

# Infection Prevention and Control Compliance Among Healthcare Workers in Rural District Hospitals in the Philippines: A Cross-Sectional Study

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**Abstract**— Infection prevention and control (IPC) remains essential in reducing healthcare-associated infections and ensuring the safety of patients and healthcare workers, particularly in rural hospital settings. This study assessed IPC compliance and practices among healthcare workers in selected rural district hospitals in the Philippines. Specifically, it determined the level of IPC compliance, examined IPC practices, and identified priority areas for strengthening IPC implementation. A descriptive cross-sectional quantitative design was used. The study involved 222 healthcare workers selected through stratified random sampling from four district hospitals. Data were collected using a structured questionnaire based on Department of Health IPC standards and were analyzed using weighted mean and grand mean. Findings showed that healthcare workers were highly compliant with IPC standards, with a general mean of 4.59. Environmental hygiene and healthcare waste management obtained the highest compliance score, followed by hand hygiene and safe injection and sharps practices. IPC practices were also highly observed, with a grand mean of 4.66. Injection safety and aseptic technique and hand hygiene practices emerged as the strongest domains, while environmental cleaning and device reprocessing received the lowest, though still highly observed, rating. The study concludes that IPC implementation in the selected rural district hospitals was strong, although sustained monitoring and targeted reinforcement remain necessary in selected areas.

**Keywords**— Infection prevention and control; healthcare workers; rural district hospitals; healthcare-associated infections; compliance.

## I. INTRODUCTION

Healthcare-associated infections (HAIs) remain one of the most persistent threats to patient safety and quality of care worldwide. These infections, acquired during the course of receiving health services, continue to contribute substantially to morbidity, mortality, prolonged hospital stay, and increased healthcare costs across both high-income and low- and middle-income countries. The World Health Organization (WHO, 2020) has emphasized that effective infection prevention and control (IPC) is among the most practical and cost-effective strategies for reducing preventable infections in healthcare settings. Similarly, the Centers for Disease Control and Prevention (CDC, 2021) recognizes HAIs as a major public health burden, while the European Centre for Disease Prevention and Control (ECDC, 2019) highlights their continuing epidemiologic and economic impact on health systems. Beyond their

clinical consequences, HAIs also impose a significant financial burden; Stone et al. (2020) noted that the economic costs associated with preventable infections are substantial because they increase treatment expenses, length of hospitalization, and resource utilization. Taken together, these concerns underscore the central role of IPC in protecting patients, healthcare workers, and the health system as a whole.

IPC encompasses a broad range of evidence-based measures intended to prevent the transmission of infectious agents during health care delivery. These include hand hygiene, appropriate use of personal protective equipment (PPE), safe injection and sharps practices, environmental cleaning, transmission-based precautions, antimicrobial stewardship, and proper healthcare waste management. The effectiveness of these measures has been consistently documented in the literature. Barker and Smith (2020), in their

systematic review, emphasized the critical role of hand hygiene compliance in reducing HAIs, while Callewaert and Nuyts (2018) reported that adherence to IPC protocols contributes meaningfully to infection reduction across clinical settings. WHO (2016, 2020) likewise stresses that IPC is not merely a technical requirement but a fundamental component of safe, high-quality care, particularly in settings vulnerable to epidemic- and pandemic-prone infections. The experience of recent global health emergencies, including Ebola, SARS, and COVID-19, further exposed how weaknesses in IPC systems can rapidly amplify risks to patients and frontline health personnel. In this context, assessing IPC compliance among healthcare workers is not only relevant but essential for understanding whether health facilities are adequately positioned to protect those who deliver and receive care.

