ORIGINAL ARTICLE

Infection Prevention and Control Practices at a Tertiary Care Centre in New Delhi

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CITATION

Chauhan K, Kumar R, Sherin RTP. Infection Prevention and Control Practices at a Tertiary Care Centre in New Delhi. Journal of the Epidemiology Foundation of India. 2025;3(2):113-119.

DOI: https://doi.org/10.56450/JEFI.2025.v3i02.003

ARTICLE CYCLE

Received: 13/05/2025; Accepted: 11/06/2025; Published: 30/06/2025

ABSTRACT

Background: Infection prevention and control is a domain of public health that is universally applicable to healthcare professionals as well as patients, at every healthcare interaction. It is the most credible approach to prevent the transmission of infections and associated hazards. HAI is a significant problem, but prevention strategies are effective and cheap, with training programs being easy to plan and implement in almost every variety of clinical setting, yielding an encouraging cost-benefit ratio, thus pointing to the vitality of KAP amongst HCWs. **Objective**: To assess the knowledge, attitude and practices of healthcare workers regarding infection prevention and control towards minimizing the risk of healthcare associated infections. **Methodology**: A cross-sectional, descriptive study conducted from November 2023 to October 2024 at a tertiary care hospital in New Delhi. The study population consisted of all healthcare workers (resident doctors and nurses) working in the Neonatology Department. A semi-structured, self-administered questionnaire was used to assess the KAP of the HCWs. **Result**: The majority of HCWs demonstrated good to excellent knowledge scores, excellent attitude scores and excellent practice scores. Only a minor proportion had average or below average knowledge score, with nursing staff demonstrating lower overall performance than resident doctors. A significant association was observed between years of experience and knowledge (p= 0.046) and between position held and knowledge (p=0.009), but not with attitude and practice. Significant barriers to IPC included lack of time and insufficient supplies. Empirical treatment was the main rationale behind antibiotic prescription. **Conclusion**: Most HCWs had satisfactory scores, with the overall KAP scores being highest for senior residents, followed by junior residents and nurses. Lack of time was the primary barrier to IPC.

KEYWORDS

Public Health; Tertiary Care Centers; Health Knowledge, Neonatology; Health Personnel; Nursing Staff; Cross Infection

INTRODUCTION

A practical evidence-based approach underpins the clinical and public health specialty of infection prevention and control, which aims to protect patients, healthcare personnel, and visitors to medical facilities from preventable infections, including those

brought on by pathogens resistant to anti-microbials, usually acquired during the provision of healthcare services. It holds a special place in the domain of safety and quality of care in health, since it is pertinent to all healthcare interactions between patients and medical professionals.(1)

Often known as 'nosocomial' or 'hospital-acquired' infections, healthcare-associated infections (HAIs), are those that develop in a patient during the course of healthcare in a hospital or any other healthcare facility.(2) These infections are not present or incubating at the time of admission; usually being contracted after hospitalisation and typically appearing 48 hours after admission to the hospital.(3) The occurrence of HAIs is the result of the failure of infection control, jeopardising the health of patients. Despite advancements in healthcare and public health, unfortunately, infections persist to plague the hospitalised patients, sometimes also affecting the hospital workers.(4)

IPC is a tried-and-tested method to prevent the emergence and spread of infectious hazards, but putting it into practice calls for institutional, programmatic, financial and knowledge support. For IPC to be effective, sustained action must be pursued at all levels of the health system, from policymakers to facility administrators, from healthcare professionals to those who avail the services, and other relevant stakeholders. IPC is the bedrock of health system resiliency and preparedness.(1)

Healthcare workers should be aware of how to prevent transmission of nosocomial infections and their potential risks to patients, family members, and the community at large. Disinfecting regimes are vital in suppressing the spread of infection in healthcare settings and hospital environments. They significantly prevent the spread of infections, breaking the chain of transmission from the healthcare workers to the patient, from the environment to the patient, and amongst the patients themselves.(5)

HAI is a significant problem, but prevention strategies are effective and cheap, thus economically justifying increasing investment in infection control. The cost-benefit ratio of infection control is favourable, and the impact on financial reserves from a decline in HAIs is very encouraging.(6)According to OECD, adopting and implementing a package comprising of hand hygiene practices, antibiotic stewardship programs and improved environmental hygiene in healthcare settings can bring down the health burden of AMR by 85%.(1)

