119 (11.5)	
AIDS/HIV causing agent can be transmitted with dirty needles and sharps.	True	144 (94.7)	598 (97.7)	235 (97.9)	34 (100.0)	1011 (97.4)	0.130
	False	8 (5.3)	14 (2.3)	5 (2.1)	0 (0.0)	27 (2.6)	
Tuberculosis causing agent can be transmitted with dirty needles and sharps.	True	112 (73.7)	389 (63.6)	161 (67.1)	21 (61.8)	683 (65.8)	0.112
	False	40 (26.3)	223 (36.4)	79 (32.9)	13 (38.2)	355 (34.2)	
Malaria causing agent can be transmitted with dirty needles and sharps.	True	104 (68.4)	315 (51.5)	119 (49.6)	18 (52.9)	556 (53.6)	**0.001**
	False	48 (31.6)	297 (48.5)	121 (50.4)	16 (47.1)	482 (46.4)	

Table 7: Chi-square test for evaluating the association between respondent's duration of working and their knowledge

Dependent: Duration of working		less than 1 year	1-5 year	5-10 year	10<	Total	p
Total N (%)		N(%)=259 (25.0)	N(%)=482 (46.4)	N(%)=204 (19.7)	N(%)=93 (9.0)	N(%)= 1038	
Dirty needle and sharp materials can transmit disease causing agents.	True	259 (100.0)	467 (96.9)	204 (100.0)	83 (89.2)	1013 (97.6)	**<0.001**
	False	0 (0.0)	15 (3.1)	0 (0.0)	10 (10.8)	25 (2.4)	
Needles should be bent	True	246 (95.0)	475 (98.5)	190 (93.1)	88 (94.6)	999	**0.002**

or broken after use.						(96.2)	
	False	13 (5.0)	7 (1.5)	14 (6.9)	5 (5.4)	39 (3.8)	
Hepatitis B causing agent can be transmitted with dirty needles and sharps.	True	230 (88.8)	422 (88.7)	199 (97.5)	93 (100.0)	944 (91.5)	**<0.001**
	False	29 (11.2)	54 (11.3)	5 (2.5)	0 (0.0)	88 (8.5)	
Hepatitis C causing agent can be transmitted with dirty needles and sharps.	True	214 (82.6)	415 (86.1)	197 (96.6)	93 (100.0)	919 (88.5)	**<0.001**
	False	45 (17.4)	67 (13.9)	7 (3.4)	0 (0.0)	119 (11.5)	
AIDS/HIV causing agent can be transmitted with dirty needles and sharps.	True	251 (96.9)	475 (98.5)	192 (94.1)	93 (100.0)	1011 (97.4)	**0.003**
	False	8 (3.1)	7 (1.5)	12 (5.9)	0 (0.0)	27 (2.6)	
Tuberculosis causing agent can be transmitted with dirty needles and sharps.	True	210 (81.1)	270 (56.0)	126 (61.8)	77 (82.8)	683 (65.8)	**<0.001**
	False	49 (18.9)	212 (44.0)	78 (38.2)	16 (17.2)	355 (34.2)	
Malaria causing agent can be transmitted with dirty needles and sharps.	True	170 (65.6)	232 (48.1)	104 (51.0)	50 (53.8)	556 (53.6)	**<0.001**
	False	89 (34.4)	250 (51.9)	100 (49.0)	43 (46.2)	482 (46.4)	

3.6 Chi square analysis for determining the associated factors with knowledge on infection prevention and prevention:

According to the chi square test, age is significantly associated with participant's knowledge. Maximum older participants had knowledge on infection prevention and control (<0.001). Working experience is also significantly associated factor regarding knowledge on it. Participants who had more experience specifically more than 10 years they had a good knowledge (<0.001). Permanent employers had good knowledge. Participants who had taken training they had a good knowledge. Moreover, working shift is significantly associated with knowledge on it. Respondents who worked day shift they had good knowledge on infection prevention and control.

Table 8: Chi-square test for evaluating the association between respondent's employment status and their knowledge

Dependent: Employment status		Permanent	Temporary	Total	p
Total N (%)		N(%)=774 (74.7)	N(%)=262 (25.3)	N(%)=1036	
Dirty needle and sharp materials can transmit disease causing agents.	True	754 (97.4)	257 (98.1)	1011 (97.6)	0.702
	False	20 (2.6)	5 (1.9)	25 (2.4)	
Needles should be bent or broken after use.	True	753 (97.3)	244 (93.1)	997 (96.2)	**0.004**
	False	21 (2.7)	18 (6.9)	39 (3.8)	
Hepatitis B causing agent can be	True	714 (93.0)	228 (87.0)	942 (91.5)	**0.004**