Despite the universal importance of IPC, compliance is not uniform across healthcare settings. In under-resourced and geographically isolated facilities, implementation of IPC measures is often constrained by shortages in infrastructure, limited supplies, workforce deficits, and inconsistent training. Alfred and Marshall (2019) observed that introducing IPC strategies in under-resourced settings requires more than policy adoption; it also demands sustained institutional support, regular supervision, and access to basic materials. In conflict-affected and fragile environments, similar barriers have been reported, including disrupted systems, weak organizational support, and challenges in sustaining staff adherence to infection control standards (Conflict and Health, 2021). More recent evidence also suggests that compliance difficulties in lower-resource settings are shaped by limited space, inadequate equipment, uneven managerial reinforcement, and insufficient monitoring systems (BMC Health Services Research, 2025; PubMed Central, 2024). These realities indicate that IPC performance is not determined solely by individual healthcare worker knowledge or willingness, but also by the broader organizational and structural conditions in which care is delivered.

Rural hospitals are particularly important in this discussion because they frequently operate under

conditions that make IPC implementation more difficult. Compared with larger urban hospitals, rural facilities often face restricted budgets, fewer trained personnel, weaker access to supplies, and more fragile support systems. This is especially concerning because patients served in rural hospitals may already experience delayed access to care, greater vulnerability, and fewer referral options. Studies examining infection control in non-urban and resource-constrained contexts suggest that while IPC programs can be effective in these settings, their success depends heavily on context-sensitive implementation. BMJ Open (2023) highlighted the role of IPC strategies in reducing HAIs in rural hospitals in the Philippines, but also pointed to persistent operational barriers that can weaken adherence. Nature (2024) similarly indicated that IPC interventions are beneficial in rural settings, although their effectiveness can be limited when training, supplies, and institutional support are inadequate. These findings reinforce the need for localized evidence from rural district hospitals, where standard IPC policies may be in place but implementation may vary considerably depending on workforce capacity and resource availability.

The Philippine healthcare setting provides a particularly relevant context for examining IPC compliance. Nationally, the importance of patient safety and infection prevention has been strengthened by Republic Act No. 11223, or the Universal Health Care Act of 2019, which emphasizes equitable access to quality care and the strengthening of health systems. Consistent with this policy direction, the Department of Health issued Administrative Order No. 2022-0051, the Revised National Policy on Infection Prevention and Control, which lays down standards for IPC governance, surveillance, training, supply provision, and facility-level implementation. These policy instruments demonstrate that IPC is not optional; it is an expected element of quality care in Philippine health facilities. However, policy presence does not automatically guarantee policy compliance. In practice, the extent to which healthcare workers can consistently perform hand hygiene, use PPE appropriately, follow transmission-based precautions, implement safe injection practices, and maintain

environmental hygiene may vary according to the realities of the workplace. Therefore, empirical assessment of compliance remains necessary, particularly in district hospitals serving rural populations.

The burden of infection and the need for stronger IPC are also highly relevant in the Philippines. HAIs continue to affect patient outcomes, increase healthcare utilization, and complicate management of already common infectious conditions. The Philippine Statistics Authority (2020) identified pneumonia as one of the leading causes of death in the country, highlighting the continuing importance of infection-related morbidity and mortality in national health outcomes. Previous Philippine-focused literature has also suggested that rural hospitals may face greater infection control difficulties than urban institutions. Tan et al. (2019) reported that HAIs and IPC-related challenges remain significant in rural Philippine hospitals, where resource limitations and workforce preparation can influence adherence to standard precautions. The BMJ Open (2023) study further underscored that rural and district-level settings require stronger, context-responsive IPC systems to sustain safe care delivery. In this light, examining compliance among healthcare workers in selected rural district hospitals is both timely and relevant, as it provides evidence on whether existing national standards are being translated into everyday practice in local health facilities.

Healthcare workers are central to the success of IPC programs because they are the direct implementers of precautionary measures at the point of care. Their compliance influences not only their own safety, but also the safety of patients, coworkers, and the broader hospital environment. Strong adherence to hand hygiene, PPE use, safe injection, aseptic technique, and environmental cleaning can reduce preventable transmission and improve confidence in the quality of healthcare services. Conversely, even when formal guidelines are available, inconsistent adherence can expose patients and personnel to avoidable infection risks. Studies from diverse settings have shown that compliance is shaped by a combination of knowledge, attitudes, organizational culture, supply sufficiency,

and monitoring practices (Conflict and Health, 2021; PubMed Central, 2024). Thus, measuring IPC compliance among healthcare workers does more than describe behavior; it also offers insight into the functional state of a hospital's infection control system.

