



ASSESSMENT OF KNOWLEDGE, ATTITUDES, AND PRACTICES TOWARDS INFECTION PREVENTION AND CONTROL AMONG HEALTH-CARE WORKERS IN A TERTIARY CARE HOSPITAL

Preventive & Social Medicine

Dr Sagar Sonawane	Professor, Department of Pediatrics, Dr Vasantao Pawar Medical College, Adgaon, Nashik.
Dr Rahul Koppikar	Associate Professor, Department of Pediatrics, Dr Vasantao Pawar Medical College, Adgaon, Nashik.
Dr Balaji Almale	Professor, Department of Community Medicine, Dr Vasantao Pawar Medical College, Adgaon, Nashik.
Dr Akshay Patil*	Assistant Professor, Department of Pediatrics, Dr Vasantao Pawar Medical College, Adgaon, Nashik. *Corresponding Author

ABSTRACT

Aim: To assess knowledge, attitude, and practices of health-care workers regarding infection prevention and control. **Study Design And Settings:** A cross-sectional study was conducted in a multidisciplinary tertiary care hospital from December 2022 to February 2023. **Methods:** Stratified random sampling technique was used to select 200 participants from the following categories of HCWs- consultants, residents, interns, nursing staff and laboratory technicians. Data was collected by using self-administered structured and validated questionnaire. Another self-administered questionnaire was used to determine perception of health-care workers regarding barriers to apply infection prevention and control strategies. **Data Analysis And Interpretation:** The collected information was entered in to Epi-info to check and manage the data, and finally analysed using statistical package for social sciences (SPSS) statistical software version 16. The knowledge score showed a mean of 9.43 with an SD of 1.48 in a score range of 5 -12 where the minimum score was 5 and the maximum score was 12. It, therefore, indicates that health-care workers have adequate knowledge of infection prevention and control. The practice score shows a mean of 7.92 with an SD of 1.87 in a range of 3 -10 score where the minimum score was 3 and the maximum score was 10. It, therefore, indicates that health-care workers follow poor practices with regard to infection prevention and control. The attitude score shows a mean of 7.17 with an SD of 1.67 in a range of 0 -10 score where the minimum score was 4 and the maximum score was 8. It, therefore, indicates that health-care workers have positive attitudes towards infection prevention and control

KEYWORDS

Infection, Prevention, Knowledge, Practice, Barriers

INTRODUCTION

Health-care associated infection (HAI) is localized or systemic condition resulting from adverse reaction to the presence of infectious agent or its toxins acquired from health care settings that was not incubating or symptomatic at the time of admission to the health-care facility ⁽¹⁾. WHO defines Health care-associated infection (HAI), also referred to as "nosocomial" or "hospital" infection, as an infection occurring in a patient during the process of care in a hospital or other health care facility which was not present or incubating at the time of admission. HAI can affect patients in any type of setting where they receive care and can also appear after discharge.

Common types of HAIs include surgical site infections, urinary tract infections (UTIs), bloodstream infections, hospital-acquired pneumonia, and device-associated infection. Bacteria, viruses, fungi, and parasites are recognized as sources of HAIs but bacterial agents are the most common cause of these infections, for example *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa* and enterococci. There are several risk factors for acquiring HAIs such as the presence of underlying conditions e.g. diabetes, renal failure, malignancies; long hospital admissions; surgical or invasive procedures; the insertion of medical devices, intravenous tubing or artificial joints and the receipt of prior antimicrobial therapy, which may lead to antimicrobial resistance.

Health care associated infections (HAI) are a major burden for patients, society, and health-care management. Health caregivers are constantly being exposed to health-care associated infections. HAI increase the morbidity and mortality in ICU settings and prolong hospital stay ⁽²⁾. Emergence and re-emergence of life-threatening infections and increasing antimicrobial resistance highlights the need for effective infection prevention and control in health-care settings as well as in the community. HAI are two to twenty times more common in developing countries than developed ones ⁽³⁾. One of the major reasons for these high rates of HAIs is lack of effective infection control programs, possibly due to limited resources ⁽⁴⁾. Other barriers are differences in knowledge and application of 'infection prevention and control' strategies amongst health-care workers.

morbidity and mortality, length of hospital stay, and cost associated with hospital stay. This is achieved by imparting research-based knowledge and training to health-care workers and emphasising its application on the ground. Various studies have shown varying trends of knowledge, attitude, and practices amongst health-care workers at various health-care settings. This study helps in assessing health-care worker's knowledge, attitude towards infection prevention and control and its actual application in tertiary health care setting.

