The Association Between the Infection Prevention and Control (IPC) Committee's Performance and Compliance With the Use of Personal Protective Equipment (PPE) in Sembiring Hospital

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Abstract

Hospitals play a critical role in preventing nosocomial infections, and the use of personal protective equipment (PPE) is a key strategy for protecting healthcare workers and preventing pathogen transmission. This cross-sectional quantitative study aimed to assess the influence of the Infection Prevention and Control (IPC) Committee's performance on PPE compliance at Sembiring Hospital. A total of 57 healthcare workers participated and were surveyed using structured questionnaires. Data were analysed using univariate, bivariate (Chi-square) and multivariate (logistic regression) methods. All IPC performance indicators, surveillance, supervision, policy and procedure development, training, education effectiveness, participation and collaboration, and PPE availability, were significantly associated with PPE compliance. Multivariate analysis showed that education effectiveness had a significant effect on compliance (p = 0.002; Exp(B) = 16.655; 95% CI: 2.707–90.543). These findings suggest that strengthening the IPC Committee's role in delivering effective education is essential to improve PPE compliance among healthcare workers. For policy and practice, hospitals should prioritise continuous IPC training programmes and institutionalise periodic competency assessments to enhance adherence to PPE protocols and safeguard both staff and patients

Keywords: IPC Committee, PPE Compliance, Infection Prevention, Hospital Policy

INTRODUCTION

In healthcare, infection surveillance plays a vital role in keeping both patients and staff safe from harmful pathogens. At the heart of effective infection prevention and control is the Infection Prevention and Control Committee (IPCC), which takes an active role in ensuring safety across facilities. This committee is responsible for creating clear guidelines training healthcare workers, and checking whether infection control practices are being followed, especially when it comes to the proper use of personal protective equipment (PPE) (Tomczyk et al., 2021).

The COVID-19 pandemic has made it clear just how critical proper PPE use is for stopping the spread of viruses in hospitals and other clinical settings (Sesay, 2025). Yet, even with greater awareness and better access to PPE, research shows that many healthcare workers still struggle to consistently follow infection prevention protocols **Error! Reference source not found.** This is where the Infection Prevention and Control Committee (IPCC) plays a vital

role. By providing ongoing supervision, monitoring, and education, the committee helps ensure that staff stay compliant, ultimately reducing the risk of healthcare-associated infections (Choy et al., 2022).

Research from Indonesian hospitals shows that healthcare-associated infections (HAIs) remain a serious challenge. For example, one study reported a phlebitis incidence of 1.9% among inpatients, pointing to weak adherence to aseptic procedures during intravenous catheter insertion (Kurniawan et al., 2019)**Error! Reference source not found.** These findings emphasize the urgent need to strengthen infection prevention and control (IPC) programs across Indonesian healthcare facilities to reduce the burden of HAIsAlthough Indonesia has made notable progress in strengthening national Infection Prevention and Control (IPC) systems, there is still limited data on how consistently healthcare workers comply with personal protective equipment (PPE) use in hospitals. Most studies have focused on the broader implementation of IPC programs or the prevalence of healthcare-associated infections (HAIs), while few have explored the organizational, leadership, and behavioral factors that shape PPE adherence (Choy et al., 2022).

International research offers useful insights into committee dynamics and leadership impact, but these findings do not fully capture the unique realities of Indonesian hospitals, which face distinct challenges in resources, infrastructure, and institutional culture. Recognizing this, the Ministry of Health has emphasized PPE compliance as a key component of national IPC standards, outlined in the Guidelines for Infection Prevention and Control in Health Service FacilitiesRecent studies reveal that while many healthcare organizations have introduced comprehensive infection control protocols, PPE adherence remains inconsistent (Amos et al., 2024). This inconsistency often stems from gaps in training and limited oversight. A strong and functional Infection Prevention and Control Committee (IPCC) can help close these gaps by ensuring that protocols are not only designed but also effectively communicated and enforced (Supriadi et al., 2023).

One of the most important factors influencing PPE adherence is the organizational culture within healthcare settings. Research shows that when leadership is proactive and communication is clear, a safety-focused culture emerges leading to stronger compliance with infection control protocols. Infection Prevention and Control Committees (IPCCs) (De Bono et al., 2014) **Error! Reference source not found.** That prioritize continuous education, run simulation drills, and maintain open dialogue with staff tend to achieve higher levels of PPE compliance (Cordeiro et al., 2022). Understanding how IPCC behaviors shape PPE adherence offers valuable insights for refining infection control strategies.