Eight core components for IPC have been identified by WHO. Out of these eight components, six are relevant at both the national and healthcare facility levels and two (components 7 and 8) can be implemented at the facility level only:(1)

IPC programs, including the relevant program linkages
Guidelines
Education and training
Surveillance
Monitoring, audit and feedback
Workload, staffing and bed occupancy
Built environment, equipment and materials
Multimodal strategies

Training programs for imparting knowledge about infection control practices are often easy to plan and implement in almost every variety of clinical setting. The investment, in terms of time, is also relatively short for such endeavours, in comparison to others. Availability of standardised training material to all the stakeholders ensures a continuity in dissemination of knowledge. The cost-benefit of establishing structured training is promising. In order to make the program more robust, post-intervention monitoring can be conducted for a longer duration along with regular refresher training sessions.(1)

Hand hygiene is the foremost intervention to prevent transmission of infection. It is of paramount importance in ensuring optimum safety standards and should be a quality standard in all healthcare settings.(7) Whether adopted as a stand-alone intervention or implemented as a component of multifaceted interventions, hand hygiene has been underscored as the most effective and successful measure to reduce the transmission of pathogens and infection in healthcare facilities.(1) The WHO recommends 5

moments where hand hygiene must be practised and adhered to in clinical settings:(8)
Before touching a patient
Before performing any clean/ aseptic procedure
After body fluid exposure risk
After touching a patient
After touching the patient's surroundings
The rate of HAI has escalated over the past few decades, despite the increasing attention to the domain of infection control and its associated measures.(9) Studies on the knowledge, awareness, and practices of healthcare workers regarding IPC point to the vitality of such interventions.
Objectives: To assess the knowledge, attitude and practices of healthcare workers regarding infection prevention and control towards minimizing the risk of healthcare associated infections in hospital settings.

Material & Methods

A cross-sectional, descriptive study was carried out over a period of one year from November 2023 to October 2024 at a tertiary care hospital in New Delhi. The study population consisted of all healthcare workers (resident doctors and nurses) working in the Neonatology Department. A convenience sampling method was used to include all healthcare workers working in the NICU during the study period; 65 HCWs were considered for the study.
A semi-structured, pre-tested, self-administered questionnaire was used to assess the knowledge, attitude and practices of the HCWs for IPC. The participants were given a brief introduction by the principal investigator and a Participant Information Sheet (PIS) and Participant Informed Consent Form (PICF). After getting the informed consent, the HCWs filled out the questionnaires.
For every correct response, a score of one was given. For example, the duration of hand hygiene had 4 possible correct responses, such as 10 secs, 20 secs, 30 secs and 60 secs; 1 mark was awarded to the correct response. A composite variable of knowledge score was generated, with 16 or more marks being excellent, 11-15 marks being good, 6-10 marks being average and less than 10 marks being below average knowledge for IPC. Similarly, for the attitude questions, a score of 6 or more implied positive attitude, 3-5 marks being neutral attitude and 2 or less marks meaning negative attitude for IPC. For the practices questions, there was score of 3 for always following a practice, 2 marks for often and 1 for never; and a cumulative score of 16 or more implied excellent practices, 11-15 marks being good practices, 6-10 marks being average practices and 5 or less marks meaning below average practices for IPC.
After proper scrutiny, the collected data was entered into IBM SPSS Version 26 and analysed using descriptive and analytical techniques. As per the objectives of the study, univariate and multivariate tables were generated.

