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Barriers to the Adoption of Infection Prevention Control (IPC) Guidelines among Health Care Workers at Saidu Group of Teaching Hospital (SGTH), SWAT - A Cross Sectional Study

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ABSTRACT

Background: *The adoption of infection prevention and control guidelines is crucial for the safety of healthcare workers and patients. However, healthcare workers often face several barriers in implementing these guidelines, such as lack of knowledge, inadequate training, limited resources, cultural and language differences, and attitudes and beliefs. These barriers can negatively impact the implementation of effective infection prevention and control measures, leading to increased healthcare-associated infections. It is imperative to identify and address these barriers to promote the adoption of infection prevention and control guidelines in healthcare settings.* ***Methods:*** *We conduct a descriptive cross-sectional study with a sample size of 228 in Saidu Group of Teaching Hospital (SGTH) of Swat, Pakistan, from October 2022 to November 2022 to assess the barriers to healthcare workers in adopting IPC guidelines. Data were collected through a self-structured questionnaire on socio-demographics, hand hygiene practices, use of PPE, NSI reporting, disinfection of injection sites and waste disposal. Non-probability consecutive sampling was used to select participants.* ***Results:*** *According to the study, the main barriers to healthcare workers not adopting IPC guidelines were a lack of formal training in IPC (66.7%), lack of time and increased workload (6.1%), lack of availability of PPE (21.1%), lack of interest (5.3%), discomfort with PPE (1.8%), lack of knowledge on proper disposal of used needles (74.1%), lack of disinfectants (10.5%), and lack of spill kits in wards/labs (45.2%). Additionally, a significant proportion of healthcare workers did not report needle stick injuries (20.2%) and did not take post-exposure prophylaxis (77.6%).* ***Conclusion and Recommendations:*** *The study findings indicate that a significant proportion of healthcare workers lack formal training in Infection Prevention and Control (IPC), and there are gaps in practices related to hand hygiene, proper use of Personal Protective Equipment (PPE), needle stick injury reporting, post-exposure prophylaxis, proper disposal of used needles, surface disinfection, and blood spill management. The study suggests the need for increased IPC training for healthcare workers, improved availability and accessibility of PPE, implementation of a robust needle stick injury reporting system, promotion of postexposure prophylaxis utilization, enhanced education on proper disposal of used needles, ensuring adequate disinfection of surfaces, provision of spill kits in wards/labs, and comprehensive training in hospital waste management program for healthcare workers.*

Keywords: Healthcare, Infection, Disease, Prevention, Swat

INTRODUCTION

Infection Prevention Control (IPC) guidelines are essential components of healthcare systems worldwide, aimed at reducing the transmission of Healthcare-Associated Infections (HAIs) and ensuring the safety of both patients and healthcare workers. Adherence to IPC guidelines is crucial to minimize the risk of infections, improve patient outcomes, and maintain a safe working environment for healthcare professionals. However, despite the availability and promotion of IPC guidelines, there are often barriers that impede their effective implementation and adoption by healthcare workers

The Saidu Group of Teaching Hospital Swat (SGTH) is a prominent healthcare institution in Swat that serves a large population. Ensuring that healthcare workers at SGTH adhere to IPC guidelines is of paramount importance to prevent the occurrence and spread of HAIs within the hospital. However, it is essential to identify and understand the specific barriers that hinder healthcare workers at SGTH from adopting IPC guidelines.

This research aims to investigate the barriers to IPC guideline adoption among healthcare workers at SGTH. By examining the challenges faced by healthcare professionals, we seek to shed light on the factors that hinder their compliance with IPC guidelines and provide insights into potential solutions to overcome these barriers. The findings of this study will contribute to enhancing infection prevention practices and promoting a culture of safety within the healthcare setting.

Understanding the barriers to IPC guideline adoption is critical as it allows for targeted interventions and strategies to address the specific challenges faced by healthcare workers. By addressing these barriers, healthcare institutions can optimize infection control measures, reduce HAIs, protect the well-being of patients and healthcare workers, and improve overall healthcare outcomes.

