Indexed in Clarivate Analytics WoS

E-B Environment - Behaviour Proceedings Journal

ICEPH-CS2025Kuching

https://iceph-cs.com/

e-IPH e-International Publishing House Ltd., United Kingdom

1st International Conference, Exhibition & Innovation on Public Health & International Community Services

Waterfront Hotel Kuching, Sarawak, Malaysia

19-22 Aug 2025

Organiser: Universiti Teknologi MARA (UiTM), Malaysia
Co-Organisers: Universitas Muhammadiyah Malang (UMM), Indonesia, Unversitas Airlangga (UNAIR), Indonesia, UiTM Technoventure, Malaysia

Compliance Level and Factors influencing Adherence to Standard Precautions Practices among Nurses

Norsuraya Hassan[1,2*], Umi Far-Ain Zulkapli[3], Siti Munirah Abdul Wahab[1], Nizuwan Azman[4]

**Corresponding Author*

[1] Faculty of Health Sciences, Universiti Teknologi MARA, Cawangan Pulau Pinang, Kampus Bertam, Kepala Batas, Pulau Pinang, Malaysia

[2] Community Health and Women's Health in Nursing (CHWH-Nursing), Universiti Teknologi MARA, Cawangan Selangor, Puncak Alam, Selangor, Malaysia

[3] Infection Control Unit, Hospital Slim River, Slim River, Perak, Malaysia

[4] Division of Research and Networking, Advanced Medical and Dental Institute, Universiti Sains Malaysia, Bertam, Malaysia

norsurayahassan@uitm.edu.my, farainzulkapli@gmail.com, munirah85@uitm.edu.my, nizuwan@usm.my
Tel: +60194646565

Abstract

This study assessed compliance with Standard Precautions (SPs) among 155 nurses at a public hospital Perak, using a cross-sectional design and convenience sampling. The Compliance with Standard Precaution Scale (CSPS) and Factors Influencing Adherence to Standard Precautions Scale (FIASPS) were used. Results showed 59.4% were compliant, while 32.9% had suboptimal compliance. Job position and education significantly influenced adherence, with lower-ranking nurses and those with lower qualifications showing higher compliance. All five FIASPS categories positively impacted adherence. As the study relied on self-reported data, future research should include qualitative methods. Findings highlight the need for strategies to strengthen SP compliance.

Keywords: Compliance; Standard Precautions; Nurses

DOI: https://doi.org/10.21834/e-bpj.v10iSI35.7520

1.0 Introduction

Sustainable Development Goal 3 targets universal health coverage, yet hospital-acquired infections (HAIs) remain a significant global health concern. Inadequate infection prevention and control (IPC) measures contribute to prolonged hospital stays, increased healthcare costs, and higher morbidity and mortality rates (Haile et al., 2017). As part of the World Health Organization's strategy to strengthen health system resilience, IPC programs emphasize the consistent application of standard precautions (SPs). Standard precautions—

eISSN: 2398-4287 © 2025. The Authors. Published for AMER by e-International Publishing House, Ltd., UK. This is an open access article under the CC BY-NC-ND license (http://c5eativecommons.org/licenses/by-nc-nd/4.0/). Peer–review under responsibility of AMER (Association of Malaysian Environment-Behaviour Researchers
DOI: https://doi.org/10.21834/e-bpj.v10iSI35.7520

outlined by the Centers for Disease Control and Prevention (CDC)—include hand hygiene, use of personal protective equipment, environmental cleaning, disinfection and sterilization, waste and linen management, safe injection practices, and respiratory etiquette.

These measures aim to minimize the transmission of infections from both identified and unidentified sources, thereby protecting both patients and healthcare workers (CDC, 2020). Despite their importance, SPs compliance remains suboptimal in many healthcare settings. For example, only 12% of healthcare workers (HCWs) at Gondar University Hospital in Northwest Ethiopia consistently adhered to SPs (Haile et al., 2017). In Indonesia, only 56.7% of nurses complied with SPs, falling short of the national accreditation benchmark of 85% (Rusli et al., 2020). Similar trends have been reported elsewhere, with SPs adherence rates dropping to 54% during patient care and 46% during invasive procedures (Desta et al., 2022).

To address the identified issues, this study explored the compliance level and factors influencing adherence to SPs practices among nurses. The study objectives are to identify the factors and level of compliance with SPs practices, and the associations with sociodemographic data among nurses in Malaysia, particularly in Perak.

2.0 Literature Review

Standard Precautions (SPs), established by WHO, are essential guidelines for preventing infection in healthcare settings. Compliance with SPs helps prevent the spread of pathogens such as HBV, SARS-CoV-2, and Pseudomonas. Challenges include limited resources (e.g., PPE, hand rubs), unsafe practices like needle recapping, and a lack of proper training. Regular education, adequate supplies, and strong institutional support are crucial to ensure HCWs consistently follow SPs and maintain a safe environment for patients and staff.

