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Assessment of Critical Care Nurses Compliance with Standard Precautions of Infection Control: A Quantitative Cross-Sectional Study at MMC Mardan

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Abstract

Background: Critical care units like CCU, MICU, SICU, and NICU where patients are more vulnerable Healthcare-associated infections (HAIs) continue to be a significant challenge. For the safety of patients and healthcare worker it is very crucial to stop spread of infection, therefore, it is necessary to follow infection prevention rules. But nurses in countries like Pakistan which are still developing standards don't always follow these safety rules. **Objective:** This study aimed to assess the level of compliance with standard precautions among critical care nurses at Mardan Medical Complex (MMC), Mardan. **Methods:** Quantitative cross-sectional study was done with 57 nurses working in critical care units (MICU, SICU, NICU, and CCU) at MMC Mardan. Total population technique was used. Self-administered modified questionnaire based on compliance with Standard

Precautions Scale (CSPS) were used to collect data. SPSS version 27 was used for analysis, inclusive of descriptive statistic and independent sample t test to assess association between attending training and how well nurses follow the rules. **Results:** The results showed that most nurses followed the rules at a medium level (49.12%), some followed them at a low level (35.08%), and just a small number (15.78%) followed them at a high level. Good habits were noticed in washing hands (59.6%), wearing gloves (63.2%), and throwing away sharp items properly (68.4%). However, unsafe actions like putting the needle cap back on (52.6%) and not properly throwing away sharp objects were still common. There was no meaningful connection between going to infection control training and how well the rules were followed ($p = 0.41$). **Conclusion:** While some aspects of standard precaution are followed very well, their overall (critical care nurses) compliance were moderate. Therefore, Proper education, institutional support, behavioural changes, and continuous monitoring is mandatory for adherence to standard precaution and reduction of HAIs.

INTRODUCTION

Healthcare-Associated Infections (HAIs) or Nosocomial Infection are infections acquired in healthcare settings [1][2][3][4][5]. They cause more illnesses in patients, longer hospital stays, and put a big financial strain on healthcare systems [6]. These infections are particularly more common in Critical Care Units (Including CCU, ICU, and NICU), where patients are critically ill, immunocompromised, and frequently subjected to invasive procedures (such as central line insertions and mechanical ventilation) [7]. In Pakistan, whereas comprehensive national data is limited, studies in tertiary care hospitals show that the predominance of HAIs remains a basic concern due to limited resources and changing levels of adherence to infection control protocols [8].

Standard precautions (SP) are a set basic safety measures used to stop the spread of diseases that can happen when someone comes into contact with body fluids, blood, cuts or sores, and wet surfaces inside the body, like in the mouth or nose [9][10][11][12][13]. Standard Precautions (SP) are the first step used to stop the spread of infection between patients and healthcare workers. This includes washing hands, wearing protective gear, safe injection practices, and proper waste management [14][15]. Critical care nurses are at the forefront of this battle, as their frequent and direct contact with high-risk patients makes their compliance with SP essential for patient safety and their own occupational health [16][17][18].

Although these safety measures are effective, nurses in Pakistan don't always use them correctly. Recent research in public hospitals in Lahore showed a big difference between what nurses know and what they actually do. Although nurses said they

followed the rules 84.7% of the time, the actual practice was only 52.7% [19]. Similarly, a study in Peshawar found an overall compliance rate of approximately 57.1%. The researchers said that lack of enough training and resources were the main reasons why some people didn't follow the rules [8]. Additionally, research on using personal protective equipment (PPE) has found that even when nurses know a lot about it, about half of them still use it at an "average" level in some advanced healthcare settings [20]. This discrepancy underscores the need for localized studies, such as the one proposed for Mardan Medical Complex (MMC) Mardan, to identify compliance of critical care nurses with standard precautions of infection control.

This study is important because it could help patients get better by decreasing the number of hospital-acquired infections (HAIs). High compliance with SPs, including hand hygiene, use of personal protective equipment (PPE), and safe injection practices, has been directly linked to lower infection rates and improved nurse safety regarding needle-stick injuries [21][22]. By assessing the current state of compliance at MMC Mardan, this research provides the necessary data to design targeted interventions and educational programs.