The subsequent sections of this research paper will delve into a comprehensive literature review on IPC guidelines, their significance in healthcare settings, factors influencing adherence to IPC guidelines, and previous studies examining IPC practices and barriers. The methodology used for this research will be described, followed by the presentation and analysis of the collected data. The results will be discussed, drawing insights from the identified barriers, and providing recommendations to overcome them. Finally, the conclusion will summarize the findings, acknowledge any limitations, and suggest avenues for future research in the field of IPC guideline adoption among healthcare workers at SGTH.

By examining the barriers to IPC guideline adoption at SGTH, this research aims to contribute to the advancement of infection prevention practices, enhance patient safety, and promote a culture of adherence to IPC guidelines among healthcare workers in Swat.

Aims and Objectives

The aim of this research is to identify and understand the barriers faced by healthcare workers in adopting Infection Prevention and Control (IPC) guidelines. The objectives are to assess healthcare workers' knowledge and awareness of IPC guidelines, explore the organizational factors influencing the adoption of IPC guidelines, examine the influence of workload and time constraints on guideline adherence, analyze healthcare workers' attitudes and beliefs towards IPC guidelines, and identify any additional barriers that may emerge during the research process. By addressing these objectives, this study aims to provide valuable insights into the specific challenges hindering the adoption of IPC guidelines and contribute to the development of targeted interventions and strategies to improve adherence and enhance patient safety.

Infection Prevention and Control (IPC) guidelines play a vital role in reducing Healthcare-Associated Infections (HAIs) and ensuring patient and healthcare worker safety. However, several studies have identified barriers that hinder the adoption of IPC guidelines among healthcare workers.

A survey conducted among 300 healthcare professionals revealed a significant gap between knowledge and practice. While 94% of respondents had good knowledge of HAIs, only 47% reported using gloves when touching patients. Additionally, 87% of healthcare workers were unaware of the national guidelines for IPC, indicating a need for improved awareness and training [1].

Disparities in IPC training programs were observed across different income countries. Low-resource settings faced challenges due to limited budgets and resources, resulting in sporadic IPC training when foreign capital was available. The lack of access to Personal Protective Equipment (PPE) further hindered adherence to IPC practices. These findings highlight the need for equitable provision of training and resources in resource-constrained settings [2].

Surgeons faced obstacles due to the lack of guidelines on exposure to COVID-19 and non-compliant patients [3].

A survey of 415 healthcare providers, predominantly graduate interns, revealed gaps in understanding basic infection control measures, and a need for formal training and organizational support. Burnoutrelated symptoms were prevalent among healthcare providers, underscoring the importance of addressing their well-being [4].

Shortages of PPE and the challenges faced by physicians leading IPC programs were identified in a study that implemented universal masking and limited patient admissions. The study emphasized the criticality of supporting infection prevention and control staff and addressing identified gaps to ensure patient and healthcare worker safety [5].

Another study involving 1,757 healthcare workers demonstrated the need for improved adherence to IPC measures, particularly in terms of PPE use and hand hygiene. Barriers such as work burden and lack of resources were reported. Efforts to enhance adherence should consider individual factors and tailor interventions accordingly [6].

In resource-constrained settings, inadequate infrastructure, limited resources, and lack of training posed challenges to IPC implementation. Local policies and in-service training were identified as potential strategies to improve IPC practices under such circumstances [7].

To effectively implement IPC in disability care, a coordinated approach that considers human nature, culture, and religious beliefs is necessary. Policies should respect socio-cultural boundaries and promote sustainable behavioral changes [8].

A study conducted in Bangladesh revealed low compliance with IPC guidelines among healthcare workers, with variations observed across different practices. Self-efficacy emerged as a significant contributor to compliance, highlighting the importance of addressing perceived barriers and providing necessary resources and guidance [9].