Although international and national literature has established the value of IPC, there remains a relative lack of published evidence focusing specifically on healthcare worker compliance in rural district hospitals in the Philippines. Much of the available literature either addresses broad national issues, tertiary facilities, or generalized IPC frameworks, with fewer studies examining routine compliance patterns in smaller district hospitals that serve rural communities. This gap is important because district hospitals occupy a critical position in the healthcare referral network and frequently operate with fewer resources than larger institutions. Evidence from these settings can help determine which IPC domains are being implemented well and which areas require reinforcement. Such information is essential for guiding targeted interventions, improving patient safety, and informing facility-level and policy-level decision making.

Against this background, the present study was undertaken to examine infection prevention and control compliance among healthcare workers in selected rural district hospitals in the Philippines. Specifically, it sought to determine the level of infection prevention and control compliance among healthcare workers, assess their infection prevention and control practices, and identify key gaps and priority areas for strengthening infection prevention and control based on the study findings. By focusing on rural district hospitals, the study contributes localized evidence to an area where published data remain limited. Its findings may help hospital administrators, infection control committees, and policymakers better understand existing strengths and areas for improvement, while supporting the development of more responsive training, supervision, and resource allocation strategies. Ultimately, strengthening IPC compliance in rural healthcare settings is essential not only for meeting policy

standards, but also for ensuring safer care, protecting healthcare workers, and reducing the burden of preventable infections.

## II. METHODOLOGY

This study employed a descriptive cross-sectional quantitative design to assess IPC compliance and practices among healthcare workers in selected rural district hospitals in the Philippines. The design was appropriate because it allowed the researchers to systematically describe existing IPC-related behaviors and institutional practice patterns as they naturally occurred, without manipulating variables or introducing an intervention. In the context of IPC, a nonexperimental approach was especially suitable because withholding or altering standard precautions for comparison would be impractical and ethically inappropriate. The design therefore enabled an objective assessment of current compliance across key IPC domains, including hand hygiene, personal protective equipment use, transmission-based precautions, safe injection practices, and environmental hygiene.

The study population consisted of healthcare workers assigned to four district hospitals, with a total population of 500 personnel. Using stratified random sampling and Slovin's formula at a 5% margin of error, the study derived a final sample of 222 respondents, proportionately allocated across the participating hospitals.

The sample included physicians, nurses, medical technologists, nursing aides, and utility workers to ensure representation of personnel directly involved in patient care and hospital infection control processes. Data were gathered using a structured survey questionnaire based on the Philippine Department of Health national standards on infection prevention and control for health facilities. Because the questionnaire items were directly adopted from these standards and were not modified by the researcher, separate instrument validation was not conducted. The tool assessed both level of compliance and IPC practices using Likert-based response categories interpreted through weighted mean ranges.

Prior to data collection, permission to conduct the study was secured from the academic institution and relevant provincial and hospital authorities. Data collection was carried out from December 2025 to January 2026 using the adapted survey instrument, with administrative staff excluded from participation. Ethical safeguards were observed throughout the study. Participants were informed of the purpose and procedures of the research, voluntary participation was emphasized, and informed consent was obtained before inclusion. Respondents were also assured that refusal or withdrawal would not result in any penalty. To protect privacy and confidentiality, responses were anonymized and data were handled in accordance with the Data Privacy Act of 2012. For analysis, descriptive statistics, particularly weighted mean and grand mean, were used to summarize IPC compliance and practice levels across domains and across hospitals.

## III. RESULTS & DISCUSSION

### *Infection Prevention and Control Compliance Among Healthcare Workers*

Table 1 shows that healthcare workers in the selected rural district hospitals demonstrated a high level of infection prevention and control compliance, as reflected in the general mean of 4.59, interpreted as highly compliant. This overall finding suggests that the respondents generally adhered to essential IPC measures in their daily practice.