AIMS AND OBJECTIVES

Primary Objective: To assess knowledge, attitude, and practices of health-care workers regarding infection prevention and control.

Secondary Objective: To assess the perceptions of health-care workers regarding barriers in implementation of infection prevention and control.

METHODOLOGY:

Study Design And Settings: A cross-sectional study was conducted in a multidisciplinary tertiary care hospital from December 2022 to February 2023.

Sampling Size And Sampling Technique: Knowledge prevalence is 67.6% (**Adil Abalkhail et al**), $I = 0.0676$ (10% of P), Sample size = 188- rounded to 200. Sampling technique – For achieving the sample size of 200, stratified random sampling technique was used to select participants from the following categories of HCWs- consultants, residents, interns, nursing staff, and laboratory technicians.

Data Collection Method: Data was collected by using self-administered structured and validated questionnaire which has different items such as demographic characters, knowledge, attitude, and practice. Questionnaire included four sections, as socio-demographic characteristics, knowledge, attitude, practice, and perception. Another self-administered questionnaire was used to determine perception of health-care workers regarding barriers to apply infection prevention and control strategies. Questionnaire was distributed amongst health-care workers in the OPD, ward and laboratories.

Data Analysis And Interpretation: The collected information was

Good infection prevention and control programs reduce patients'

entered in to Epi-info to check and manage the data, and finally analysed using statistical package for social sciences (SPSS) statistical software version 16. Knowledge questions were scored as 1 or 0 for correct and incorrect responses respectively. Positive or favourable attitude is scored as 1 and neutral or negative attitude is scored as 0. Responses for practice are scored as 3, 2 and 1 for always, sometimes, and never for correct or favourable practices of infection prevention and control. Mean scores for questions in all segments were calculated and used as a cut-off point to dichotomize the outcome variables. Scores below the mean considered as inadequate knowledge, unfavourable attitude, or inadequate practice. Proportion for categorical variables was compared using chi-square test. In all cases p values less than 0.05 was taken as statistically significant. The feedback regarding barriers to application of IPC strategies was analysed using simple frequency distribution.

Table: 1 Knowledge On Infection Prevention Among Health-Care Workers

Question	Response	Frequency (%)
1. Are you aware about infection prevention & control policies and guidelines?	Yes	184(92)
	No	16 (8)
2. Does the 'bundle approach' help in preventing hospital-acquired infection?	Yes	170(85)
	No	30(15)
3. Does hand washing help in preventing health-care related infections?	Yes	198(99)
	No	2 (1)
4. Does 1:100 dilution of Sodium Hypochlorite sufficient to decontaminate large spills (>10ml)?	Yes	133 (66.50)
	No	67 (33.50)
5. Is antibiotic prophylaxis indicated in colorectal surgeries?	Yes	178 (89)
	No	22 (11)
6. Is the chemical sterilization technique used for all equipment?	Yes	86 (43)
	No	114(57)
7. Do you believe that all microorganisms including spores are destroyed by autoclaving?	Yes	145 (72.5)
	No	55 (27.50)
8. Are alcohol-based chlorhexidine antiseptic solutions used in surgical site skin preparation?	Yes	152 (76)
	No	48 (24)
9. Does all equipment need decontamination before sterilization?	Yes	173(86.5)
	No	27 (13.5)
10. Does protective clothing minimize hospital-acquired infection?	Yes	186 (93)
	No	14 (7)
11. Did you know that there is post-exposure prophylaxis for HIV?	Yes	183 (91.5)
	No	17 (8.5)
12. Do you believe that drug-resistant microorganisms are restricted to health institutions?	Yes	116 (58)
	No	84 (42)