Despite the growing scholarship on infection prevention, the specific impact of IPCC performance on PPE use has not been thoroughly examined (Weldetinsae et al., 2023). Most studies have focused on broad infection management or the outcomes of isolated training programs (Al-Qahtani et al., 2025). The implementation of comprehensive infection control protocols, particularly those that are role-specific and involve continuous training and feedback mechanisms, has been shown to significantly improve adherence to infection prevention measures and reduce healthcare-associated infections across multidisciplinary healthcare teams (Alghfainah et al., 2024). This study addresses that gap by empirically analyzing the direct link between IPCC effectiveness and PPE adherence in a regional private hospital. By highlighting the committee's educational and supervisory roles as key drivers, this research contributes fresh insights to the literature and supports the design of targeted strategies to strengthen infection control practices (Kartini Seilatu & Ayubi, 2023).

METHODS

This quantitative study used a cross-sectional design to examine the relationship between independent and dependent variables at a single point in time. The dependent variable was PPE compliance, while the independent variables included surveillance, supervision, policy formulation, training, educational effectiveness, participation, collaboration, and PPE availability. These factors were measured using a five-point Likert scale (1–5), with higher scores reflecting stronger compliance. The study population consisted of 130 registered nurses, with a sample size of 57 determined using the Slovin formula and selected through simple random sampling. The research instrument was validated, and reliability testing produced Cronbach's Alpha values ranging from 0.78 to 0.86, indicating good internal consistency. Data analysis involved three stages: univariate analysis to describe the variables, bivariate analysis using the chi-square test, and multivariate analysis through logistic regression with a stepwise approach. Ethical approval was obtained from the Health Research Ethics Committee of Deli Husada Institute (No. 081/KEP-IKDH/III/2025), along with a research permit from the hospital (No. 072/RS-SMD/IV/2025). All participants provided informed consent, and confidentiality was strictly maintained.

RESULT

Table 1. Distribution Based on Age and Gender (n=57)

Characterictics	n	%
Age		
21-45	53	93.2
46-65	4	6.8
Gender		

Male	3	5,3
Female	54	94,7
Total	**57**	**100**

The majority of respondents were aged 21–45 years (93.2%), indicating that most participants were in the productive working-age group. Only 6.8% of respondents were aged 46–65 years. In terms of gender, the respondents were predominantly female (94.7%), while male nurses accounted for only 5.3% of the total participants.

Table 2. The results of the Bivariate analysis are based on the independent variables at Sembiring Hospital (n=57)

Variable	Compliance				p-value
	Obedient		Not Obey		
	f	%	f	%	
Surveillance					
Implemented	32	82	9	50	0.016
Not Implemented	7	18	9	50	
Supervision					
Implemented	32	82	9	50	0.016
Not Implemented	7	18	9	50	
Policy Development					
Conducted	35	89,7	4	22,2	0.000
Not Conducted	4	10,3	14	77,8	
Training Implementation					
Implemented	34	87,1	6	33,3	0.000
Not Implemented	5	12,9	12	66,7	
Education Effectiveness					
Effective	36	92,3	3	16,6	0.000
Not Effective	3	0,7	15	83,4	
Partisipation and Colaboration					
Effective	35	89,7	5	27,7	0.000
Not Effective	4	10,3	13	72,3	
PPE Availability					
Available	36	92,3	3	16,6	0.000
Not Available	3	0,7	15	83,4	
Total	**39**	**100**	**18**	**100**	

The results of the bivariate analysis showed that all independent variables had a significant relationship with healthcare workers' compliance with infection prevention and control (IPC) practices ($p < 0.05$). Surveillance and supervision were both significantly associated with compliance ($p = 0.016$), indicating that continuous monitoring and direct supervision play a crucial role in promoting adherence to IPC standards. Policy development also demonstrated a strong correlation ($p = 0.000$); respondents working in units where IPC policies were developed and implemented were more compliant (89.7%) compared to those without such policies (22.2%).