Results

The profile of healthcare workers posted in the Department of Neonatology at the hospital was studied. DM residents (senior residents) comprised 18.4%, junior residents comprised 23% and nurses made up 58.6% of the HCW workforce. Out of all, 75.4% were females and rest 24.6% were males. Analysis of the work experience of HCWs (in years) showed that 66.1% had experience of up to 2 years, 21.6% had experience of 3 to 5 years and 12.3% had 6 or more years of work experience in healthcare. [Table 1]

Table 1: Profile of HCWs (n=65)

Characteristic	Number	Percentage (%)
Position Held		
Senior Residents (DM)	12	18.4
Junior Residents	15	23
Nurses	38	58.6
Work Experience		
Up to 2 years	43	66.1
3-5 years	14	21.6
6 or more years	8	12.3
Sex		
Males	16	24.6
Females	49	75.4

The knowledge, attitude and practice scores of all the HCWs were calculated from the questionnaires. For the knowledge, 30.8% had excellent score, 49.2% had good score, 18.5% had average and 1.5% had below average score. For the attitude, 98.5% had excellent

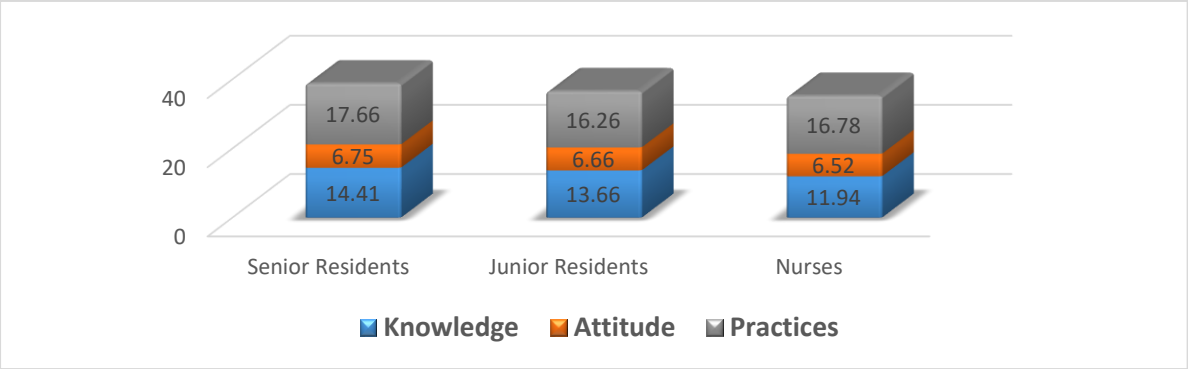
score and 1.5% had average score. For the practice, 84.6% had excellent score and 15.4% had average score. None of them had below average attitude and practice score. [Table 2]

Table 2: Scores of Knowledge, Attitude and Practice of HCWs (n=65)

Characteristic	Number	Percentage (%)
Knowledge		
Excellent (15 or above marks)	20	30.8
Good (11-14 marks)	32	49.2
Average (6-10 marks)	12	18.5
Below Average (5 or less marks)	1	1.5
Attitude		
Excellent (6 or above marks)	64	98.5
Average (3-5 marks)	1	1.5
Below Average (2 or less marks)	0	0
Practice		
Excellent (16 or above marks)	55	84.6
Average (11-15 marks)	10	15.4
Below Average (10 or less marks)	0	0

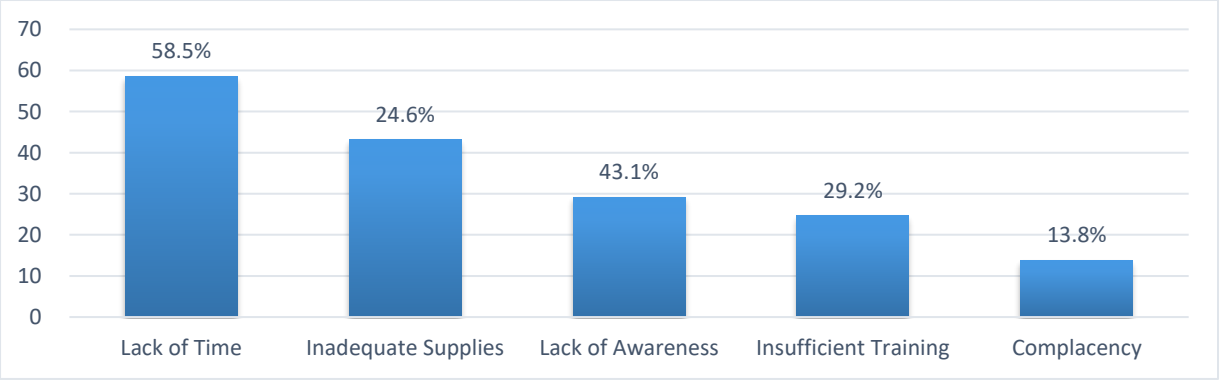
A combined KAP score was also calculated for all the HCWs, which highlighted the scores in each category. For the knowledge, senior residents had the highest score (14.41), followed by junior residents (13.66), and nurses (11.04). For the attitude, senior residents had the highest score (6.75), followed by junior residents (6.66), and nurses (6.52). For the practices, senior residents had the highest score (17.66), followed by nurses (16.78), and junior residents (16.26). [Figure 1]