Compliance with Standard Precautions (SPs) is shaped by leadership, workplace context, resources, and personal judgment. Gaps often involve hand hygiene and needle safety (Medeiros et al., 2022). Supportive leadership and audits enhance adherence (Donati ett al., 2020), while lack of PPE and high workload hinder it (Cunha et al., 2020). Though training helps, many still lack guideline knowledge (Mulat Endalew et al., 2022). Risk awareness aids compliance, but attitude alone is insufficient.

Demographic factors such as age, gender, education level, job position, and work experience may influence compliance with SPs. Some studies report higher adherence among nurses with senior positions or advanced education, possibly due to greater responsibility and training access. However, others found no significant link between age, gender, or experience and compliance (Alshammari et al., 2018; Haque et al., 2020). These mixed results suggest that demographic factors alone may not predict adherence and should be considered alongside workplace environment and support systems.

A previous study has shown that nurses suffer the most on-the-job injuries among healthcare occupational groups, and sharps injuries and other work-related incidents remain common in nursing staff (Medeni et al., 2025). A lack of knowledge and inadequate training have been identified as important contributors to poor adherence to standard precautions (Da'seh et al., 2023). In addition, compliance with standard precautions is influenced by sociodemographic and environmental factors for example, years of experience, unit of work, availability of resources, and presence of enforcement mechanisms, all of which affect workers' adherence and therefore require targeted investigation to drive meaningful behavioural change in healthcare (Senbato et al., 2024).

The exact level of compliance with SPs for government nurses in Malaysia still needs to be determined. Thus, there needs to be more research here. An examination of the previous literature suggests an extension of the study that emphasizes the value of educating healthcare personnel to improve their familiarity with and compliance with SPs. It motivates doing more research to deepen knowledge of this issue among nurses who often encounter possibly contaminated biological material in their work. This research may provide an alternative to the problem of manually demonstrating that factors and compliance with SPs can provide the best patient care. Therefore, this study will contribute to narrowing this gap and defining the factors of the problem for compliance with SP practices among nurses.

3.0 Methodology

3.1 Study setting and study design

This study was conducted from September 2022 to January 2024 at a public Hospital Slim River, Perak, Malaysia. The hospital serves as one of the state's specialized facilities, providing a range of medical services to the surrounding communities.

A cross-sectional study design was adopted to collect data at a single point in time without manipulating any variables. This quantitative, non-experimental approach was used to assess the level of nurses' compliance with Standard Precautions (SPs) and to identify the factors associated with their adherence.

3.2 Sample and sampling method

Approximately 257 nurses work at the selected public hospital for this study. The sample size was calculated using the Raosoft® Software with a 5% margin of error. Using the 95% confidence level and 50% response distribution, the recommended sample size was 155. A non-probability convenience sampling method was used to recruit eligible nurses based on predefined inclusion and exclusion criteria. While this method allowed efficient data collection, the findings may not be generalizable to all nurses in Malaysia, as the sample was drawn from a single facility in Perak.

3.3 Inclusion and exclusion criteria

Respondents participating in this study were registered nurses who had worked for more than six months. Therefore, respondents must also be able to read and understand the Malay/ English language and have good visual and cognitive functions to respond to the

questionnaire. Exclusion criteria are the respondents who were nursing students and nurses on special leave during the data collection period.

3.3 Instruments

This study used a self-administered online questionnaire based on the English version of the Compliance with Standard Precaution Scale (CSPS) and the Factors Influencing Adherence to Standard Precaution Practices Scale (FIASPS). The questionnaire consisted of three sections. Section A captured demographic details such as age, gender, position, work experience, and education level. Section B assessed compliance with SPs using the 20-item CSPS, rated on a 4-point adjectival scale (0 = never, 1 = seldom, 2 = sometimes, 3 = always). Four negatively worded items (items 2, 4, 6, and 15) were reverse-scored. Only "always" for positive items and "never" for negative items were scored as 1; all other responses were scored 0. Total scores ranged from 0 to 20, with higher scores indicating better compliance. Compliance was categorized as optimal (>90%), satisfactory (80–89%), suboptimal (50–79%), and poor (<49%). Section C measured factors influencing SP adherence using the 29-item FIASPS. Responses were rated on a 5-point Likert scale: Very Much (4), Often (3), Sometimes (2), Seldom (1), and Not at All (0), assessing attitudinal and workplace-related influences on compliance.

3.4 Data analysis

Data were analyzed using SPSS version 27. Descriptive statistics analysis was used for socio-demographic variables, compliance level and factors affecting compliance with standard precautions practices. Associations between demographic factors and compliance levels were tested using Pearson's Chi-Square and One-Way ANOVA. Results were presented as percentages in tabular form.

3.5 Ethical considerations and data collection process

This study was conducted in December 2023 with approval from the National Medical Research Register (NMRR) and the Research Ethics Committee (REC) of Universiti Teknologi MARA (UiTM).