Training implementation and educational effectiveness were highly significant ($p = 0.000$), with compliant respondents reporting more frequent and effective training sessions

(87.1% and 92.3%, respectively). Similarly, participation and collaboration were positively associated with compliance (p = 0.000), suggesting that an inclusive and team-based approach enhances commitment to safe practices. Finally, the availability of personal protective equipment (PPE) was a determining factor (p = 0.000); units with adequate PPE resources showed markedly higher compliance (92.3%) compared to those lacking availability (16.6%). These findings emphasize that organizational support, structured policies, and adequate resources are critical components in sustaining IPC compliance among healthcare workers.

Table 3. Dominant Factors Affecting Compliance in IPC Implementation

Variable	B	Wald	P-Value	Exp(B)	95% CI for Exp(B)
PPE Availability	2.621	11.96	0.001	13.75	3.18 – 59.49
Education Effectiveness	2.417	10.54	0.001	11.21	2.82 – 44.65
Policy Development	2.187	9.24	0.002	8.91	2.34 – 33.89

The results show that PPE availability is the most dominant factor influencing staff compliance in Infection Prevention and Control (IPC) implementation, with an Exp(B) value of 13.75 (p = 0.001). This indicates that staff with adequate PPE are 13.75 times more likely to be compliant compared to those with limited PPE availability. In addition, education effectiveness (Exp(B) = 11.21; p = 0.001) and policy development (Exp(B) = 8.91; p = 0.002) also have significant effects on improving compliance.

DISCUSSION

The Influence of the Availability of Personal Protective Equipment on Compliance with the Use of Personal Protective Equipment at Sembiring Hospital

The multivariate analysis revealed that the availability of Personal Protective Equipment (PPE) was the most influential factor in determining compliance among healthcare workers. When PPE is consistently available and accessible, staff can carry out infection prevention measures more effectively, with fewer physical and psychological barriers. This readiness encourages adherence to protocols and supports safe practices in clinical settings. The finding is consistent with earlier studies that highlight resource availability as a key determinant of infection control compliance (Haas et al., 2024).

Participation and collaboration also showed a strong link to PPE adherence. When healthcare workers are actively involved in decision-making and interdepartmental teamwork, they develop a sense of ownership and shared responsibility for infection prevention. Collaborative practices, such as peer monitoring and feedback systems, have been shown to strengthen accountability and improve compliance, particularly in high-pressure environments (George et al., 2023).

These results suggest that hospitals should prioritize reliable PPE supply chains and resource monitoring to sustain compliance. At the same time, policies that encourage participatory management and cross-department collaboration should be reinforced. Empowering healthcare workers to contribute to PPE policy development and supervision mechanisms can foster long-term behavioral adherence and build a stronger safety culture (Bridson et al., 2021).From a theoretical standpoint, this study supports the Health Belief Model (HBM), which emphasizes that perceived barriers and enabling factors, such as PPE availability, directly shape compliance behaviors. By integrating teamwork and collaborative culture into the HBM, the findings extend the theory to show how social and organizational support systems can drive sustained preventive practices (George et al., 2023).

The Effect Education Effectiveness on Compliance with Personal Protective Equipment Use at Sembiring Hospital

Education plays a central role in ensuring that healthcare workers use Personal Protective Equipment (PPE) correctly and consistently. This study found a strong and significant link between educational effectiveness and PPE compliance ($p = 0.01$). Comprehensive training programs, covering technical skills such as proper donning and doffing procedures, and raising awareness of the risks of non-compliance, help sustain adherence over time (Alanazi, 2024).

Interactive and multimodal approaches, including online modules, live demonstrations, simulations, and visual media, further strengthen understanding and practical skills, leading to higher compliance levels (Ge et al., 2025). Leadership involvement in training not only reinforces accountability but also fosters a workplace safety culture (George et al., 2023). To remain effective, training materials must be regularly, in line with the latest clinical guidelines and participant feedback, ensuring relevance and preparedness against emerging infectious threats (Sesay, 2025).

These findings highlight the importance of continuous PPE education programs. Training should be mandatory during staff orientation and offered as periodic refreshers. Leadership participation is essential to set an example and encourage a culture of compliance. Incorporating digital technologies and interactive simulations can also improve accessibility (Yoshikawa et al., 2025).

From a theoretical perspective, the results support Adult Learning Theory (Andragogy), which emphasizes that learning is most effective when it is contextual, participatory, and directly tied to professional practice. Interactive, leadership-supported approaches promote sustainable behavioral change (George et al., 2023). The findings also reinforce the Health

Belief Model (HBM), showing that improved perceptions of competence and self-efficacy gained through effective education encourage healthcare workers to consistently follow PPE protocols (Amini et al., 2021).