Table 2: Attitude Towards Infection Prevention & Control

Question	Response	Frequency (%)
13. It is necessary to wash hands before examining every patient	Strongly Agree	130 (65)
	Agree	62 (31)
	Neutral	5 (2.5)
	Disagree	3 (1.5)
	Strongly Disagree	0
14. Standard operating procedures decreases the risk of contamination	Strongly Agree	131 (65.5)
	Agree	63 (31.5)
	Neutral	3 (1.5)
	Disagree	3 (1.5)
	Strongly Disagree	1 (0.5)
15. Daily cleaning of the operation theatre and intensive care areas will prevent and control the infection	Strongly Agree	143 (71.5)
	Agree	52 (26)
	Neutral	4 (2)
	Disagree	1 (0.5)
	Strongly Disagree	0
16. Overcrowding of working areas increases the transmission of infection	Strongly Agree	138 (69)
	Agree	55 (27.5)
	Neutral	4 (2)
	Disagree	2 (1)
	Strongly Disagree	1 (0.5)
17. Proper sterilization of equipment before any procedure is necessary to prevent infection	Strongly Agree	152 (76)
	Agree	42 (21)
	Neutral	5 (2.5)
	Disagree	1 (0.5)
	Strongly Disagree	0
18. Vaccination decreases the risk of acquiring hospital-acquired infections	Strongly Agree	92 (46)
	Agree	66 (33)
	Neutral	27 (13.5)
	Disagree	9 (4.5)

RESULTS & OBSERVATIONS

The present cross-sectional study was conducted in a multidisciplinary tertiary care hospital with an aim to assess the knowledge, attitude, and practices of health-care workers regarding infection prevention and control. An online self-administered structured and validated questionnaire was circulated among a total of 200 participants among health-care workers.

Out of 200 participants, 127 (63.50%) were less than 40 years of age group. 73 (36.50%) participants were more than 40 years age group. It is observed that 107 (53.50%) were female participants and 93 (46.50%) were male participants. The ratio of female: male is 1.15:1. Majority 63 (31.5 %) of participants were consultants followed by 50 (25 %) nursing staff, 32 (16 %) technicians, 30 (15 %) interns & 25 (12.5%) residents.

	Strongly Disagree	4 (2)
19. Antibiotic Prophylaxis prevents the hospital-acquired infections	Strongly Agree	67 (38)
	Agree	79 (39.5)
	Neutral	24 (12)
	Disagree	25 (12.5)
	Strongly Disagree	5 (2.5)
20. Patient's awareness and education about the transmission of infection decreases the risk of hospital-acquired infection	Strongly Agree	115 (57.5)
	Agree	77 (38.5)
	Neutral	4 (2)
	Disagree	1 (0.5)
	Strongly Disagree	1 (0.5)

Table 3: Practice Associated With Infection Prevention & Control

Question	Response	Frequency (%)
21. Do you wash your hands before and after taking blood/urine/ biological samples?	Always	184 (92)
	sometimes	15 (7.5)
	Never	1 (0.5)
22. Do you wear a sterile gown, gloves, and mask before the procedure?	Always	174 (87)
	sometimes	24 (12)
	Never	2 (1)
23. Do you follow standard guidelines for the preparation and administration of medication?	Always	169 (84.5)
	sometimes	30 (15)
	Never	1 (0.5)
24. Do you discard biomedical wastes as per the guidelines in different bins?	Always	185 (92.5)
	sometimes	15 (7.5)
	Never	0
25. Do you wash your hands immediately when you come into contact with blood, body fluid, and contaminated material?	Always	190 (95)
	sometimes	10 (5)
	Never	0
26. Do you enter the operation theatre and other sterilized areas wearing gowns and masks?	Always	176 (88)
	sometimes	20 (10)
	Never	4 (2)
27. Do you insist your colleagues follow infection prevention and control practices in the healthcare facility?	Always	175 (87.5)
	sometimes	21 (10.5)
	Never	4 (2)
28. Do you follow the protocol of 'hospital infection prevention and control' of your hospital to prevent infection in your workplace	Always	182 (91)
	sometimes	17 (8.5)
	Never	1 (0.5)
29. Do you recap needles before disposal?	Always	138 (69)
	sometimes	27 (13.5)
	Never	32 (16)
30. Do you eat and drink in your working area?	Always	27 (13.5)
	sometimes	65 (32.5)
	Never	107 (53.5)