Participants accessed the questionnaire via a QR code linked to a Google Form that consisted of the online questionnaire. The form included an explanation of the study's purpose, required information, and a consent statement. Respondents provided informed consent by selecting "agree" or could withdraw by selecting "disagree." The entire respondent's security and anonymity of the information collected were kept confidential and stored in a password-protected, encrypted database. The questionnaire took approximately 10–15 minutes to complete, and responses were collected for data analysis. A summary of the research process is shown in Fig. 1.

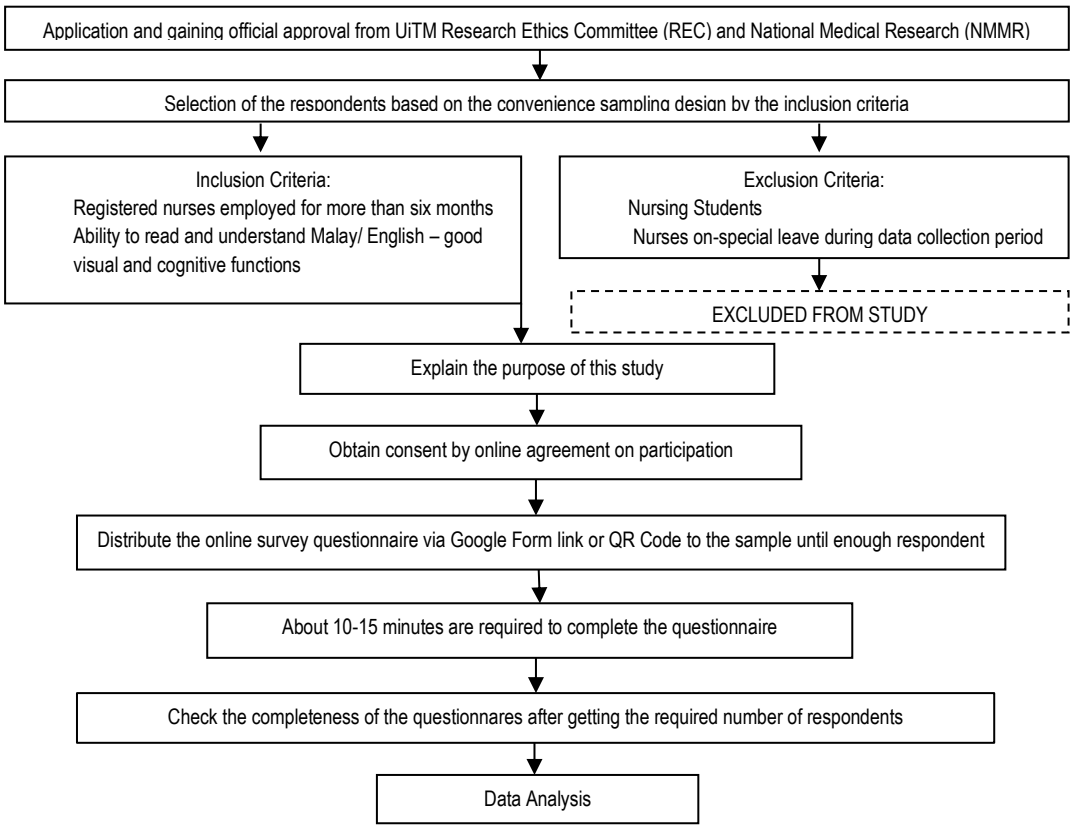

Fig. 1: The Research Process Flowchart

4.0 Findings

4.1 Demographic data

Table 1 presents the demographic characteristics of the 155 nurse respondents. Most were female (93.5%, n = 145), while only 6.5% (n = 10) were male. The average age was 36.96 years (SD = 6.44). The majority held the position of JT U29 (63.9%, n = 99), followed by JT U32 (27.1%, n = 42) and KJ U32 (9.0%, n = 14). The mean working experience was 13.5 years. Most respondents had 11–31 years of experience (60.6%, n = 94), while the fewest had 5–10 years (5.2%, n = 8). Educational levels were fairly balanced, with 49.0% (n = 76) holding a diploma and 49.7% (n = 77) having post-basic qualifications.

Table 1. Demographic characteristics of the respondents (N= 155)

Items	Response	
	Frequency (n)	Percentage %
Age (Mean ±SD)	36.96	6.44
Gender		
Male	10	6.5
Female	145	93.5
Position		
JT U29	99	63.9
JT U32	42	27.1
KJ U32	14	9.0
Working experience		
1-5 years	8	5.2
6 – 10 years	53	34.2
11 – 31 years	94	60.6
Education Level		
Diploma	76	49.0
Post Basic	77	49.7
Bachelor	02	1.3

4.2 Level of compliance with standard precautions practices among nurses.

Table 2 presents the compliance levels among nurses at Hospital Slim River. Overall, 29.7% of respondents had high compliance (>90%), and another 29.7% showed satisfactory compliance (80–89%). However, the majority (32.9%) demonstrated suboptimal compliance (50–79%). The highest compliance rates were in the use of protective devices (47.1%, n = 73), waste disposal (87.7%, n = 136), and decontamination of spills and used articles (72.3%, n = 112). Lower compliance rates were observed in the disposal of sharp objects (50.3%, n = 78) and the prevention of cross-infection (45.2%, n = 70).