The result may indicate that the hospitals have existing systems, routines, and institutional expectations that support compliance with infection prevention and control standards.

This is consistent with the view of the World Health Organization (2020), which emphasizes that IPC is a fundamental component of safe, effective, and quality health care. The finding also supports the broader literature showing that strong compliance with IPC measures helps reduce the occurrence of healthcare-associated infections and strengthens patient and worker safety (Callewaert & Nuyts, 2018; WHO, 2020).

**Table 1.** Summary of infection prevention and control compliance among healthcare workers in selected rural district hospitals

IPC Domain	H1	H2	H3	H4	Overall Mean	Interpretation
<b>Hand hygiene</b>	4.61	4.50	4.85	4.59	4.62	Highly compliant
<b>Use of personal protective equipment</b>	4.64	4.47	4.62	4.62	4.58	Highly compliant
<b>Transmission-based precautions</b>	4.51	4.39	4.76	4.48	4.54	Highly compliant
<b>Prevention of healthcare-associated infections</b>	4.58	4.46	4.79	4.44	4.54	Highly compliant
<b>Safe injection and sharps practices</b>	4.77	4.61	4.87	4.48	4.60	Highly compliant
<b>Antimicrobial stewardship and resistance control</b>	4.59	4.46	4.74	4.44	4.56	Highly compliant
<b>Environmental hygiene and healthcare waste management</b>	4.72	4.62	4.71	4.58	4.66	Highly compliant
<b>General mean</b>					4.59	Highly compliant

Among the IPC domains, environmental hygiene and healthcare waste management obtained the highest overall mean of 4.66, followed by hand hygiene with 4.62 and safe injection and sharps practices with 4.60, all interpreted as highly compliant. The high rating for environmental hygiene and waste management may reflect the respondents' awareness of the importance of maintaining a clean and safe healthcare environment, especially in preventing contamination and interrupting the chain of infection. This finding is supported by Public Health Agency of Canada (2018), which stressed that environmental control and proper waste management are core components of infection prevention in healthcare facilities. Likewise, the strong compliance in hand hygiene supports previous evidence showing that hand hygiene remains one of the most effective and essential strategies in reducing healthcare-associated infections. Barker and Smith (2020) emphasized that compliance with hand hygiene protocols plays a critical role in preventing the transmission of infectious agents in healthcare settings. Similarly, BMJ Open (2023) noted that IPC strategies, particularly hand hygiene and environmental sanitation, are vital in reducing infection risks in rural hospitals. The high score for safe injection and sharps practices also reflects positive adherence to procedures that protect both patients and healthcare workers from blood-borne infections and procedural contamination. This finding is aligned with WHO (2020) and Public Health Agency of Canada (2018), both of which identify

injection safety and sharps management as essential IPC practices in all levels of care.

Although all domains were rated as highly compliant, transmission-based precautions and prevention of healthcare-associated infections, both with an overall mean of 4.54, were the lowest-rated domains. While these values still indicate strong compliance, they may suggest that these areas require more focused attention than the others. Transmission-based precautions and HAI prevention are often more complex to implement because they depend not only on individual behavior but also on institutional readiness, adequate space, availability of isolation materials, surveillance systems, and continuous reinforcement. This interpretation is consistent with findings from BMC Health Services Research (2025), which reported that healthcare workers' compliance with IPC standards may be influenced by practical and organizational barriers even when awareness is high. Likewise, Conflict and Health (2021) and PubMed Central (2024) noted that adherence to IPC standards in resource-constrained settings is often challenged by structural limitations, workload pressures, and supply-related issues. The variation in mean scores across hospitals further supports this point. Hospital 3 obtained the highest compliance scores in most domains, whereas Hospitals 2 and 4 tended to register relatively lower scores in several areas. These differences may reflect variations in local implementation, training, leadership support, or access to IPC resources. Overall, the findings indicate that

healthcare workers in the selected rural district hospitals exhibit strong IPC compliance; however, the relatively lower scores in transmission-based precautions and HAI prevention suggest the need for sustained monitoring and targeted reinforcement. These results are also consistent with studies showing that rural and under-resourced hospitals can achieve strong IPC compliance, but continued support is necessary to maintain standards and address gaps in more demanding domains (Alfred & Marshall, 2019; Nature, 2024; Tan et al., 2019).