The Impact of Policy and Procedure Development on Personal Protective Equipment (PPE) Compliance at Sembiring Hospital

Clear and comprehensive policies are essential for ensuring consistent PPE compliance among healthcare professionals. This study found a strong and significant correlation (p =0.00–0.01) between well-defined institutional policies and improved adherence to PPE protocols. Effective policies should provide detailed guidance on PPE use, disposal, storage, and maintenance, while also incorporating regular revisions based on frontline feedback. Evidence shows that embedding routine audits, supervision, and feedback mechanisms into standard operating procedures (SOPs) significantly strengthens staff compliance (p = 0.0) (Ge et al., 2025).

The results support Institutional Theory, which explains how compliance is shaped by organizational rules and norms. They also align with the Organizational Safety Culture Model, which emphasizes leadership engagement and policy clarity as drivers of safety. Finally, the findings reflect Systems Theory, showing that responsive institutional frameworks are critical for sustaining compliance and building organizational resilience (Curtis et al., 2022).

The Influence of Surveillance on Compliance with Personal Protective Equipment Use at Sembiring Hospital

Personal Protective Equipment (PPE) is a critical safeguard for healthcare workers in high-risk environments, especially during public health crises such as the COVID-19 pandemic. Adherence to PPE protocols is essential, as poor compliance increases the risk of infection and compromises both worker and patient safety (Weldetinsae et al., 2023). Evidence shows that structured surveillance systems play a major role in improving PPE compliance. Regular monitoring, data collection, and feedback mechanisms foster accountability and strengthen adherence to safety standards (Choi et al., 2021).

Studies further demonstrate that when surveillance is combined with staff training, supervision, and corrective actions, PPE compliance improves and healthcare-associated infections are reduced (Shehab et al., 2021).The present study (p = 0.01) confirms that surveillance is a significant factor in PPE adherence. Continuous follow-up, transparent reporting, and visible tracking help reduce non-compliance and enhance infection control outcomes (Ge et al., 2025). Surveillance thus acts as both a preventive and corrective

mechanism supporting high compliance and a strong safety culture when paired with education and policy enforcement (Choi et al., 2021).

These findings highlight the importance of robust surveillance systems within hospital IPC programs. Management should integrate surveillance into daily operations through monitoring tools, checklists, and digital tracking, while ensuring that feedback is communicated to staff for improvement. Surveillance teams must be trained to provide timely interventions and collaboration between infection control committees and leadership is essential to sustain these systems (Shehab et al., 2021).

The findings support the Control Theory of Behavior, which explains how monitoring and feedback align actions with standards. They also reinforce the Donabedian Quality of Care Framework, showing that surveillance enhances safety outcomes and align with the Health Belief Model by strengthening perceptions of susceptibility and encouraging adherence behaviors (Choi et al., 2021).

The Influence of Supervision on Compliance with Personal Protective Equipment Use at Sembiring Hospital

Supervision plays a vital role in ensuring adherence to PPE protocols in healthcare environments with high infection risks. The findings ($p = 0.01$) show a statistically significant link between supervisory interventions and improved compliance (Al-Azani et al., 2024). Confirming that consistent oversight directly contributes to safer practices (Sesay, 2025). Regular monitoring and constructive feedback help detect early deviations and reinforce adherence, ultimately reducing healthcare-associated infections.

Importantly, supervision is not only corrective but also formative, it cultivates professional accountability and strengthens the safety culture within institutions. Evidence indicates that when supervision is combined with ongoing training, audit systems, and behavioral reinforcement it leads to sustained improvements in compliance. This study supports the Behavioral Compliance Model, which highlights how observation and feedback enhance intrinsic motivation and self-regulation among healthcare workers. It extends existing frameworks by positioning supervision as more than external control: it is a catalyst for building a safety-focused culture. Consistent with organizational behavior theory, the findings show that leadership oversight and feedback shape collective norms and reinforce safety as a shared value, making supervision a key driver of PPE compliance (Choy et al., 2022).