Table 2. Compliance with Standard Precautions Scale (CSPS) (N = 155)

Items	Response			
	Poor (49%) n (%)	Suboptimal (50-79%) n (%)	Satisfactory (80-89%) n (%)	Compliance (>90%) n (%)
Overall	12 (7.7)	51 (32.9)	46 (29.7)	46 (29.7)
Use of protective devices	10 (6.5)	31 (20.0)	41 (26.5)	73 (47.1)
Disposal of sharp	29 (18.7)	78 (50.3)	0 (0.0)	48 (31)
Disposal of waste	19 (12.3)	0 (0.0)	0 (0.0)	136 (87.7)
Decontamination of spills and used articles	27 (17.4)	16 (10.3)	0 (0.0)	112 (72.3)
Prevention of cross-infection from Person to Person	26 (16.8)	70 (45.2)	49 (31.6)	10 (6.5)

4.3 Factors affecting adherence to standard precautions practices among nurses

Table 3 (a) presents the descriptive statistics for the Justification category in the Factors Influencing Adherence to Standard Precautions, based on seven items. Most respondents answered “Not at All” for Q2 (49.0%), Q4 (46.5%), Q5 (58.7%), Q6 (54.8%), and Q7 (44.5%). For Q1 and Q3, most respondents selected “Sometimes” at 40% and 36.1%, respectively.

Table 3. (a) Factors Influencing Adherence to Standard Precautions Scale (FIASPS) for Justification

Items	Response				
	Not at all n (%)	Seldom n (%)	Sometimes n (%)	Often n (%)	Very much n (%)
Q1. I don't wear gloves as I cannot feel veins.	46 (29.7)	27 (17.4)	62 (40.0)	9 (5.8)	11 (7.1)
Q2. I am clumsier when I wear gloves and risk having to repeat the procedure.	76 (49.0)	29 (18.7)	33 (21.3)	10 (6.5)	7 (4.5)
Q3. Wearing gloves makes it more difficult to palpate veins when practicing venipuncture or cannulation	48 (31.0)	24 (15.5)	56 (36.1)	16(10.3)	11 (7.1)
Q4. I am less likely to wear gloves as I was taught procedures without them.	72 (46.5)	33 (21.3)	29 (18.7)	15 (9.7)	6 (3.9)
Q5. I don't need to wear gloves when taking blood/cannulating as I am skilled at what I do	91 (58.7)	23 (14.8)	25 (16.1)	9 (5.8)	7 (4.5)
Q6. It is my choice to not wear gloves when taking blood/cannulating as I am only putting myself at risk	85 (54.8)	28 (18.1)	25 (16.1)	9 (5.8)	8 (5.2)
Q7. Some procedures I learned without personal protective equipment, and I continue to perform these without.	69 (44.5)	23 (14.8)	35 (22.6)	16 (10.3)	12 (7.7)

Table 3 (b) presents the descriptive statistics for the Leadership category of Factors Influencing Adherence to Standard Precautions, based on six items. Most respondents answered “Very much” for Q11 (36.8%), Q12 (52.3%), and Q13 (52.3%). For Q8 and Q9, most chose “Often” at 29.0% and 33.5%, respectively. The highest response for Q10 was “Not at all” (24.5%).

Table 3. (b) Factors Influencing Adherence to Standard Precautions Scale (FIASPS) for Leadership

Items	Response				
	Not at all n (%)	Seldom n (%)	Sometimes n (%)	Often n (%)	Very much n (%)
Q8. I feel the need to confront people I see not adhering to standard precautions.	15 (9.7)	19 (12.3)	37 (23.9)	45 (29.0)	39 (25.2)
Q9. When I witness others’non-adherence with standard precautions, I use that as an education opportunity.	9 (5.8)	12 (7.7)	36 (23.2)	52 (33.5)	46 (29.7)
Q10. I feel comfortable challenging nurses or doctors when I see them not adhering to standard precautions.	38 (24.5)	14 (9.0)	34 (21.9)	34 (21.9)	35 (22.6)
Q11. I use role modeling to increase the use of standard precautions.	1 (0.6)	11 (7.1)	33 (21.3)	53 (34.2)	57 (36.8)
Q12. I have a responsibility to encourage people to protect themselves.	1 (0.6)	3 (1.9)	29 (18.7)	41 (26.5)	81 (52.3)
Q13. If people see me practicing standard precautions, they will do the same.	1 (0.6)	4 (2.6)	30 (19.4)	39 (25.2)	81 (52.3)

Table 3 (c) presents the descriptive statistics for the Contextual Cues category of Factors Influencing Adherence to Standard Precautions, based on six items. Most respondents selected “Very much” for all questions: Q14 (38.7%), Q15 (34.2%), Q16 (52.9%), Q17 (63.9%), Q18 (63.2%), and Q19 (63.9%).