A study conducted in Dhaka, Bangladesh, involved 604 doctors and nurses working in six randomly selected tertiary care facilities. The findings revealed a mean compliance score of 0.49 (± 0.25) on a scale of 0-1, indicating unsatisfactory compliance overall. Notably, healthcare workers exhibited the highest compliance with guidelines on wearing medical masks (81%), while compliance was significantly lower for decontamination of high-touch surfaces (23%). In terms of demographic factors, the study identified significant associations between adherence to IPC guidelines and certain variables. Age, female gender, working as a registered nurse, having non-communicable diseases, and increased contact with patients with a history of COVID-19 were all factors positively associated with adherence to IPC guidelines. Additionally, factors such as perceived usefulness (B=0.039, 95% CI 0.001 to 0.076), self-efficacy (B=0.101, 95% CI 0.060 to 0.142), and behavioral cues (B=0.045, 95% CI 0.002 to 0.002) were found to significantly contribute to adherence [10].

In summary, the literature review highlights various barriers to healthcare workers' adoption of IPC guidelines, including gaps between knowledge and practice, disparities in training and resources, lack of guidelines, burnout-related symptoms, and challenges in resource-constrained settings. These findings underscore the significance of raising awareness, providing comprehensive training, ensuring resource availability, addressing organizational and cultural factors, and supporting healthcare workers to enhance adherence to IPC guidelines.

MATERIAL AND METHODS

Study Setting and Participants

The present study was conducted at Saidu Group of Teaching Hospital (SGTH) in Swat, Pakistan. The study aimed to investigate the barriers faced by healthcare workers at SGTH in adopting Infection Prevention Control (IPC) guidelines. The target population for this study comprised healthcare workers, including doctors, nurses, and allied healthcare professionals, who were directly involved in patient care at SGTH.

Study Design and Sample Size

The study design employed was a descriptive cross-sectional study. The study was conducted from 1st October to 30th November 2022 to gather data on healthcare workers' perceptions of the barriers to IPC guideline adoption at SGTH. The sample size was determined using the WHO sample size calculator, which estimated a required sample size of 228 participants based on the population size and desired level of precision.

Sampling Technique

Non-probability consecutive sampling was utilized to select participants for this study. Healthcare workers who met the inclusion criteria and were available during the study period were consecutively approached and invited to participate. This sampling technique facilitated the recruitment of a sufficient number of participants within the study duration.

Data Collection

Data for this study was collected through a self-structured questionnaire. The questionnaire consisted of two types of variables: constant variables and other variables. Constant variables included sociodemographic data such as name, gender, age, job status, specialty, and experience. These variables were used to describe the characteristics of the study population. Other variables assessed various aspects of IPC practices, including hand hygiene practices, use of Personal Protective Equipment (PPEs), Needle Stick Injury (NSI) reporting, disinfection of injection sites, and waste disposal.

The self-structured questionnaire was developed based on a thorough review of relevant literature and guidelines related to IPC practices. The questionnaire was carefully designed to capture the specific barriers identified in the literature and tailored to the context of SGTH. Pilot testing of the questionnaire was conducted to ensure clarity, under standability, and face validity. Based on the pilot study results, minor modifications were made to enhance the questionnaire's reliability and content validity.

Data Analysis

Data obtained from the completed questionnaires were entered into a computerized database for analysis. Descriptive statistics were used to summarize the constant variables, providing information on the socio-demographic characteristics of the study participants. The other variables related to IPC practices were analyzed to identify the prevalence and perceived barriers associated with each practice. The data analysis involved both qualitative and quantitative techniques. Qualitative data obtained from open-ended questions were analyzed using thematic analysis to identify recurring themes and patterns related to the barriers to IPC guideline adoption. Quantitative data were analyzed using appropriate statistical methods, such as frequencies, percentages, and measures of central tendency, to describe the prevalence of specific barriers and assess their association with socio-demographic factors.

Ethical Considerations

Ethical approval for the study was obtained from the Institutional Review Board of SGTH MS of the hospital. Informed consent was obtained from all participants before their participation in the study. Confidentiality and privacy of the participants' information were ensured throughout the data collection process.