METHODOLOGY:

A study was conducted to find out how well critical care nurses at Mardan Medical Complex (MMC), Hospital Mardan follow infection control rules. This was quantitative cross- sectional study consisted of all registered nurses (RNs) actively working in the critical care units of MMC Mardan. A total population sampling technique was used, including all 57 registered nurses working in critical care units (including Medical ICU (MICU), Surgical ICU (SICU), Neonatal ICU (NICU), and the Cardiac Care Unit (CCU)) of MMC, Mardan. Data was gathered using a self-administered modified questionnaire taken from [23] that people filled out themselves the questionnaire asked for personal details and included a set of 18 questions called the Compliance with Standard Precautions Scale (CSPS). All questions were marked from 1 to 4, therefore, everyone will have to respond each question by choosing a number from 1(Never) to 4(Always) respectively. The internal consistency of the entire questionnaire was assessed through Cronbach alpha, which shows good reliability ($\alpha = 0.707$). Participation was voluntary, confidentiality was maintained, and informed consent was obtained from all respondents. Negatively worded questions were changed to be positive before analysis of the data so that higher score would mean stronger agreement. Sum score was obtained by adding all the questions which become 18-72. To find the compliance rate, we took the total score, divided it by the highest possible score, and then multiplied by 100 to get a percentage. It was split into three groups: high (80% or more), medium

(60% to 79%), and low (less than 60%). The information was looked at using SPSS version 27. We used simple statistics like frequency and percentages for the different categories of data. An independent sample t-test was applied to analyze the association between attendance at infection control training and compliance scores, with a p-value of <0.05 being statistically significant.

RESULTS

57 registered nurses participated in this study. Among them 59.6% were 24-29 years old, followed by 29.8% which were 30-34 years old and then 10.5% have their ages 35-39 years. Most participants were male 54.4%, while 45.6% were female. In term of marital status most of the respondents were married 52.6%, some were single 45.6%, and a few were divorced 1.8%. Majority of the nurses have BSN degree 36.8%, followed by Post RN BSN 35.1%, while some nurses have only a general nursing diploma 24.6% and only a small number 3.5% with MSN qualification. 42.1% people have their work experience 2-3 years, 29.8% had less than a year, and 26.3% had 4-5 years of experience. Regarding their duty area 29.8% had performed their duty in Medical ICU, subsequent by Surgical ICU 24.6%, Neonatal ICU 24.6%, and Cardiac Care Unit 21.1%. About 56.1% (more than half participants) have attendant infection control courses.

Variables	Frequency (%)
Age in years	
24-29	34 (59.6%)
30-34	17 (29.8%)
35-39	6 (10.5%)
Gender	
Male	31 (54.4%)
Female	26 (45.6%)
Marital status	
Married	30 (52.6%)
Single	26 (45.6%)
Divorced	1 (1.8%)
Qualifications	
Diploma in Nursing Critical	14 (24.6%)
BSN	21 (36.8%)
Post RN BSN	20 (35.1%)
MSN	2 (3.5%)
Clinical experience (years)	

< 1 year	17 (29.8%)
2-3 years	24 (42.1%)
4-5 years	15 (26.3%)
> 5 years	1 (1.8%)
Working Area	
Medical ICU	17 (29.8%)
Surgical ICU	14 (24.6%)
Neonatal ICU	14 (24.6%)
Cardiac Care Unit	12 (21.1%)
Attending infection control courses	
Yes	32 (56.1%)
No	25 (43.9%)

Table 1: Socio-Demographic Data

The results showed that nurses followed the basic safety rules to different degrees in different situations. Many nurses said they always wash their hands between patient's contacts (59.6%) and wear gloves when they come into contact with body fluids (63.2%), Likewise, (68.4%) of participants said they always throw sharp items into sharps boxes properly. Some unsafe habits were still seen. Among them (52.6%) respond that they always recap used needles after giving an injection. In term of disposal of sharp boxes only (31.6%) said that the sharp boxes are disposed only when its full. (54.4%) nurses respond that they always remove their personal protective equipment in the right spots, while (35.1%) said that they always wear a gown when exposed to blood, body fluids, or any patient excretions. (56.1%) of people said that they never reuse a surgical mask or disposable personal protective equipment (PPE). Majority of the participants did a good job by following the mask rules, where (71.9%) said that their mouths and noses is covered by their mask. People didn't follow the rules for cleaning surfaces and using hand sanitizers very well, so these areas need improvement. Furthermore, an independent sample t-test was applied to see if there is a link between going to infection control training and the scores for following the rules. The results showed that there was no important difference between nurses who went to training and those who did not ($p = 0.41$). This means that just attending the training did not have a big effect on how well they followed the rules in this study.