### ***Infection Prevention and Control Practices Among Healthcare Workers***

Table 2 shows that the infection prevention and control practices of healthcare workers in the selected rural district hospitals were highly observed, as reflected in the grand mean of 4.66. This finding indicates that the respondents generally practiced key IPC measures consistently in their workplace. The result suggests that routine infection prevention behaviors are well integrated into daily clinical activities in the participating hospitals. This is an important finding because IPC practices represent the actual application of infection control principles at the point of care, where the safety of both patients and healthcare workers is directly affected. The World Health Organization (2020) emphasized that the consistent implementation of IPC measures is essential to reducing infection risks in healthcare settings, while Callewaert and Nuyts (2018) likewise noted that adherence to IPC protocols plays a significant role in preventing healthcare-associated infections. The present finding therefore reflects a favorable level of practical compliance with standard infection

prevention measures in the selected rural district hospitals.

Among the practice domains, injection safety and aseptic technique obtained the highest overall mean of 4.74, followed closely by hand hygiene practices with 4.73, both interpreted as highly observed. These findings indicate that the respondents were particularly attentive to procedures directly associated with patient safety, procedural sterility, and prevention of cross-contamination. The strong rating for injection safety and aseptic technique is notable because safe injection practices are fundamental to preventing blood-borne infections, medication-related contamination, and procedure-associated transmission. This result is supported by the World Health Organization (2020) and the Public Health Agency of Canada (2018), both of which identify aseptic technique and injection safety as essential components of effective infection prevention in healthcare settings. In the same way, the very high observation of hand hygiene practices supports the widely accepted evidence that hand hygiene remains one of the most effective and accessible measures for reducing healthcare-associated infections. Barker and Smith (2020) emphasized that hand hygiene compliance is central to infection prevention, while BMJ Open (2023) highlighted the importance of basic IPC strategies such as hand hygiene in rural hospitals, where infection control systems may be more vulnerable to operational constraints. The findings in these two domains therefore suggest that the respondents recognize and apply high-priority practices that directly reduce infection transmission.

**Table 2.** Summary of infection prevention and control practices among healthcare workers in selected rural district hospitals

IPC Practice Domain	D1	D2	D3	D4	Overall Mean	Interpretation
<b>Hand Hygiene Practices</b>	4.81	4.68	4.85	4.54	4.73	Highly Observed
<b>PPE Use</b>	4.69	4.49	4.66	4.49	4.62	Highly Observed
<b>Injection Safety and Aseptic Technique</b>	4.79	4.68	4.82	4.71	4.74	Highly Observed

<b>Environmental Cleaning and Device Reprocessing</b>	4.53	4.44	4.66	4.58	4.55	Highly Observed
<b>Grand Mean</b>					4.66	Highly Observed

The domain of PPE use also obtained a high overall mean of 4.62, indicating that the use of protective barriers was highly observed among the respondents. This suggests that healthcare workers generally followed recommended precautions in situations involving potential exposure to infectious materials. Appropriate use of PPE is a key component of IPC because it protects both healthcare personnel and patients from direct and indirect transmission of infectious agents. The World Health Organization (2016, 2020) and the Public Health Agency of Canada (2018) consistently identify PPE as an essential safeguard in healthcare settings, particularly during contact with blood, body fluids, respiratory secretions, or contaminated materials. However, although the result remained highly positive, the slightly lower mean compared with hand hygiene and injection safety may suggest that PPE use is somewhat more dependent on situational judgment, availability of supplies, or comfort in practice. This interpretation is consistent with BMC Health Services Research (2025), which noted that even when healthcare workers are aware of IPC standards, consistent adherence may still be affected by practical and organizational barriers such as supply constraints, workload, and institutional monitoring.