Table 3. (c) Factors Influencing Adherence to Standard Precautions Scale (FIASPS) for Contextual Cues

Items	Response				
	Not at all n (%)	Seldom n (%)	Sometimes n (%)	Often n (%)	Very much n (%)
Q14. I am more likely to wear personal protective equipment if they are located near patients.	10 (6.5)	12 (7.7)	32 (20.6)	41 (26.5)	60 (38.7)
Q15. I am more likely to wear personal protective equipment if I see my colleagues wearing them.	20 (12.9)	8 (5.2)	33 (21.3)	41 (26.5)	53 (34.2)
Q16. A potential exposure to contaminants will trigger my use of standard Precautions.	4 (2.6)	8 (5.2)	28 (18.1)	33 (21.3)	82 (52.9)
Q17. I am more careful if I know that a patient has a blood-borne pathogen.	0 (0.0)	2 (1.3)	20 (12.9)	34 (21.9)	99 (63.9
Q18. I am more likely to follow standard precautions if I am dealing with needles.	2 (1.3)	0 (0.0)	24 (15.5)	31 (20.0)	98 (63.2)
Q19. I am more likely to follow standard precautions if I am dealing with sharp instruments.	3 (1.9)	2 (1.3)	21 (13.5)	30 (19.4)	99 (63.9)

Table 3 (d) presents the descriptive statistics for the Culture/Practice category of Factors Influencing Adherence to Standard Precautions, based on five items. Most respondents answered “Not at all” for Q20 (60.0%) and Q21 (61.9%), “Sometimes” for Q23 (29.0%), and “Very much” for Q22 (48.4%) and Q24 (31.6%).

Table 3. (d) Factors Influencing Adherence to Standard Precautions Scale (FIASPS) for Culture/Practice

Items	Response				
	Not at all n (%)	Seldom n (%)	Sometimes n (%)	Often n (%)	Very much n (%)
Q20. The culture of my organization allows people not to follow standard precaution guidelines.	93 (60.0)	6 (3.9)	21 (13.5)	18 (11.6)	17(11.0)
Q21. In some workplaces, it is standard practice not to follow guidelines.	96 (61.9)	14 (9.0)	24 (15.5)	17 (11.0)	4 (2.6)
Q22. Most nurses typically adhere to standard precautions.	7 (4.5)	6 (3.9)	29 (18.7)	38 (24.5)	75 (48.4)
Q23. People interpret standard precaution guidelines differently.	31 (20.0)	22 (14.2)	45 (29.0)	40 (25.8)	17 (11.0)
Q24. Most doctors typically adhere to standard precautions.	7 (4.5)	14 (9.0)	42 (27.1)	43 (27.7)	49 (31.6)

Table 3 (e) presents the descriptive statistics for the Judgement category of Factors Influencing Adherence to Standard Precautions, based on five items. Most respondents answered “Very much” for all questions: Q25 (36.8%), Q26 (31.6%), Q27 (38.1%), Q28 (47.7%), and Q29 (47.7%).

Table 3. (e) Factors Influencing Adherence to Standard Precautions Scale (FIASPS) for Judgement

Items	Response				
	Not at all n (%)	Seldom n (%)	Sometimes n (%)	Often n (%)	Very much n (%)
Q25. I am able to decide whether or not to use personal protective equipment based on the clinical risks to me.	18 (11.6)	13 (8.4)	32 (20.6)	35 (22.6)	57 (36.8)
Q26. I am educated and able to weigh up the risks/benefits of not using standard precautions when needed.	24 (15.5)	2 (1.3)	35 (22.6)	45 (29.0)	49 (31.6)
Q27. The more experienced I become at my job, the more likely I am to be able to decide when I need to use standard precautions.	18 (11.6)	8 (5.2)	26 (16.8)	44 (28.4)	59 (38.1)
Q28. My assessment of a patient's status will indicate if I need to follow standard precautions guidelines.	8 (5.2)	9 (5.8)	22 (14.2)	42 (27.1)	74 (47.7)
Q29. Is what is wrong with a patient before deciding whether or not to implement standard precautions.	8 (5.2)	9 (5.8)	22 (14.2)	42 (27.1)	74 (47.7)

4.4 The association between sociodemographic data and compliance level of standard precautions practices

Table 4 presents the association between sociodemographic factors and compliance with standard precautions, using Pearson chi-square and one-way ANOVA. The results show a significant association between job position (p = 0.026) and education level (p = 0.033) with compliance levels. However, no significant associations were found for age (p = 0.444), gender (p = 0.614), or working experience (p = 0.368).