By employing a descriptive cross-sectional study design and collecting data through a self-structured questionnaire, this study aimed to comprehensively explore the barriers to IPC guideline adoption among healthcare workers at SGTH. The utilization of non-probability consecutive sampling facilitated the recruitment of participants within the study period, while the analysis of qualitative and quantitative data provided a holistic understanding of the barriers faced by healthcare workers.

RESULTS

Socio-demographic Characteristics of the Healthcare Workers

A total of 228 healthcare workers participated in the study. Among the participants, the majority were male 194 (85.1%) while the remaining 34 (14.9%) were female. The distribution of participants across different professional

education categories as the largest proportion of participants were doctors 134 (58.8%), followed by nurses 56 (24.6%), paramedical staff 19 (8.3%), and other staff such as sweepers 19 (8.3%).Furthermore, the participants' job roles were categorized based on their professional status. The majority of the participants were house officers 63 (27.6%), followed by postgraduate medical trainees 47 (20.6%), and nurses (19.7%). Regarding the participants' clinical specialties, 109 (47.8%) were from the medicine and allied fields, while 79 (34.6%) were from surgery and allied fields. The participants' clinical experience was also examined. It was found that 109 (47.8%) participants had experience of less than one year, while 68 (29.8%) had more than three years of experience. Additionally, 51 (22.4%) participants reported having experience ranging from 1 year to 3 years.

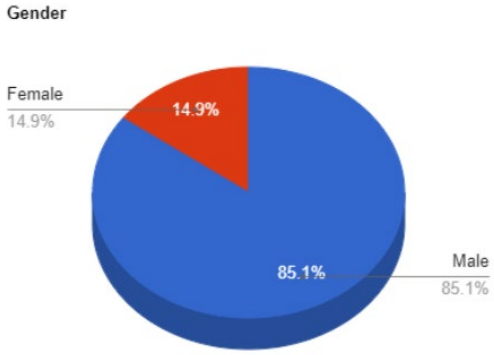

Figure 1 Gender

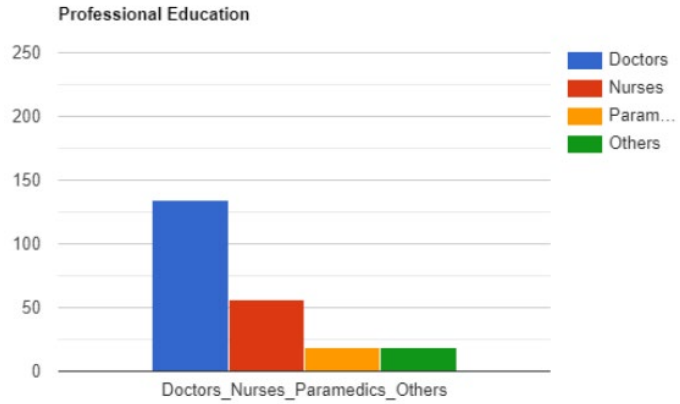

Figure 2 Professional education

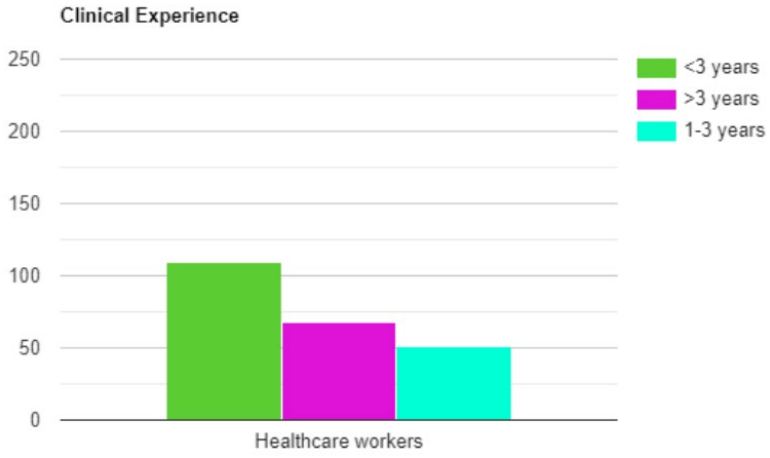

Figure 3 Clinical experiences

The results of the present study revealed important insights into the IPC practices and training among healthcare workers at Saidu Group of Teaching Hospital (SGTH) in Swat, Pakistan (Figure 1-3).