The total mean knowledge score in the age group less than 40 years was 9.40 & SD 1.52 while in the age group of more than 40 years, it was 9.48 & SD 1.42. The association of knowledge score with age group was statistically insignificant. The total mean practice score in the age group less than 40 years was 8.24 with SD 1.57 and in the age group more than 40 years, it was 7.34 with SD 2.21. The association of practice score with age group was statistically significant. The total mean attitude score in the age group less than 40 years was 7.12 with SD 1.52 and in the age group more than 40 years, it was 7.21 with SD 2.63. The association of attitude score with age group was also statistically insignificant.

Table 4: Descriptive Statistic Summary Reflecting Knowledge, Attitude, And Practice Scores Of Health-care Workers Regarding Infection Prevention And Control (n=200).

	Knowledge score	Practice score	Attitude score
N	200	200	200
Mean	9.43	7.92	7.17
SD	1.48	1.87	1.67
Minimum	5	3	4
Maximum	12	10	8

Table 5: Study Of Perception About Barriers In The Implementation Of IPC Practices

Perception	Frequency (N)	Percentage (%)
Inadequate hand-washing practices	56	28
Inadequate training regarding IPC practices	40	20

The negative attitude of health-care workers toward the IPC policy	35	17.5
Inadequate staff	36	18
Shortage of material supply	40	20
Inexperienced staff	34	17
Patient's and visitor's unawareness of IPC	56	28
Overcrowding in the hospital	32	16

DISCUSSION

The knowledge score shows a mean of 9.43 with SD 1.48 in a range of 5 - 12 score where the minimum score was 5 and the maximum score was 12. It, therefore, indicates that health-care workers have adequate knowledge of infection prevention and control. The practice score shows a mean of 7.92 with SD 1.87 in a range of 3 - 10 score where the minimum score was 3 and the maximum score was 10. It, therefore, indicates that health-care workers follow poor practices regarding infection prevention and control. The attitude score shows a mean of 7.17 with an SD of 1.67 in a range of 0 - 10 score where the minimum score was 4 and the maximum score was 8. It, therefore, indicates that health-care workers have positive attitudes towards infection prevention and control. Study by Oliveria AC et al shows that even if health-care workers have adequate knowledge of infection prevention and control, their attitude towards infection prevention and control may not be compatible with knowledge⁽⁵⁾. The study by Acharya AS, Khandekar J et al revealed that nurses had poor knowledge about standard precautions (97.9%). 189 (64.5%) nurses had inadequate knowledge about the transmission of blood-borne pathogens; more than three-fourth (77.5%) were aware about hepatitis-B vaccine; majority (72.7%) practiced washing soiled hands immediately; and more than half (58.7%) used Gowns and Gloves very often⁽⁶⁾. A study showed the prevalence of good knowledge, attitude, and practice were

67.6%, 61.5%, and 73.2%, respectively. The predictors of good knowledge included the age of the HCWs (>34 years) and training. More than 6 years of work experience was a significant predictor of having a positive attitude and practice. Predictors of good practice were previous exposure to HAIs, and training⁽⁷⁾.

It was observed that 56 (28%) health care workers had perception that inadequate hand-washing practices is a barrier to implement infection prevention and control. 20 (20%) participants believed that inadequate training is responsible for poor IPC practices. 35 (17.5%) participants said that a negative attitude of health-care workers toward the IPC policy is one of the barriers in implementing IPC. Among the participants, 36 (18%) attributed inadequate IPC to inadequate staff, 40 (20%) to shortage of material supply, 34 (17%) to inexperienced staff, 56 (28%) to lack of awareness of IPC among patients & visitors & 32 (16%) to overcrowding in the hospital.

Adinma ED et al found that the most important factor influencing universal precautions practice is the lack of provision of adequate protective equipment. Other factors include carelessness, lack of display of universal precaution guidelines, emergency nature of procedures, insufficient water supply, patient perceived to be at low risk of blood borne pathogens, pressure of time, and universal precaution equipment interfering with technical skills⁽⁸⁾.