Table 4. The association between sociodemographic data and the compliance level of standard precautions practices

Items	Response					
	Poor n (%)	Suboptimal n (%)	Satisfactory n (%)	Compliance n (%)	χ2 (df)	P-value@
Age (Mean, SD)	37 (6.4)	36 (5.5)	36(6.9)	38(6.8)		0.444
Gender						
Male	0 (0.0)	5 (50.0)	3 (30.0)	2 (20.0)	3	0.614
Female	12 (8.3)	46 (31.7)	43 (29.7)	44 (30.3)		
Position						

JT U29	8 (8.1)	36 (36.4)	32 (32.3)	23 (23.2)	6	0.026*
JT U32	3 (7.1)	13 (31.0)	13 (31.0)	13 (31.0)		
KJ U32	1 (7.1)	3 (14.3)	1 (7.1)	10 (71.4)		

* Significant at 0.05

Table 4. The association between sociodemographic data and compliance level of standard precautions practices (continue)

Items	Response				χ2 (df)	P-value@
	Poor n (%)	Suboptimal n (%)	Satisfactory n (%)	Compliance n (%)		
Working experience						
1-5 years	0 (0.0)	3 (37.5)	3 (37.5)	2 (25.0)	6	0.368
6 – 10 years	6 (11.3)	16 (30.2)	20 (37.7)	11 (20.8)		
11-31 years	6 (6.4)	32 (34.0)	23 (24.5)	33 (35.1)		
Education Level						
Diploma	4 (5.3)	22 (28.9)	30 (39.5)	20 (26.3)	6	0.033*
Post basic	7 (9.1)	29 (37.7)	16 (20.8)	25 (32.5)		
Bachelor	1 (50.0)	0 (0.0)	0 (00.0)	1 (50.0)		

* Significant at 0.05

5.0 Discussion

5.1 Level of Compliance with Standard Precautions Practices

Among the 155 respondents, 59.4% demonstrated considerable compliance with Standard Precautions (SPs). Overall, compliance levels were evenly distributed between high (>90%) and satisfactory (80–89%) categories, while 32.9% showed suboptimal compliance (50–79%). This reflects a generally acceptable level of compliance, aligning with previous findings that reported moderate knowledge and fair adherence among healthcare workers (HCWs) (Wright et al., 2019).

From the perspective of the Knowledge–Attitude–Practice (KAP) model (Launiala, 2009), these findings suggest that while nurses possess adequate knowledge and positive attitudes toward SPs, gaps persist in practices requiring higher technical skill—such as safe sharp-object disposal and preventing cross-infection. According to the KAP model, incomplete knowledge limits the consistent application of safe practices, explaining the variations observed between high and suboptimal compliance categories.

A meta-analysis reported 100% compliance among nurses in 32 hospitals (Dioso, 2014), whereas other studies from Ghana and Saudi Arabia noted low SP adherence among HCWs (Akagbo et al., 2017; Dakhilallah & Dakhilallah, 2021). These discrepancies align with the Health Belief Model (HBM), which posits that behavioural performance is influenced by perceived susceptibility, perceived barriers, perceived benefits, and cues to action (Rosenstock et al., 1988). Hospitals with strong SP enforcement likely increase perceived susceptibility to infection and decrease perceived barriers, promoting higher compliance. Settings lacking resources or strict supervision reduce these perceptions and lead to weaker adherence.

Thus, the current study's findings reflect a behavioural pattern shaped by knowledge (KAP) and risk appraisal (HBM). While compliance levels are acceptable, persistent gaps in specific SPs components indicate the need for strengthened educational interventions and environmental supports to achieve uniform high-level practice.

5.2 Factors Affecting Adherence with SP Practices

The study found that most nurses demonstrated high compliance with Standard Precautions (SPs) and showed minimal justification for non-compliance, contributing to a safer and more controlled healthcare environment, as highlighted by Lim et al. (2021), who observed similar patterns among acute care nurses. High adherence also reflected effective supervision and informal leadership, aligning with findings by van Gulik et al. (2021), who identified leadership as a significant factor influencing compliance among Thai nursing students.

Contextual cues were also found to significantly influence adherence, with nurses responding more positively to cues that promote safe practices. Both Lim et al. (2021) and van Gulik et al. (2021) reported similar findings, indicating that such cues play a critical role in supporting SPs adherence.

Additionally, variations in how nurses engaged with cultural and practice-related factors suggest challenges in standardizing infection control behaviors across healthcare settings, further supported by Lim et al. (2021). Moreover, inconsistent compliance among doctors highlights the need for interdisciplinary collaboration and communication to ensure uniform infection control standards.

Most nurses in this study also preferred self-evaluation over strict adherence to procedural guidelines, a trend consistent with the moderate judgment domain scores reported by Lim et al. (2021). Finally, the preference for self-evaluation over strict procedural adherence reflects a partial application of knowledge (KAP model), underscoring the need for ongoing reinforcement to ensure consistent compliance across all SPs domains.

5.3 Association between Sociodemographic Characteristics and Level of Compliance of SP Practices

Statistically significant associations were found between nurses' compliance with Standard Precautions (SPs) and two sociodemographic variables: job position and educational level. Higher compliance was observed among senior nurses and those with advanced education, possibly reflecting effective organizational leadership.