Among the four practice domains, environmental cleaning and device reprocessing obtained the lowest overall mean of 4.55, although it was still interpreted as highly observed. This suggests that environmental cleaning and reprocessing practices were generally implemented, but perhaps with slightly less consistency than the other areas. This result is understandable because environmental cleaning and device reprocessing often involve multiple steps, coordination among staff, availability of supplies, and careful adherence to established procedures. Public Health Agency of Canada (2018) stressed that proper environmental cleaning and device reprocessing are essential to preventing contamination and transmission within healthcare settings. Likewise,

BMJ Open (2023) and Nature (2024) indicated that environmental hygiene is particularly important in rural hospitals, where limitations in equipment, staffing, and infrastructure may affect the consistency of practice. The lower relative rating of this domain may therefore point to the need for sustained attention to cleaning workflows, supervision, and reprocessing protocols. The variation across district hospitals also supports this interpretation. District Hospital 3 posted the highest scores in most domains, while District Hospital 2 registered comparatively lower values, particularly in PPE use and environmental cleaning and device reprocessing. These differences may reflect variations in local implementation, supervision, resource availability, or staff reinforcement. Overall, Table 2 indicates that healthcare workers in the selected rural district hospitals demonstrated a high level of observed IPC practice, particularly in hand hygiene and injection safety, while environmental cleaning and device reprocessing may require continued strengthening to ensure consistent implementation across settings. These findings are consistent with previous studies showing that rural and resource-constrained hospitals can achieve strong IPC practices when supported by clear policies, training, and institutional commitment, but that some domains remain more vulnerable to operational and structural limitations (Alfred & Marshall, 2019; Conflict and Health, 2021; PubMed Central, 2024; Tan et al., 2019).

### ***Priority Areas for Strengthening Infection Prevention and Control***

Table 3 presents the priority areas for strengthening infection prevention and control based on the findings of the study. Although the results of Tables 1 and 2 showed that healthcare workers in the selected rural district hospitals were generally highly compliant and that IPC practices were highly observed, the domain-level patterns also revealed specific areas where continued strengthening is warranted. This is an important part of the analysis because high overall

compliance does not necessarily mean that all components of infection prevention are equally strong or consistently sustained across facilities. In infection prevention and control, even small weaknesses in routine practice, infrastructure, supplies, or monitoring can affect the continuity and effectiveness of protective measures. The World Health Organization (2020) emphasized that IPC systems must be continuously strengthened through training, supervision, environmental support, and regular monitoring in order to maintain safe healthcare delivery. In the same way, Alfred and Marshall (2019) noted that in under-resourced settings, IPC improvement depends not only on staff awareness but also on practical institutional support that allows standards to be followed consistently.

One of the major priority areas identified in the table is hand hygiene practice. Although this domain received a very high compliance rating, the findings

suggest that some hospitals had slightly lower scores in relation to the accessibility of hand hygiene facilities and the correct performance of hand hygiene steps. This indicates that the issue is not the absence of awareness, but rather the need to sustain proper execution and make compliance easier in daily practice. Barker and Smith (2020) emphasized that hand hygiene remains one of the most effective means of preventing healthcare-associated infections, yet compliance can be influenced by access to handwashing stations, availability of alcohol-based hand rub, and staff reinforcement. The recommendation to improve the placement and maintenance of sinks and hand rub dispensers, use visual reminders, and conduct brief peer refreshers is therefore well supported by the literature. These are practical and feasible interventions that may help maintain already high performance while addressing small but meaningful gaps in consistency.