Regarding the formal training on IPC received by the participants in the last year, the majority of respondents 152 (66.7%) reported not receiving any training. This finding highlights the potential gap in IPC training programs at SGTH.

In terms of hand hygiene practices, a significant proportion of respondents 204 (89.5%) reported practicing hand washing before and after touching a patient. However, a considerable number of respondents who did not practice hand washing 208 (82.2%) chose not to answer, indicating a need for further investigation into the reasons behind this behavior. Some respondents 14 (6.1%) cited increased workload and lack of time as reasons for not practicing hand hygiene.

Regarding the use of Personal Protective Equipment (PPE), the majority of healthcare workers 200 (87.7%) reported being aware of PPE, and a significant proportion 141 61.8%) used PPE while approaching patients. However, a notable number of respondents 87 (38.2%) reported not using PPE. Among non-PPE users, the majority 158 (69.3%) did not provide any reason for not using PPE. Some reasons cited for not using PPE included lack of availability 48 (21.1%), lack of interest 12 (5.3%), lack of time 6 (2.6%), and discomfort with PPE 4 (1.8%).

In terms of the reporting system for Needle Stick Injuries (NSI) in the hospital, the majority of respondents 140 (64.1%) reported that there was no reporting system in place. Out of the total participants, 160 (72.2%) reported never experiencing a needle stick injury, while 68 (29.8%) had experienced one. However, only a small number of respondents 13 (5.7%) reported their NSI to the concerned authorities, indicating a potential underreporting issue. Additionally, 46 (20.2%) respondents did not report their NSI.

Regarding post-exposure prophylaxis, the majority of participants 177 (77.6%) reported not taking it, while 51 (22.4%) had taken post-exposure prophylaxis. Only a limited number of healthcare workers 59 (25.9%) demonstrated proper knowledge about the proper disposal of used needles.

In terms of infection control practices, a significant proportion of respondents 174 (76.3%) reported disinfecting the surface area before giving an injection or IV line. Some reasons cited for not disinfecting the injection site included lack of disinfectants 24 (10.5%) and lack of time due to patient overload 6 (2.6%). Additionally, the majority of respondents 179 (78.5%) reported that hospital surfaces were routinely disinfected; while a smaller proportion 49 (21.5%) disagreed. Among those who disagreed, lack of disinfectants was the most common reason 10 (4.4%).

Furthermore, a considerable number of respondents 103 (45.2%) expressed the opinion that there were no spill kits available in wards/labs, highlighting the potential need for improvement in this area. Only 56 (24.6%) healthcare workers reported having proper knowledge on how to deal with blood spill incidents. Regarding the training provided for hospital waste management, 108 (47.4%) participants reported receiving training, while 120 (52.6%) had not received any training (Table 1, Figure 4).

Table 1 Summary of health care worker's practices and knowledge

Activities	Frequency	Percentage (%)
Formal training about IPC in the last one year		
Yes	76	33.30%
No	152	66.70%
Hand hygiene practices		
Yes	204	89.50%
No	24	10.50%
Reasons for not practicing hand hygiene		
No answer	208	82.20%
Increase workload and lack of time	14	6.10%
Personal Protective Equipment (PPE) awareness		