These findings are consistent with Silva Rodrigues et al. (2019), who reported significant differences in SPs compliance based on professional category among Brazilian nursing staff. Likewise, Khatijah et al. (2023) found that diploma and degree nursing students achieved higher compliance scores compared to their peers. However, some studies produced contradictory results. For instance, in a separate Brazilian study, no significant association was found between education level and SPs compliance (Silva et al., 2020). These inconsistencies may stem from variations in study populations, sampling methods, or instruments used.

6.0 Conclusion& Recommendations

In conclusion, all five FIASPS categories—justification, leadership, contextual cues, cultural/practice, and judgment—positively contributed to nurses' commitment and compliance with SPs guidelines. The study revealed a significant association between sociodemographic factors and SP compliance, with nurses in lower-ranking positions and those with lower educational qualifications showing higher adherence. This supports previous research linking job position and education level to compliance. No significant associations were found for age, gender, or work experience, indicating consistent adherence across these demographics. As for the limitation, this study relied on self-reported data and was conducted in a single healthcare organization. Future studies should replicate this research across diverse settings and use additional methods, such as in-depth interviews or observational data, to obtain more comprehensive and nationally representative evidence on SP adherence among nurses in Malaysia.

Based on the findings, several targeted preventive measures are recommended to improve and sustain SP compliance among nurses. Strengthening continuous training through hands-on sessions and refresher modules is essential, particularly for areas with lower adherence, such as sharp disposal and cross-infection prevention. Leadership support should be enhanced by encouraging nurse managers to model correct practices and conduct supportive supervisory rounds. Environmental supports must be improved by ensuring adequate PPE, sharps containers, and visual reminders in all units to reinforce safe behaviours. Promoting a strong safety culture—where staff can report concerns without fear and where SP adherence is embedded into performance indicators—is also crucial. Interdisciplinary collaboration should be fostered through joint SP training and clearer reinforcement from medical leadership to address inconsistent compliance across professions. Regular monitoring through audits and structured feedback can help identify gaps and sustain behavioural improvements. Finally, interventions should be tailored to sociodemographic findings by providing additional support to nurses in higher positions or with advanced qualifications and by implementing mentorship programs to promote consistent best practices. Collectively, these measures can strengthen SP adherence and enhance patient and staff safety in healthcare settings.

Acknowledgement

The authors thank all study participants, Universiti Teknologi MARA Cawangan Pulau Pinang, the Clinical Research Committee for NMRR and MREC approval, and the Hospital Slim River nursing department for their support.

Paper Contribution to Related Field of Study

By identifying the level of compliance with standard precautions (SPs) and the contributing factors, this study provides valuable insights for the hospital's infection control unit to implement targeted strategies aimed at reducing infection rates. The findings also support the development of preventive measures to enhance adherence to SPs among healthcare staff.

References

Akagbo, S. E., Nortey, P., & Ackumey, M. M. (2017). Knowledge of standard precautions and barriers to compliance among healthcare workers in the Lower Manya Krobo District, Ghana. *BMC Research Notes, 10*(1), 1–9. https://doi.org/10.1186/s13104-017-2999-3

Alshammari, M., Reynolds, K. A., Verhougstraete, M. P., & Gerba, C. P. (2018). Hospital-associated infections in healthcare workers and infection control practices in Saudi hospitals: A systematic review. *International Journal of Environmental Research and Public Health, 15*(5), 1037. https://doi.org/10.3390/ijerph15051037

Centers for Disease Control and Prevention. (2020). *Standard precautions*. https://www.cdc.gov/infectioncontrol/basics/standard-precautions.html

Cunha, S. M., Vieira, G. D., & Ribeiro, L. L. (2020). Factors influencing the adherence to standard precautions among nursing professionals in a surgical center. *Revista Brasileira de Enfermagem, 73*(6), e20190392. https://doi.org/10.1590/0034-7167-2019-0392

Da'seh, A., Al-Zaru, I., Hayajneh, A., & Obaid, O. (2023). The nurses' knowledge and compliance with standard precautions to prevent healthcare-associated infections. *The Open Nursing Journal, 17*, e187443462306231. https://doi.org/10.2174/18744346-v17-e20230711-2023-3

Dakhilallah, M., & Dakhilallah, H. (2021). Compliance with standard precautions among nurses in Saudi hospitals. *iMedPub Journals, 36648*, 1–6.

Desta, M., Ayenew, T., Sitotaw, N., Tefera, Y., Dagne, H., & Azazh, A. (2022). Knowledge, practice and associated factors of infection prevention among healthcare workers in Debre Markos Referral Hospital, Northwest Ethiopia. *Frontiers in Health Services, 2*, 1071517. https://doi.org/10.3389/frhs.2023.1071517

Dioso, R. P. (2014). Factors affecting doctors' and nurses' compliance with standard precautions in all areas of hospital settings worldwide: A meta-analysis. *ASM Science Journal, 8*(2), 134–142.