**Table 3.** Priority areas for strengthening infection prevention and control based on study findings

IPC Area	Key Insight from Results	Proposed Enhancement Strategy
<b>Hand Hygiene Practices</b>	Very high compliance, but slightly lower scores in facility accessibility and correct steps in some hospitals	Improve placement and maintenance of sinks and alcohol-based hand rubs; use visual reminders near stations; conduct quick peer-to-peer refreshers
<b>Use of PPE</b>	PPE use is highly compliant, with minor variation in risk-based use	Conduct brief scenario-based discussions during handovers; ensure PPE availability per unit; reinforce donning and doffing through spot coaching
<b>Transmission-Based Precautions</b>	Strong knowledge and adherence; bed spacing and ventilation affected by infrastructure limits	Optimize patient flow and cohorting during peak admissions; advocate gradual space improvements or temporary layout adjustments; review isolation practices regularly
<b>HAI Prevention</b>	High compliance with aseptic technique and reporting; slight variation in bundle adherence	Continue routine audits with immediate supportive feedback; share infection-reduction wins; simplify care bundle checklists
<b>Injection Safety and Sharps Management</b>	One of the strongest domains; needle recapping slightly lower in some areas	Reinforce no-recapping through visual cues near sharps containers; encourage non-punitive reporting of needle-stick injuries; hold regular safety huddles
<b>Antimicrobial Stewardship Practices</b>	High compliance overall, but documentation and monitoring need strengthening	Reinforce accurate antimicrobial documentation; promote regular review of antimicrobial use; strengthen monitoring and feedback

<b>Environmental Hygiene and Waste Management</b>	Highest compliance domain, though some indicators suggest room for better consistency in cleaning schedules and segregation at point of generation	Sustain monitoring of cleaning and waste segregation; reinforce scheduled disinfection and point-of-generation segregation; continue supportive supervision
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Another priority area concerns the use of personal protective equipment, where compliance was high overall but with slight variation in risk-based use. This suggests that healthcare workers generally understand the importance of PPE, but there may be situations in which correct selection, timing, or technique in donning and doffing require further reinforcement. This interpretation is consistent with the World Health Organization (2016, 2020), which describes PPE as an essential barrier against infection transmission but also notes that correct use depends on proper training, availability, and situational judgment. Likewise, BMC Health Services Research (2025) reported that IPC compliance among healthcare workers may be limited by practical barriers such as inconsistent supply, workload, and the need for continuous reinforcement of protocol-based decisions. The proposed strategy of integrating short scenario-based discussions during handovers, ensuring PPE availability per unit, and reinforcing donning and doffing through spot coaching is therefore appropriate. These interventions are relatively low cost and can strengthen practical decision-making in real clinical situations.

The table also identifies transmission-based precautions and HAI prevention as areas needing continued support. While these domains remained highly compliant, they were among the relatively lower-rated aspects of IPC compliance. Their lower ranking may reflect the fact that these domains are often more difficult to sustain because they depend not only on individual adherence but also on broader structural and organizational conditions, such as bed spacing, ventilation, patient flow, surveillance, and consistent application of prevention bundles. Studies in resource-constrained settings have shown that implementing transmission-based precautions is often challenged by limitations in infrastructure and overcrowding. Conflict and Health (2021) highlighted that hospitals working under constrained conditions often struggle to sustain isolation practices and other

infection control measures because of environmental and operational barriers. Similarly, PubMed Central (2024) identified both structural and organizational factors as barriers to IPC compliance in rural hospitals. In this context, the recommendations to optimize patient flow and cohorting, review isolation practices regularly, continue routine audits, and simplify care bundle checklists are realistic and evidence-based responses to the gaps suggested by the findings.

Another important area identified in the table is injection safety and sharps management. Although this was one of the strongest domains in the study, the findings noted that needle recapping was slightly lower in some areas, which remains significant because even a small lapse in sharps safety can expose healthcare workers to needle-stick injuries and blood-borne infections. The World Health Organization (2020) and the Public Health Agency of Canada (2018) both stress that safe injection and sharps disposal practices are indispensable elements of infection prevention. Reinforcing a strict no-recapping policy, placing visual cues near sharps containers, encouraging non-punitive reporting of injuries, and conducting regular safety huddles are appropriate strategies because they focus on sustaining a strong practice area while preventing complacency. This also aligns with the principle that IPC strengthening should not focus only on weak domains, but also on maintaining domains that are already performing well.