Yes	200	87.70%
No	28	12.30%
Reasons for not using PPE		
No reason	158	69.30%
Lack of availability	48	21.10%
Lack of interest	12	5.30%
Lack of time	6	2.63%
Discomfort with PPE	4	1.80%
Needle Stick Injury (NSI) reporting system in the hospital		
Yes	88	38.60%
No	140	61.40%
Needle Stick Injury (NSI) experience		
Yes	68	29.80%
No	160	70.20%
Report of NSI		
Reported	13	5.70%
Not reported	46	20.20%
Post Exposure Prophylaxis (PEP) taken		
Yes	51	22.40%
No	177	77.60%
Knowledge of proper disposal of used needles		
Yes	59	25.90%
No	169	74.10%
Disinfection of surface area before giving an injection or IV-line		
Yes	174	76.30%
No	54	23.70%
Reason for not disinfecting injection site		
Lack of disinfectants	24	10.50%
Lack of time due to patient overload	6	2.60%
Hospital surfaces routinely disinfected		
Yes	179	78.50%
No	49	21.50%
Reasons for not disinfecting hospital surfaces		
No reason	163	71.50%
Lack of disinfectants	10	4.40%
No availability of spill kits in wards	103	45.20%
Proper knowledge of how to deal with blood spill incidents	56	24.60%
Training on hospital waste management		
Yes	108	47.40%
No	120	52.60%

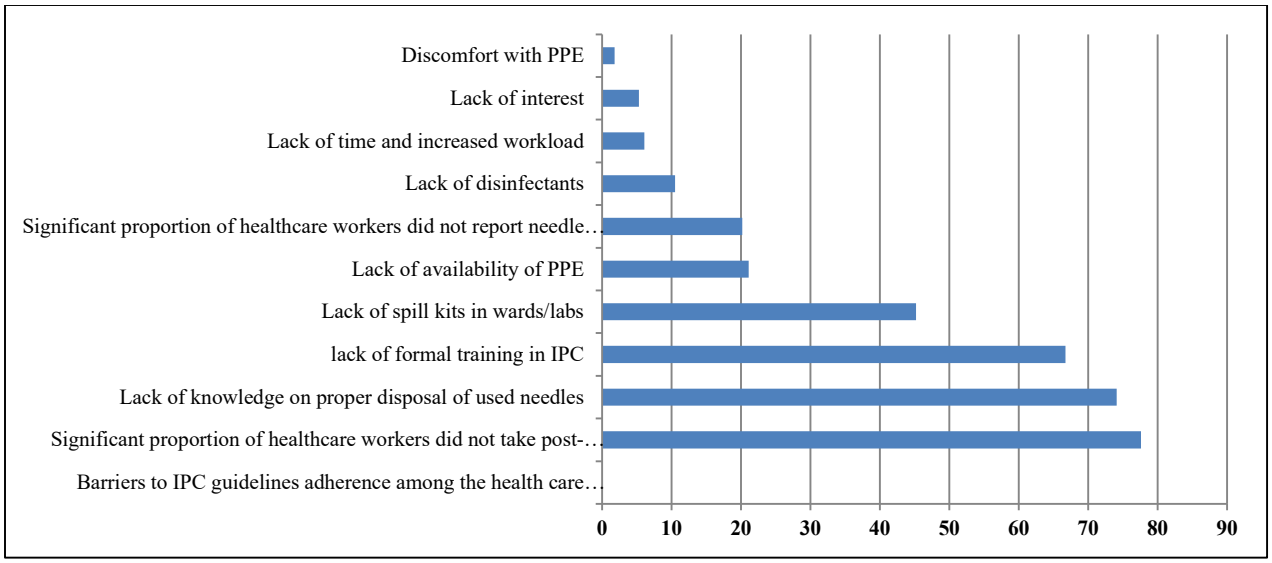

Figure 4 Barriers to IPC guidelines adherence among the health care workers of SGTH Swat

DISCUSSION

The findings from this study reveal several important insights regarding Infection Prevention and Control (IPC) practices among Healthcare Workers (HCWs). One notable finding is that a majority of respondents (66.7%) had not received formal training in IPC within the past year. This lack of training is concerning, as proper education and training are crucial for HCWs to effectively implement IPC guidelines and protocols. Comparing this to a study which highlights that about 87% of healthcare workers were unaware of the national guidelines for IPC, indicating a need for improved awareness and training [1].