transmitted with dirty needles and sharps.	False	54 (7.0)	34 (13.0)	88 (8.5)	
Hepatitis C causing agent can be transmitted with dirty needles and sharps.	True	705 (91.1)	212 (80.9)	917 (88.5)	**<0.001**
	False	69 (8.9)	50 (19.1)	119 (11.5)	
AIDS/HIV causing agent can be transmitted with dirty needles and sharps.	True	762 (98.4)	247 (94.3)	1009 (97.4)	**0.001**
	False	12 (1.6)	15 (5.7)	27 (2.6)	
Tuberculosis causing agent can be transmitted with dirty needles and sharps.	True	491 (63.4)	190 (72.5)	681 (65.7)	**0.009**
	False	283 (36.6)	72 (27.5)	355 (34.3)	
Malaria causing agent can be transmitted with dirty needles and sharps.	True	411 (53.1)	145 (55.3)	556 (53.7)	0.577
	False	363 (46.9)	117 (44.7)	480 (46.3)	

4. Discussion:

This study revealed the knowledge, attitude, practice and obstacle on infection prevention and control among healthcare workers in primary and secondary hospitals in several rural area, Bangladesh.

Table 9: Chi-square test for evaluating the association between respondent's taking training on infection prevention and control and their knowledge

Dependent: Taking training on infection prevention and control		**Yes**	**No**	**Total**	**p**
Total N (%)		N(%)=529 (51.0)	N(%)=509 (49.0)	N(%)=1038	
Dirty needle and sharp materials can transmit disease causing agents.	True	524 (99.1)	489 (96.1)	1013 (97.6)	**0.003**
	False	5 (0.9)	20 (3.9)	25 (2.4)	
Needles should be bent or broken after use.	True	517 (97.7)	482 (94.7)	999 (96.2)	**0.016**
	False	12 (2.3)	27 (5.3)	39 (3.8)	
Hepatitis B causing agent can be transmitted with dirty needles and sharps.	True	507 (95.8)	437 (86.9)	944 (91.5)	**<0.001**
	False	22 (4.2)	66 (13.1)	88 (8.5)	
Hepatitis C causing agent can be transmitted with dirty needles and sharps.	True	510 (96.4)	409 (80.4)	919 (88.5)	**<0.001**
	False	19 (3.6)	100 (19.6)	119 (11.5)	
AIDS/HIV causing agent can be transmitted with dirty needles and sharps.	True	517 (97.7)	494 (97.1)	1011 (97.4)	0.623
	False	12 (2.3)	15 (2.9)	27 (2.6)	
Tuberculosis causing agent can be transmitted with dirty needles and sharps.	True	388 (73.3)	295 (58.0)	683 (65.8)	**<0.001**
	False	141 (26.7)	214 (42.0)	355 (34.2)	
Malaria causing agent can be transmitted with dirty needles and sharps.	True	278 (52.6)	278 (54.6)	556 (53.6)	0.545
	False	251 (47.4)	231 (45.4)	482 (46.4)	

Table 10: Chi-square test for evaluating the association between respondent's working shift and their knowledge

Dependent: Working shift		Day	Night	Both	Total	p-value
Total N (%)		N(%)=363 (35.0)	N(%)=57 (5.5)	N(%)=618 (59.5)	N(%)=1038	
Dirty needle and sharp materials can transmit disease causing agents.	True	358 (98.6)	52 (91.2)	603 (97.6)	1013 (97.6)	**0.003**
	False	5 (1.4)	5 (8.8)	15 (2.4)	25 (2.4)	
Needles should be bent or broken after use.	True	356 (98.1)	52 (91.2)	591 (95.6)	999 (96.2)	**0.019**
	False	7 (1.9)	5 (8.8)	27 (4.4)	39 (3.8)	
Hepatitis B causing agent can be transmitted with dirty needles and sharps.	True	358 (98.6)	52 (91.2)	534 (87.3)	944 (91.5)	**<0.001**
	False	5 (1.4)	5 (8.8)	78 (12.7)	88 (8.5)	
Hepatitis C causing agent can be transmitted with dirty needles and sharps.	True	362 (99.7)	57 (100.0)	500 (80.9)	919 (88.5)	**<0.001**
	False	1 (0.3)	0 (0.0)	118 (19.1)	119 (11.5)	
AIDS/HIV causing agent can be transmitted with dirty needles and sharps.	True	363 (100.0)	52 (91.2)	596 (96.4)	1011 (97.4)	**<0.001**
	False	0 (0.0)	5 (8.8)	22 (3.6)	27 (2.6)	
Tuberculosis causing agent can be transmitted with dirty needles and sharps.	True	263 (72.5)	50 (87.7)	370 (59.9)	683 (65.8)	**<0.001**
	False	100 (27.5)	7 (12.3)	248 (40.1)	355 (34.2)	
Malaria causing agent can be transmitted with dirty needles and sharps.	True	229 (63.1)	40 (70.2)	287 (46.4)	556 (53.6)	**<0.001**
	False	134 (36.9)	17 (29.8)	331 (53.6)	482 (46.4)	

According to our study, knowledge level was good among healthcare workers. They knew about infection transmission through needle, sharp etc. They knew that HIV/AIDS, Tuberculosis, Hepatitis virus can transmit in hospital. In Nepal, a study revealed that 70% healthcare workers had accurate knowledge and they did not misuse their medical instruments (Panta *et al*.,2022). In Pakistan, 76.30% participants had good knowledge and most of them had more than 2 years working experience (Mahdi *et al*.,2021). In our study, 46.4% participants had 1-5 years working experience. In Saudi Arab, a study exposed that around 84% central sterile supply department staffs had proper knowledge (Almedaini *et al.*,2021). The same study exposed in their research that 31.6% respondents had poor knowledge about infection prevention and control (Al-Ahmari *et al*.,2021).