Donati, D., Biagioli, V., Cianfrocca, C., Armenti, D., De Marinis, M. G., & Tartaglini, D. (2020). Experiences of compliance with standard precautions during emergencies: A qualitative study of nurses working in Italian emergency departments. *BMC Nursing, 19*, 1–9. https://doi.org/10.1186/s12912-020-00449-5

Haile, T. G., Engeda, E. H., & Abdo, A. A. (2017). Compliance with standard precautions and associated factors among healthcare workers in Gondar University Comprehensive Specialized Hospital, Northwest Ethiopia. *Journal of Environmental and Public Health, 2017*, Article ID 2050635. https://doi.org/10.1155/2017/2050635

Haque, M., Sartelli, M., McKimm, J., & Abu Bakar, M. (2020). Health care-associated infections – an overview. *Infection and Drug Resistance, 11*, 2321–2333. https://doi.org/10.2147/IDR.S177247

Khatijah, L. A., Zaini, N. H., Yahya, N. A., & Nazurah, Z. (2023). Knowledge, compliance and attitude of nursing students towards standard precautions: A cross-sectional study in a tertiary hospital. *Malaysian Journal of Medicine and Health Sciences, 19*(2), 2–7. https://doi.org/10.47836/mjmhs19.2.2

Launiala, A. (2009). How much can a KAP survey tell us about people's knowledge, attitudes and practices? Anthropology Matters, 11(1), 1–13.

Lim, S. H., Bouchoucha, S. L., Aloweni, F., & Suhari, N. A. B. (2021). Evaluation of infection prevention and control preparedness in acute care nurses: Factors influencing adherence to standard precautions. *Infection, Disease & Health, 26*(2), 132–138. https://doi.org/10.1016/j.idh.2020.12.003

Medeiros, L. P., Oliveira, A. C., & Moura, M. L. M. (2022). Adherence to standard precautions in the COVID-19 pandemic: A cross-sectional study with nursing professionals. *Revista Latino-Americana de Enfermagem, 30*, e3790. https://doi.org/10.1590/1518-8345.5355.3790

Medeni, V., Çetintepe, S. P., Medeni, İ., Özdemir Öztel, H., Bozdağ, F., & Uğraş Dikmen, A. (2025). Occupational injuries among hospital workers: A retrospective study in Turkey. *Journal of Clinical Medicine, 14*(4), 1050. https://doi.org/10.3390/jcm14041050

Mulat Endalew, A., Belachew, T., & Worku, A. (2022). Knowledge and practices of infection prevention among health workers in Ethiopia: A cross-sectional study. *PLOS ONE, 17*(4), e0267482. https://doi.org/10.1371/journal.pone.0267482

Rusli, N. T., Mansyur, M., Kekalih, A., Sulistomo, A., & Werdhani, R. A. (2020). Assessment of compliance to standard precautions among nurses using the Health Belief Model. *Universa Medicina, 39*(2), 113–120. https://doi.org/10.18051/UnivMed.2020.v39.113-120

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the Health Belief Model. *Health Education Quarterly, 15*(2), 175–183.

Senbato, F. R., Wolde, D., Belina, M., Kotiso, K. S., Medhin, G., Amogne, W., & Eguale, T. (2024). Compliance with infection prevention and control standard precautions and factors associated with noncompliance among healthcare workers working in public hospitals in Addis Ababa, Ethiopia. *Antimicrobial Resistance & Infection Control, 13*, Article 32. https://doi.org/10.1186/s13756-024-01381-w

Silva, D. O., Pereira, D. A., Ferreira, A. M., Watanabe, E., Schneider, G., Santos, A. P. D., Valim, M. D., Santos, B. S., Souza, M. A. M., & Vaz, E. D. S. A. (2020). Adherence to standard precautions by nursing professionals in a public university hospital: A cross-sectional study. *Journal of Infection in Developing Countries, 17*(5), 677–683. https://doi.org/10.3855/jidc.15873

Silva Rodrigues, L. S., Floriano, D. R., Dutra, C. M., Malagutti Toffano, S. E., Pereira, F. M. V., & Chavaglia, S. R. R. (2019). Compliance with standard precautions by nursing professionals in high complexity care. *Escola Anna Nery, 23*(2), e20180263. https://doi.org/10.1590/2177-9465-EAN-2018-0263

van Gulik, N., Bouchoucha, S., Apivanich, S., Lucas, J., & Hutchinson, A. (2021). Factors influencing self-reported adherence to standard precautions among Thai nursing students: A cross-sectional study. *Nurse Education in Practice, 57*, 103238. https://doi.org/10.1016/j.nepr.2021.103238

Wright, T., Adhikari, A., Yin, J., Vogel, R., Smallwood, S., & Shah, G. (2019). Issue of compliance with use of personal protective equipment among wastewater workers across the southeast region of the United States. *International Journal of Environmental Research and Public Health, 16*(11), 1–18. https://doi.org/10.3390/ijerph16111921