However, despite the lack of formal training, a significant proportion of respondents (89.5%) reported practicing hand hygiene before and after patient contact, which is a fundamental IPC measure. This suggests that while formal training may be lacking, HCWs have acquired some knowledge and awareness of basic IPC practices through other means, such as on-the-job experience or informal training .In terms of Personal Protective Equipment (PPE) usage, a majority of HCWs (87.7%) reported being aware of PPE and 61.8% used PPE while approaching patients. However, it is concerning that 38.2% of HCWs did not use PPE. Lack of availability was cited as the main reason for not using PPE (21.1%), followed by lack of interest (5.3%), lack of time (2.6%), and discomfort with PPE (1.8%). These findings highlight the importance of ensuring the availability of PPE and addressing any barriers or misconceptions that may deter HCWs from using it effectively. Shortages of PPE and the challenges faced by physicians leading IPC programs were identified in a study that implemented universal masking and limited patient admissions [5].

Regarding Needle Stick Injuries (NSIs), a substantial proportion of HCWs (29.8%) reported experiencing such injuries, but only a small percentage (5.7%) reported them to the appropriate authorities. This suggests a significant underreporting of NSIs, which is a concern as prompt reporting is crucial for appropriate management and prevention of further infections [11]. Similarly, a significant proportion of HCWs (77.6%) did not take Post-Exposure Prophylaxis (PEP) after NSIs, indicating a potential gap in knowledge or accessibility of PEP services.

The study also revealed a lack of knowledge on proper disposal of used needles, as only 25.9% of HCWs demonstrated awareness of the correct disposal methods. This highlights the need for comprehensive training programs that cover all aspects of IPC, including safe handling and disposal of hazardous waste. Another concerning finding is the inadequate disinfection practices observed. While a majority of HCWs (76.3%) reported disinfecting surfaces before giving injections or initiating IV-lines, a significant proportion (10.5%) cited the lack of disinfectants as a reason for not disinfecting, and some (2.6%) mentioned time constraints due to patient overload. These findings underscore the importance of ensuring the availability of disinfectants and addressing workload-related challenges to promote proper disinfection practices [12].

Furthermore, a substantial number of respondents (45.2%) reported the absence of spill kits in wards/labs, indicating a potential gap in preparedness for handling hazardous spills. Adequate availability of spill kits is essential for prompt and safe management of spills to prevent the spread of infections [13].

CONCLUSION

In conclusion, this study highlighted several barriers and challenges that impact the adherence of Healthcare Workers (HCWs) to Infection Prevention and Control (IPC) guidelines. The majority of the HCWs in the study reported a lack of formal training in IPC, which suggests a need for comprehensive training programs to enhance their knowledge and skills in IPC practices. Furthermore, time constraints and increased workloads were identified as additional factors that hindered adherence to IPC guidelines.

The study also revealed that the availability and utilization of Personal Protective Equipment (PPE) varied among HCWs. While a significant proportion of HCWs were aware of PPE and utilized it during patient interactions, a considerable number did not use PPE, citing reasons such as lack of availability, lack of interest, and discomfort. This highlights the importance of ensuring the availability of PPE and addressing any concerns or discomfort associated with its use. One concerning finding was the lack of knowledge regarding the proper disposal of used needles among HCWs. This knowledge gap poses a significant risk for needle stick injuries and highlights the need for targeted education and training on safe needle disposal practices.

Additionally, the study identified a lack of disinfectants and spill kits in wards/labs, which can compromise IPC practices. These findings underscore the importance of ensuring an adequate supply of disinfectants and spill kits in healthcare settings to promote a safe and hygienic environment. Furthermore, the study revealed a significant proportion of HCWs who did not report needle stick injuries and did not take post-exposure prophylaxis. These points to the need for a robust reporting system and improved awareness of the importance of reporting incidents and seeking appropriate medical care following exposures. To address these barriers and challenges, healthcare institutions should prioritize IPC training programs, provide sufficient resources and infrastructure, and establish effective communication channels to promote adherence to IPC guidelines. It is crucial to foster a culture that values and prioritizes IPC practices, with strong leadership support to ensure accountability and compliance.