According to our study, almost all respondents had positive attitude on infection prevention and control. They thought that standard precaution can prevent infection. Another reported that the majority of the staff was positive about using hand sanitizer before and after entering the work area, arranging recyclable medical equipment in an organized and effective manner, handling cutting blades, using a spill kit, disassembling refillable medical devices while cleaning, adhering to proper implications for wearing and epaulettes PPE, and using a usability evaluation test (Almedaini *et al*.,2021). According to another study, 79.5% healthcare staffs had proper attitude on infection prevention and control (Zaman *et al*.,2021). In Saudi Arab, a research had been conducted by Al-Ahmari et al. In their study, they showed that 88.1% respondents had positive attitude on it (Al-

Ahmari *et al.*,2021). In Saudi Arab, another study had been conducted by Abalkhail *et al*. They reported in their research that only 61.5% respondents had positive attitude on hospital infection prevention and control (Abalkhai *et al*.,2021).

As per our study, respondents did not practice properly on infection prevention and control. Only 57.6% participants used face mask and 61.8% participants washed their hands before examining patients. According to the Abalkhail *et al*, study in Saudi Arab, 73.2% participants had good practice on it (Abalkhail *et al.*,2021). In South Karnataka, a research revealed that around 95% healthcare staffs washed their hands before and after patients caring (Bhageerathi and Naik, 2019).

According to our study some obstacles had been revealed. They were lack of training on infection control guidelines, lack of personal protection, inadequate hand washing facility, lack of guidelines at primary health care center, shortage of health workers.

Another area of basic human rights that is being grossly violated in Bangladesh and is receiving inadequate attention is the handling of hospital trash. In most cases, healthcare facilities are not equipped with a method for the secure disposal of waste. The media frequently covers stories about recycling programs that collect unwanted things from medical facilities like hospitals and clinics. One of the fundamental requirements of managing a hospital is to sort the waste into different categories, such as sharps, infected goods, and non-infected items, and then to dispose of them at the prescribed location after giving them the appropriate treatment (Hasan, 2010). This is one of the essential tasks. Some of the commercially owned hospitals in Dhaka have implemented fundamental infection control procedures, but the vast majority of hospitals in the city, including those controlled by the government and those run by private operators, are not even aware that such methods exist. Microbiologists have a significant role to play in this situation. They are able to engage not only by delivering cultural and susceptibility assessments but also by assisting in the organization of training courses for healthcare staff, making contributions to the standard control of the central sterile supply department (CSSD), and carrying out surveillance (Hasan, 2010).

In Bangladesh, there are a few non-profit groups that are working to reduce the spread of infectious diseases. One of these organizations, known as the Infection Control and Prevention in Bangladesh (ICPPB), is responsible for starting up the practice of holding seminars and roundtable talks in Dhaka's medical facilities. The fact that these kinds of efforts have brought about positive improvements in the private sector is an encouraging observation. However, the answer from the government is not even close to being sufficient. It is past time for the government to take action and put into place the fundamental procedures for controlling infections in all hospitals; the sooner they do this, the better.

5. Conclusion

This study exposed the good knowledge, positive attitude and low level practice on infection prevention and control among healthcare staffs. Some factors were associated with them. Some obstacles and respondent's perception about those obstacles were identified. Government should take proper steps and government/NGO should invest money to arrange seminar, workshop to deliver knowledge to healthcare staff specially primary and secondary care hospital's healthcare staffs.

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7. Authors Contributions

Research concept- Mohammd Zakerin Abedin, Md. Emdadul Hasan Mukul & Safayet Jamil, Research design- Emdadul Hasan Mukul, Asma Akhter & Safayet Jamil, Supervision- Md. Emdadul Hasan Mukul, Literature search- Safayet Jamil & Asma Akhter, Data collection- Rakibur Rahman, Md. Tawhed Islam, Nazmul Islam, Al Amin Sarkar, Asma Akhter & Safayet Jamil, Data analysis and interpretation- Mohitul Ameen Ahmed Mustafi, Mahdi Hasan & Safayet Jamil, Writing article- Safayet Jamil, Asma Akhter & Rakibur Rahman, Article editing- Md. Emdadul Hasan Mukul, Final approval- All authors.

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9. Conflict of Interests

The authors declare no conflicts of interests.

10. Reference

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