S.No	Questions	Never Frequency (%)	Sometimes Frequency (%)	Often Frequency (%)	Always Frequency (%)
1	I wash my hands between patient contacts.	9 (15.8%)	5 (8.8%)	9 (15.8%)	34 (59.6%)
2	I only use water for hand washing.	11 (19.3%)	26 (45.6%)	8 (14.0%)	12 (21.1%)
3	I use alcoholic hand rubs as an alternative if my hands are not visibly soiled.	6 (10.5%)	10 (17.5%)	16 (28.1%)	25 (43.9%)
4	I recap used needles after giving an injection.	8 (14.0%)	8 (14.0%)	11 (19.3%)	30 (52.6%)
5	I put used sharp articles into sharp boxes.	1 (1.8%)	9 (15.8%)	8 (14.0%)	39 (68.4%)
6	The sharp box is disposed only when it is full.	8 (14.0%)	7 (12.3%)	24 (42.1%)	18 (31.6%)
7	I remove personal protective equipment (PPE) in a designated area.	5 (8.8%)	15 (26.3%)	6 (10.5%)	31 (54.4%)
8	I take a shower in case of extensive splashing even after I have put on personal protective equipment (PPE).	7 (12.3%)	21 (36.8%)	14 (24.6%)	15 (26.3%)
9	I cover my wounds or lesions with waterproof dressing before patient contacts.	4 (7.0%)	12 (21.1%)	14 (24.6%)	27 (47.4%)
10	I wear gloves when I am exposed to body fluids, blood products, and any excretion of patients.	2 (3.5%)	5 (8.8%)	14 (24.6%)	36 (63.2%)
11	I change gloves between patient contacts.	0 (0%)	14 (24.6%)	11 (19.3%)	32 (56.1%)
12	I decontaminate my hands immediately after removal of gloves.	4 (7.0%)	8 (14.0%)	17 (29.8%)	28 (49.1%)

13	I wear a surgical mask alone or in combination of goggles, face shield and apron whenever there is a possibility of a splash or splatter.	7 (12.3%)	25 (43.9%)	5 (8.8%)	20 (35.1%)
14	My mouth and nose are covered when I wear a mask.	6 (10.5%)	5 (8.8%)	5 (8.8%)	41 (71.9%)
15	I reuse a surgical mask or disposable personal protective equipment (PPE).	32 (56.1%)	11 (19.3%)	7 (12.3%)	7 (12.3%)
16	I wear a gown when exposed to blood, body fluids, or any patient excretions.	9 (15.8%)	12 (21.1%)	16 (28.1%)	20 (35.1%)
17	Waste contaminated with blood, body fluids, secretions, and excretions is placed in red plastic bags irrespective of the patient's infection status.	1 (1.8%)	15 (26.3%)	23 (40.4%)	18 (31.6%)
18	I decontaminate surfaces and equipment after use.	13 (22.8%)	10 (17.5%)	11 (19.3%)	23 (40.4%)

Table 2: Compliance with standard precautions scale (CSPS). Independent sample t test was applied to assess the association of attending infection control courses with CSPS with a p value 0.41 were obtained which is >0.05. Therefore, no significance difference was found between those who attend the courses and those who did not.

Most participants showed a moderate level of following standard safety rules. Out of the nurses, 49.12% followed the rules moderately, 35.08% didn't follow them much (Low), and only 15.78% followed them very well (High).