The Impact of Training Implementation on Compliance with Personal Protective Equipment Use at Sembiring Hospital

Training is a cornerstone of PPE compliance, as it strengthens the knowledge, skills, and attitudes of healthcare professionals. Role-specific and competency-based training helps staff understand infection prevention in the context of their duties (Al-Azani et al., 2024). Ensuring that PPE procedures are applied correctly (Qaboli et al., 2024). Interactive learning methods, such as simulations, demonstrations, and peer feedback, further enhance retention and practical application of safe practices (Suppan et al., 2020). Embedding evaluation mechanisms within training aligns knowledge acquisition with behavioral outcomes, reinforcing compliance over time.

The findings highlight the need to make continuous PPE training part of hospital infection control policies. Hospitals should conduct regular competency assessments, integrate PPE training into staff orientation, and provide periodic refresher courses. Policies should also encourage experiential and simulation-based learning, which are more effective than traditional lectures in sustaining compliance. At the national level, health authorities should standardize PPE training to ensure consistent quality and accountability across institutions

The results support the Knowledge-Attitude-Practice (KAP) Model and Adult Learning Theory, showing that structured, experiential learning not only improves knowledge but also builds self-efficacy and reinforces compliance through social support. Integrating training into daily clinical routines reflects organizational learning theory, emphasizing education as a continuous process. This approach demonstrates how targeted, context-specific training can drive sustained behavioral change in PPE adherence.

The Influence of Participation and Collaboration on Compliance with Personal Protective Equipment Use at Sembiring Hospital

Participation and collaboration are pivotal in strengthening PPE compliance because they foster shared responsibility and collective accountability among healthcare workers. This study found a significant relationship ($p = 0.01$) between active involvement and adherence, showing that engagement in policy development builds ownership and reinforces behavioral commitment (Haas et al., 2024). Cross-departmental and interprofessional collaboration among physicians, nurses, and support staff, has also been shown to improve adherence through shared learning and mutual reinforcement (George et al., 2023).

Teamwork-based interventions, such as peer monitoring, collaborative safety audits, and joint feedback mechanisms, further reduce infection rates and sustain consistent PPE use (Bridson et al., 2021). Leadership-driven collaboration enhances these outcomes by promoting communication, cultivating a safety culture, and ensuring that PPE practices remain a collective institutional priority (Ge et al., 2025).

The findings underscore the need for healthcare institutions to embed participatory and collaborative frameworks into PPE management policies. Hospitals should establish cross-functional infection prevention committees that actively involve frontline staff in decision-making, policy review, and safety audits. Leadership should also create platforms, such as interprofessional meetings and feedback sessions, that encourage open communication and shared accountability. At the national level, policymakers could strengthen compliance by mandating participatory training and interdepartmental coordination as part of standard infection prevention protocols. This participatory approach ensures that PPE adherence becomes embedded in organizational culture rather than treated as an individual obligation (Berihun et al., 2024).

From a theoretical perspective, the study extends Social Cognitive Theory and Collaborative Governance Theory in healthcare compliance. It demonstrates that participatory engagement and collaborative interaction act as social reinforcement mechanisms, boosting self-efficacy and collective behavior toward safety practices. By linking interpersonal collaboration with institutional trust and shared accountability, the findings highlight how social and organizational dynamics shape consistent PPE adherence. This reinforces the idea that effective compliance arises not only from individual awareness or training, but from a synergistic system of participation, collaboration, and leadership-driven organizational learning (Ada et al., 2025).

CONCLUSION

The analysis showed that PPE availability, educational effectiveness, and policy development significantly influenced nurses' compliance with PPE use at Sembiring Hospital ($p < 0.05$). Of these, PPE availability was the most dominant factor, with an Exp(B) value of 13.75 (95% CI: 3.18–59.49). This highlights that consistent access to PPE is a fundamental prerequisite for healthcare workers to follow infection prevention standards. Educational effectiveness (Exp(B) = 11.21) and policy development (Exp(B) = 8.91) also played important roles, improving staff competence and reinforcing consistent compliance with safety practices.

Hospitals should prioritize continuous PPE supply chain management, strengthen structured and ongoing education programs, and align institutional policies and SOPs to foster a culture of compliance. Leadership involvement and the active role of infection prevention and control (IPC) committees are equally vital for sustaining safety practices and promoting accountability among healthcare staff. Future research should adopt longitudinal or multicenter designs to better understand compliance dynamics across diverse healthcare settings. Further

exploration of organizational, psychosocial, and safety culture factors is recommended to develop more comprehensive intervention models that enhance healthcare worker safety and strengthen infection control performance in Indonesia.

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