By addressing these factors, healthcare institutions can significantly enhance adherence to IPC guidelines, reduce the risk of healthcare-associated infections, and promote the safety and well-being of both HCWs and patients. Future research should focus on evaluating the effectiveness of interventions aimed at improving IPC adherence, exploring the impact of organizational culture and leadership on IPC practices, and identifying innovative strategies to address the knowledge gaps and barriers identified in this study. In conclusion, this study highlights the need for continuous efforts to enhance adherence to IPC guidelines among HCWs. By addressing the identified barriers and implementing targeted interventions, healthcare institutions can create a safer and healthier environment for both HCWs and patients.

DECLARATIONS

Conflict of Interest

The authors declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

REFERENCES

[1] Zaidi, Nosheen, et al. "Gaps in knowledge and practices about health care associated infections among health care workers at a tertiary care hospital." *Journal of Islamabad Medical & Dental College (JIMDC),* Vol. 5, No. 2, 2016, pp. 84-7.

[2] Qureshi, Mohammed, Abrar Chughtai, and Holly Seale. "Supporting the Delivery of Infection Prevention and Control Training to Healthcare Workers: Insights from the Sector." *Healthcare*, Vol. 10. No. 5, 2022.

[3] Majeed, Abdul, et al. "Assessing barriers faced by surgeons while providing surgical care during the COVID-19 pandemic in Pakistan: an online cross-sectional study." *Journal of Multidisciplinary Healthcare,* 2021, pp. 665-72.

[4] Haq, Muhammad Irfan Ul, Faraz Shafiq, and Haris Sheikh. "Potential barriers amongst health care professionals of Pakistan in managing COVID-19 patients." *Pakistan Journal of Medical Sciences*, Vol. 36, 2020, p. 17.

[5] Abbas, Salma, and Faisal Sultan. "Infection control practices and challenges in Pakistan during the COVID-19 pandemic: a multicentre cross-sectional study." *Journal of Infection Prevention*, Vol. 22, No. 5, 2021, pp. 205-11.

[6] Abed Alah, M., et al. "Compliance and barriers to the use of infection prevention and control measures among health care workers during COVID-19 pandemic in Qatar: A national survey." *Journal of nursing management,* Vol. 29, No. 8, 2021, pp. 2401-11.

[7] Lowe, Hattie, et al. "Challenges and opportunities for infection prevention and control in hospitals in conflict-affected settings: a qualitative study." *Conflict and health,* Vol. 15, No. 1, 2021, pp. 1-10.

[8] Houben, Famke, et al. "Barriers and facilitators to infection prevention and control in Dutch residential care facilities for people with intellectual and developmental disabilities: A theory-informed qualitative study." *PLoS One*, Vol. 16, No. 10, 2021.

[9] Azam, Naila, et al. "Assessing barriers to adoption of sustainable personal hygiene behaviour and lifestyle change in communities in rawalpindi during Covid-19 pandemic." *Pakistan Armed Forces Medical Journal*, Vol. 72, 2022.

[10] Salwa, Marium, et al. "Compliance of healthcare workers with the infection prevention and control guidance in tertiary care hospitals: quantitative findings from an explanatory sequential mixed-methods study in Bangladesh." *BMJ open*, Vol. 12, No. 6, 2022.

[11] Cheng, V. C. C., et al. "Hand-touch contact assessment of high-touch and mutual-touch surfaces among healthcare workers, patients, and visitors." *Journal of Hospital Infection*, Vol. 90, No. 3, 2015, pp. 220-5.

[12] Pittet, Didier, et al. "Evidence-based model for hand transmission during patient care and the role of improved practices." *The Lancet infectious diseases,* Vol. 6, No. 10, 2006, pp. 641-52.

[13] Allegranzi, Benedetta, et al. "Successful implementation of the World Health Organization hand hygiene improvement strategy in a referral hospital in Mali, Africa." *Infection Control & Hospital Epidemiology,* Vol. 31, No. 2, 2010, pp. 133-41.