There are several barriers that need to be addressed, such as culture, working conditions, and communication problems through documented interventions in education, working environment, and professional identity of nursing staff⁽⁹⁾. Low compliance of hand hygiene, lack of training, heavy workload, and underuse of personal protective equipment are other major obstacles in preventing infection and spread of multi-drug-resistant pathogens⁽¹⁰⁾.

Most of the healthcare workers follow appropriate practices regarding infection prevention and control apart from capping needles prior to their disposal. However, the younger group of health care workers (below 40 years) adhered to infection prevention and control practices better than their older counterparts. This possibly represents awareness programmes and activities in recent years which younger individuals have received as a part of their training and education. It also emphasises the need to involve health care workers right up to senior designations and older age groups in the sensitisation programmes for infection prevention and control.

It appears that very few of the health care workers were able to attribute various factors as barriers to implement infection prevention and control practices. This probably represents the inability of the participants to use their existing knowledge, attitude, and practices to identify the exact barriers in their environments and a tendency to accept some of these barriers rather than see them as obstacles to be removed. This reiterates the need to motivate health care workers to see themselves as advocates of change rather than accept the status quo and is another aspect of infection prevention and control that can be incorporated in future strategies.

REFERENCES:

- Horan TC, Andrus M, Dudeck MA. CDC/NHSN surveillance definition of health care-associated infection and criteria for specific types of infections in the acute care setting. *Am J Infect Control*. 2008;36(5):309–32. (1a)
- Huixue, Liuyi Li, Weiguang Li, Tieying Hou, Hongqiu Liu et al. Impact of Healthcare Associated infections on Length of Stay: A study in 68 Hospitals in China, *BioMed Research International*, Vol 2019, April 2019.
- Allegranzi B, Nejad SB, Combescure C, Graffmans W, Attar H, Donaldson L et al. Burden of endemic healthcare-associated infection in developing countries: Systematic review and meta-analysis. *Lancet* 2011; 377:228–41.
- Purva Mathur, Prevention of Healthcare-Associated infections in Low- and Middle-Income Countries: The “Bundle Approach”, *Indian Journal of Medical Microbiology*, April-June 2018, Vol 36(2): 155–162.
- Oliveria AC, Marziale MHP, Paiva MHRS, Lopes ACS. Knowledge and attitude regarding standard precautions in a Brazilian public emergency service: A cross-sectional study. *Rev Esc Enferm USP* 2009;43:313–9. [PubMed] [Google Scholar]
- Acharya AS, Khandekar J, Sharma A, Tilak HR, Kataria A. Awareness and practices of standard precautions for infection control among nurses in a tertiary care hospital. *Nurs J India*. 2013;104:275–9. [PubMed] [Google Scholar]
- Abalkhail A, Al Imam MH, Elmoasad YM, Jaber MF, Hosis KA, Alhumaydhi FA, Alsalmah T, Alamer A, Mahmud I. Knowledge, Attitude and Practice of Standard Infection Control Precautions among Health-Care Workers in a University Hospital in Qassim, Saudi Arabia: A Cross-Sectional Survey. *Int J Environ Res Public Health*. 2021 Nov 11;18(22):11831. doi: 10.3390/ijerph182211831. PMID: 34831585; PMCID: PMC8624606.
- Adinma ED, Ezeama C, Adinma JI, Asuzu MC. Knowledge and practice of universal precautions against blood borne pathogens amongst house officers and nurses in tertiary health institutions in Southeast Nigeria. *Niger J Clin Pract*. 2009;12:398–402. [PubMed] [Google Scholar]
- Dimitriadou I, Pittas S, Sidiropoulos A, et al. (December 28, 2022) Perception of Nursing Staff in ICU Regarding Measures to Prevent Hospital-Acquired Infections: A

Qualitative Approach. *Cureus* 14(12): e33029. doi:10.7759/cureus.33029

- Gupta R, Sharma S, Yadav A, Arora U, Bhattar S, Sherwal B L. A multicentric study to ascertain knowledge, attitude and practices for infection prevention and control amongst nurses. *J Saf Infect Control* 2020;8:21–8