The findings further point to antimicrobial stewardship practices as a priority area for improvement. Although compliance was high overall, documentation and monitoring were identified as needing reinforcement. This is particularly relevant because antimicrobial stewardship is closely linked to infection prevention and resistance control. Proper documentation, regular review of antimicrobial use, and effective monitoring systems are necessary to prevent inappropriate prescribing and reduce the emergence of resistant

organisms. The Public Health Agency of Canada (2018) and the World Health Organization (2020) both recognize antimicrobial stewardship as a critical part of a comprehensive IPC program. The proposed strategies of improving documentation accuracy, promoting regular antimicrobial review, and strengthening feedback mechanisms are therefore appropriate and responsive to the findings. In facilities where staffing and time may be limited, structured but practical documentation practices can support both patient safety and surveillance.

Finally, environmental hygiene and waste management, while identified as the highest compliance domain, was still included in the table because some indicators suggested a need for greater consistency in cleaning schedules and waste segregation at the point of generation. This reflects an important principle in infection prevention: even well-performing domains require sustained monitoring to preserve standards over time. Public Health Agency of Canada (2018) and WHO (2020) both emphasize that environmental cleanliness and proper waste segregation are essential to interrupting transmission and maintaining a safe healthcare environment. The recommendation to sustain monitoring, reinforce scheduled disinfection, and continue supportive supervision is therefore justified. Overall, Table 3 shows that the study did not merely identify strengths in IPC compliance and practice, but also highlighted specific and actionable areas for reinforcement. The proposed enhancement strategies are practical, context-sensitive, and aligned with the literature on IPC improvement in rural and resource-constrained hospitals. Consistent with the observations of BMJ Open (2023), Nature (2024), and Tan et al. (2019), the findings suggest that rural hospitals can demonstrate strong IPC performance, but sustained gains depend on continuous supervision, accessible resources, routine monitoring, and institutional commitment to quality and safety.

#### IV. CONCLUSIONS

This study examined infection prevention and control compliance among healthcare workers in selected rural district hospitals in the Philippines. The findings showed that healthcare workers demonstrated a high

level of infection prevention and control compliance, with all assessed domains interpreted as highly compliant. Among these, environmental hygiene and healthcare waste management obtained the highest overall mean, followed by hand hygiene and safe injection and sharps practices. Although transmission-based precautions and prevention of healthcare-associated infections received the lowest means among the domains, both were still rated as highly compliant. These results indicate that infection prevention and control standards are generally well observed in the participating hospitals and suggest that healthcare workers have incorporated core IPC principles into routine practice.

The study also found that infection prevention and control practices were highly observed across the selected rural district hospitals. Injection safety and aseptic technique and hand hygiene practices emerged as the strongest areas, while environmental cleaning and device reprocessing, although still highly observed, obtained the lowest overall mean among the practice domains. Taken together, the findings suggest that the participating hospitals have established a generally favorable culture of IPC implementation. At the same time, the slight variations across domains and across hospitals indicate that some aspects of practice may still be influenced by differences in infrastructure, resource availability, monitoring systems, and local implementation. Thus, while the overall findings are encouraging, they also highlight the importance of sustaining compliance and addressing specific operational gaps that may affect consistency over time.

Based on the findings, rural district hospitals should strengthen IPC implementation through practical and targeted measures. Hospital administrators and infection control committees should improve the accessibility and maintenance of hand hygiene facilities, ensure adequate and unit-based availability of personal protective equipment, and reinforce proper donning, doffing, and risk-based PPE use through brief on-site coaching and regular refreshers. Facilities should also optimize patient flow, spacing, and cohorting practices to support transmission-based precautions, while routine audits and supportive feedback should be sustained to improve adherence to

HAI prevention measures. In addition, hospitals should reinforce no-recapping practices, promote non-punitive reporting of needle-stick injuries, strengthen antimicrobial documentation and review processes, and maintain regular supervision of environmental cleaning, device reprocessing, and waste segregation. These actions may help sustain the strong IPC performance observed in the study while addressing the priority areas identified for continuous improvement.

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