S.No	Compliance rate of RN with CSPS n (%)	Interpretation
1	9 (15.78%)	High (⩾ 80%)
2	28 (49.12%)	Moderate (60–79%)
3	20 (35.08%)	Low (< 60%)

Table 3: Compliance rate of RN with CSPS

DISCUSSION

The aim of this study is assessing the compliance of nurses (work in critical areas like MICU, SICU, NICU and CCU) with standard precautions in MMC Mardan. Nurses' adherence to infection control protocol is essential for preventing healthcare associated infections (HAIs) and ensuring patient safety, preserve the health and wellbeing of patients, healthcare providers, and stakeholders during care provision while optimizing the relative success of associated interventions.

Noncompliance with infection control guidelines increases the "risk of contracting and spreading infectious diseases among healthcare workers (HCWs). Poor infection control can result in HAIs; therefore, compliance with standard precautions in critical care units is primary strategy for preventing HAIs [24]. Similarly, the nurse's adherence to standard precautions in this study was found to be moderate. The result of this study indicates that more than half of the nurses comply with standard precautions. This result is similar to the previous study by [19]. On the other hand, our results are dissimilar from the outcomes of research carried out in Egypt which reported a lower level (66.7%) of adherence to SPs of nurses [23].

Regarding hand washing and wearing gloves when attending the patient, nurses' response was good 59.6% and 63.2%. This finding support the guidelines to prevent ventilator associated pneumonia in ICUs as stated in the study [25], VAP prevention guidelines, "inconsistent hand hygiene practices leading to VAP transmission risk". So, through proper hand hygiene VAP risk can be reduced. Furthermore, fragmented and soiled nature of healthcare data leads to insufficient recognition of infection control priorities and poor adherence to preventive measures. Infection control personnel often spend considerable time manually collecting, analyzing, and reporting data, delaying decision-making and straining clinical resources [17]. Regarding this 49.3% use alcoholic hands rub if their hands is not visibly soiled.

Nurses engage in tailored communication using clear, culturally sensitive language and educational tools to teach hand hygiene, respiratory etiquette, and wound care practices. This educational role fosters adherence to IPC protocols beyond the clinical setting [26]. Likewise, 56.1% more than half of the nurses attending infection control training. This suggests that training is not sufficient institutional support, practical reinforcement, and continuous monitoring is necessary.

CONCLUSION

In Conclusion the compliance of critical care nurses at MMC Mardan with standard precaution is moderate, with profound differences in some practices like how they handle needles and use personal protective equipment. It is recommended to have

specialized program, uncompromised adherence, and regular monitoring to reduce healthcare related infections and improve compliance.

REFERENCES

[1] J. A. Al-tawfiq, "Striving for zero traditional and non-traditional healthcare-associated infections (HAI): a target , vision , or philosophy," pp. 1–9, 2025, doi: 10.1017/ash.2025.10031.

[2] C. D. Onwuliri *et al.*, "Systematic review and meta-analysis of the prevalence and types of health care associated infections in Nigeria," pp. 1–15, 2025.

[3] N. M. M. Alotaibi *et al.*, "DIABETIC STUDIES Advances In Infection Control : Strategies For Preventing Healthcare-Associated Infections," pp. 125–139.

[4] R. Paper, "INTRAHOSPITAL / NOSOCOMIAL INFECTIONS Intrahospital transfers," pp. 117–123, 2024, doi: 10.7251/SANUS2401117Z.

[5] A. Khavandegar, Z. Siami, A. Rasouli, P. Nazemi, and A. Gull, "Impact of healthcare-associated infections on in-hospital outcomes during the COVID-19 era : a multicenter comparative study of 20 , 942 isolated microorganisms from ICU patients," no. February, 2025, doi: 10.3389/fpubh.2025.1475221.

[6] K. Parindra, A. Khalik, and L. Sulaiman, "Analysis of Factors Influencing Nurse Compliance in Implementing Standard Precautions at Hospital X in West Nusa Tengara," vol. 13, no. 1, pp. 197–217, 2025.

[7] M. Yaseen, M. Yaseen, M. Suliman, M. Yaseen, S. Ali, and A. Sultan, "The therapist," pp. 15–19, 2022.

[8] C. Study *et al.*, "Original article," pp. 2–7.

[9] C. O. Iheanacho, K. H. El-badway, A. El-yakub, O. Ejembi, J. D. Ekere, and C. E. Etim, "BMC Primary Care Article in Press Current status of standard precautions : a cross- sectional evaluation of healthcare workers ' knowledge and practice across northern Nigeria IN IN," 2026.