Figure 1: Cumulative KAP scores of HCWs (n=65)



The HCWs were asked to mention the factors that act as barriers in implementing and following the appropriate IPC protocols. Lack of time was cited as the main reason (58.5%), followed by inadequate supplies (43.1%), lack of awareness (29.2%), insufficient training (24.6%) and cited complacency (13.8%). [Figure 2]

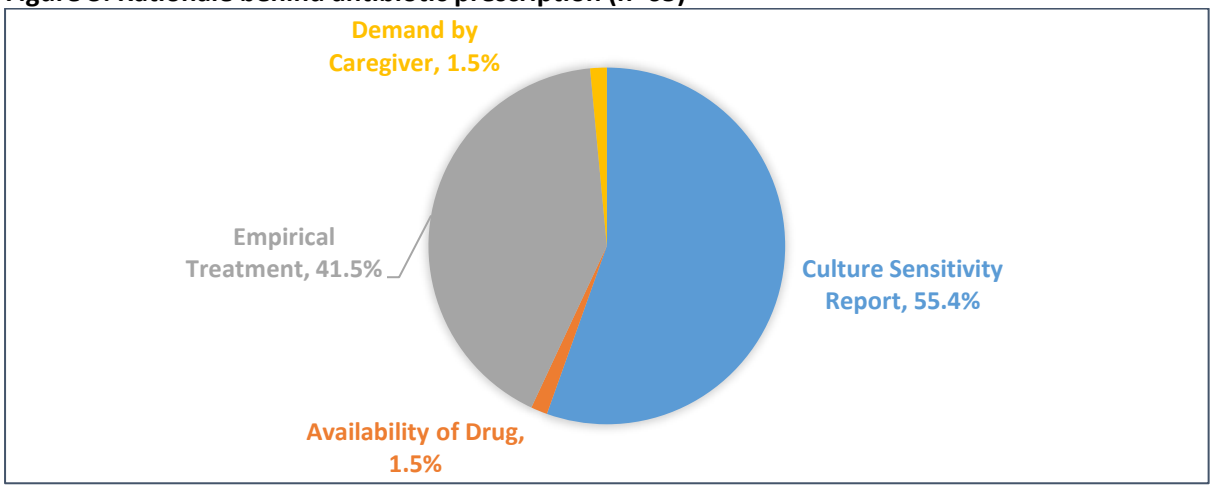
Figure 2: Barriers to effective IPC (n=65) *



**Multiple responses present, hence, sum may not be 100%*

The rationale behind antibiotic prescription as perceived by the HCWs was assessed. Empirical treatment was the most common rationale (55.4%) followed by culture sensitivity reports (41.5%). Both availability of drugs and demand by caregivers played a relatively minor role, each accounting for only 1.5% of cases. [Figure 3]

Figure 3: Rationale behind antibiotic prescription (n=65)



The association between scores of knowledge, attitude & practices and the position held & years of experience was calculated. Notably, a significant association was observed between years of experience and knowledge (p= 0.046) as well as between position held and knowledge (p=0.009). However, no substantial association was found between years of experience and position held with either attitude or practices. [Table 3]

Table 3: Association of KAP scores with years of experience and position held (n=65)

Characteristics	Knowledge	p-value	Attitude	p-value	Practices	p-value
Position/Role						
Senior Resident	14.41	0.009*	6.75	0.581	17.66	0.072
Junior Resident	13.66		6.66		16.26	
Nurse	11.94		6.52		16.78	
Years of Experience						
2 or less years	12.51	0.046*	6.51	0.388	16.6	0.167
3 to 5 years	12.78		6.85		17.21	
6 or more years	14.37		6.62		17.37	