[10] M. Y. Id, G. Taye, and W. Abebe, "Magnitude of standard precautions practices among healthcare workers in health facilities of Low and Middle Income Countries : A systematic review and meta-analysis," pp. 1–22, 2024, doi: 10.1371/journal.pone.0302282.

[11] F. R. M. Almalki *et al.*, "STANDARD PRECAUTIONS VERSUS SPECIALTY- SPECIFIC INFECTION CONTROL PRACTICES IN RADIOLOGY , NURSING , DENTISTRY , AND MEDICAL LABORATORY SCIENCES," vol. 32, pp. 2780–2787, 2025.

[12] "Standard precautions for the prevention and control of infections Key elements at a glance Risk assessment," pp. 1–5, 2022.

[13] N. T. Rusli, M. Mansyur, and A. Kekalih, "Assessment of compliance to standard

precautions among nurses using the Health Belief Model," vol. 39, no. 3, pp. 199–206, 2020, doi: 10.18051/UnivMed.2020.

[14] L. Bouchoucha and F. Aloweni, "ScienceDirect Evaluation of infection prevention and control preparedness in acute care nurses : Factors influencing adherence to standard precautions," pp. 132–138, 2021, doi: 10.1016/j.idh.2020.11.005.

[15] G. Hatice and T. Celik, "Oncology nurses ' compliance with standard precautions : a multi-method study," vol. 1, pp. 1–12, 2025.

[16] R. Batran *et al.*, "Determinants of Nurses ' Compliance with Infection Prevention and Control Practices in Critical Care Units," 2025, doi: 10.1177/23779608251339193.

[17] D. S. Kakeeto and M. Nanyingi, "Infection Prevention and Control Compliance among Healthcare Workers in a Rural Ugandan District : A Facility-Based Study," vol. 13, no. 1, 2026, doi: 10.21522/TIJAR.2014.13.01.Art008.

[18] M. Salwa, M. A. Haque, S. S. Islam, M. T. Islam, S. Sultana, and M. H. Khan, "Compliance of healthcare workers with the infection prevention and control guidance in tertiary care hospitals : quantitative findings from an explanatory sequential mixed- - methods study in Bangladesh," no. March 2020, pp. 1–9, 2022, doi: 10.1136/bmjopen-2021-054837.

[19] A. Aftab, M. Ghani, and S. Kausar, "Practices and adherence of nurses with standard precautions of infection control in intensive care units of public sector hospitals in Lahore," vol. 39, no. 4, pp. 161–167, 1996.

[20] G. Nazar, G. Nazar, I. W. Ahmad, D. Muhammad, and K. Words, "Assessment of Nurses ' Knowledge Regarding Personal Protective Equipment at Two Tertiary Care Hospitals , Peshawar," pp. 35–39, 2023.

[21] S. K. Aslan, A. S. Kocagöz, G. Bozkır, and N. Şebne, "Abant Sağlık Bilimleri ve Teknolojileri Dergisi Abant Journal of Health Sciences and Technologies Assessing Nurses Hand Hygiene : A Comprehensive Analysis from Pre-Pandemic to Post-Pandemic Periods," vol. 5, no. 1, pp. 15–25, 2025.

[22] F. Ghabayen *et al.*, "Knowledge and Compliance With Standard Precautions Among Nurses," 2023, doi: 10.1177/23779608231189966.

[23] A. El *et al.*, "Assessment of neonatal intensive care unit nurses ' compliance with standard precautions of infection control and identification of enabling factors," *Futur. J. Pharm. Sci.*, 2023, doi: 10.1186/s43094-022-00456-y.

[24] A. Mahsoon and M. M. Elhady, "Compliance among Registered Nurses and Doctors in Critical Care Units : Challenges Affecting Their Adherence to Standard Precautions," pp. 1–14, 2023.

[25] H. N. Villagracia *et al.*, "Intensive and critical care nurses ' compliance , barriers , and challenges with ventilator- associated pneumonia prevention : a cross-sectional study," 2025.

[26] N. Yahya *et al.*, "DIABETIC STUDIES Infection Prevention And Control In Nursing Practice : Strategies , Challenges , And Innovations," pp. 288–300.