**Significant p-value*

Discussion

The study evaluated the knowledge, attitudes, and practices of HCWs working in the Department of Neonatology regarding infection prevention and control protocols. The healthcare workforce included senior and junior resident doctors and nurses. The majority of them were females and had work experience of up to 2 years. While the majority of HCWs demonstrate good to excellent knowledge scores, there was a small percentage that fell into the average and below average categories. Most HCWs had an excellent attitude and practice scores. The overall KAP scores were relatively similar across the three groups, with Senior Residents having the highest score, followed by Junior Residents and Nurses. Although most HCWs exhibited good to excellent knowledge and attitudes, a minor proportion were categorised as average or below average, with nursing staff demonstrating lower overall performance than resident doctors.

A significant association was observed between years of experience and knowledge (p= 0.046) and between position held and knowledge (p=0.009), but not of attitude and

practice with either years of experience or position held. This difference among roles (nurses, who comprised majority of the HCWs, had relatively lower scores than resident doctors, especially regarding knowledge) suggests a need for targeted IPC training for nurses who are on the front lines of neonatal care and play a crucial role in infection prevention. Similar findings can be found in a study by Bayleyegn et al. (2021), where 90% and 57.2% of the participants had good knowledge and positive attitudes towards HAI prevention, respectively. However, only 36% had good practice towards HAI prevention, inferring less than satisfactory scores. The level of education and work experience were significantly associated with safe-infection prevention attitude and practice.10

Significant barriers that hindered the effective implementation of infection prevention and control (IPC) measures included lack of time, insufficient supplies, unawareness and inadequate training, highlighting the necessity for targeted interventions to address these lacunae. A study by Olatade et al. (2021) revealed that 94.1% of the healthcare workers had high knowledge about nosocomial infection and 95.9% had high knowledge of preventive practices to curb these infections. The study hence concluded that the health workers in the selected tertiary hospitals had good knowledge about HAI and satisfactory practices. However, the practice was hindered by some factors, such as workload, lack of equipment, and distance to preventive equipment, similar to the barriers to effective IPC in this study.5

The rationale behind antibiotic prescription varied for all, with empirical treatment being the most common rationale followed by culture sensitivity reports. The high rate of empirical antibiotic prescription among HCWs further underscores the need for systematic support for evidence-based practices.

Conclusion

The majority of HCWs were females and had work experience of up to 2 years. Although most HCWs exhibited good to excellent knowledge scores, excellent attitude scores and excellent practice scores, a minor proportion had average or below average knowledge scores. The nursing staff had lesser overall scores as compared to resident doctors, with senior residents faring the best amongst all HCWs. A significant association was observed between knowledge and both years of experience and position held.

However, there were certain barriers that hindered the effective implementation of infection prevention and control (IPC) measures, with lack of time and insufficient supplies being the most cited ones.

Antibiotic prescription practices differed amongst all, with most common rationales guiding them being empirical treatment and culture sensitivity reports.

Recommendation

Infection Prevention and Control remains the cornerstone of high-quality and safe healthcare. The vitality of IPC is gradually being recognised across the globe, with stringent guidelines being implemented to tackle the menace of infections. Healthcare workers are at the forefront of this approach and must be adequately trained and equipped with resources to carry out the IPC protocols efficiently. Hand hygiene is one of the best proven and cost-effective solutions to reduce the risk of emergence and transmission of infection.

Evidence-based protocols must be developed that can be implemented uniformly across healthcare facilities. Regular training of HCWs is essential to ensure consistent adherence to the guidelines. Logistics must be strengthened to ensure an adequate supply of personal protective equipment, disinfection products, and hand hygiene facilities. Robust surveillance systems should be in place to monitor trends and provide timely interventions. Finally, a culture of patient safety should be promoted, and a sense of accountability should be inculcated in them so that IPC is acknowledged as a shared responsibility and not merely a formality.

Authors Contribution

All authors have contributed equally.

Financial Support and Sponsorship

Nil

Conflict of Interest

There are no conflicts of interest.

Declaration Of Generative AI And AI Assisted Technologies In The Writing Process

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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