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The Impact of Organizational, Occupational, and Individual Factors Nurses' compliance in Practicing Hand Hygiene

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A B S T R A C T

Hospitals and other healthcare facilities place a high priority on hand hygiene because pathogen-contaminated hands can spread infectious diseases known as healthcare-associated infections (HAIs). According to the findings of preliminary research that involved document tracing, the implementation of hand hygiene at private hospitals in Manado from January to July 2020 did not meet the stated standards for compliance indicators. This study aimed to analyze the influence of organizational, occupational, and individual factors on the level of compliance of nurses in Private Hospitals in Manado in performing hand hygiene practices. This study was an analytical observational study using a cross-sectional design. Data was collected using questionnaires and observations of 125 respondents from 14 treatment rooms at Private Hospital in Manado. Multiple linear regression was performed to analyze the data. The results of the multiple linear regression test showed that climate factors of safety, facility availability, information and training, supervision, and risk perception (ρ-value: 0.001; 0.017; 0.002; 0.019; and 0.022) were significant for nurses' compliance in performing hand hygiene. The hospital management is expected to provide inspiration to increase nurse motivation, build communication-related to hand hygiene practices, and implement reward and punishment programs.

Kata kunci:

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A B S T R A K

Hand hygiene merupakan praktek yang penting di rumah sakit maupun fasilitas pelayanan kesehatan lainnya karena. tangan yang terkontaminasi patogen dapat menularkan penyakit infeksi yang disebut Healthcare-associated infections (HAIs). Hasil studi pendahuluan berupa telusur dokumen ditemukan bahwa capaian indikator kepatuhan pelaksanaan hand hygiene di RS Privat di Manado selama Januari hingga Juli 2020 belum mencapai standar yang telah ditetapkan. Penelitian ini bertujuan melakukan menganalisis pengaruh faktor organisasi, pekerjaan, dan individu terhadap tingkat kepatuhan perawat di RS Privat di Manado dalam melaksanakan praktek hand hygiene. Penelitian ini merupakan penelitian observasional analitik menggunakan desain cross-sectional. Pengumpulan data dilakukan melalui pengisian kuisioner dan observasi terhadap 125 responden dari 14 ruang perawatan di RS Privat di Manado. Analisis data dilakukan dengan uji regresi linear ganda. Hasil uji regresi linear ganda menunjukkan bahwa faktor iklim keselamatan, ketersediaan fasilitas, informasi dan pelatihan, supervisi, dan persepsi risiko (ρ-value: 0.001; 0.017; 0.002; 0.019; dan 0.022) signifikan terhadap kepatuhan perawat dalam melakukan hand hygiene. Pihak manajemen rumah sakit diharapkan dapat memberikan inspirasi untuk meningkatkan motivasi perawat dan membangun komunikasi terkait praktek hand hygiene, serta menerapkan program reward and punishment.

INTRODUCTION

Infectious disease is one of the health problems in Indonesia as it happens because of the interaction between microorganisms and susceptible bodies. Healthcare-Associated Infections (HAIs), also referred to as nosocomial infections, is infections that occur in patients during treatment in hospitals or health facilities after being admitted within a period of 48–72 hours (World Health Organization (WHO), 2016). The Indonesian Government has enacted regulations related to infection prevention policies in hospitals and health facilities contained in the Minister of Health Regulation Number 27 of 2017 about Guidelines for Infection Prevention and Control in Healthcare Facilities and Ministrial Regulation of Ministry of Health of The Republic of Indonesia Number 4 of 2019 on Technical Standards for Fulfillment of Basic Service Quality in Minimum Service Standards for the Health Sector, which stipulates the standard for the incidence of HAIs in hospitals is ≤1.5% (Hutagaol et al., 2021; The Ministry of Health of The Republic of Indonesia, 2017, 2019) . The policy was enacted as an effort to break the chain of disease transmission and to protect patients, health workers, visitors, and the public who receive services in hospitals and other health facilities (The Ministry of Health of The Republic of Indonesia, 2017).

A fairly high number of HAIs, which were 6–16% with an average of 9.8%, was shown in a survey conducted by the Ministry of Health of the Republic of Indonesia in 2013 in 10 teaching hospitals in Indonesia. The survey conducted in 11 hospitals in DKI Jakarta also showed that 9.8% of hospitalized patients received new infections during treatment (The Ministry of Health of The Republic of Indonesia, 2013). The types of infections commonly reported include bloodstream infections, postoperative infections, urinary tract infections (UTIs), gastrointestinal infections, and respiratory tract infections (Abubakar, 2020; Nouetchognou et al., 2016; Scherbaum et al., 2014). Based on clinical area indicator data in 2016, data on the prevalence of HAIs at Dr. Soedarso Pontianak Hospital showed an average incidence of phlebitis in the first, second, and third quarters of 2016 of 2.4%, 17.7%, and 17%, respectively (Syamsulastri, 2017). In addition, based on previous study by Syamsulastri (2017) conducted at RSUD Ade Muhammad Djoen Sintang in 2016, the types of HAIs that often occur were: urinary tract infection (UTI) by 1.7%, surgical wound infection by 1.18%, phlebitis by 22.29%, Hospital Acquired Pneumonia (HAP) by 0.69%, and Ventilator Acquired Pneumonia (VAP) by 0.02%.

HAIs are spread by direct contact between a patient and a medical professional, between patients, between patients and visitors or family members, or between a medical professional and a patient. They can also be spread by equipment or materials that have been contaminated with blood or other bodily fluids (Hidayah & Ramadhani, 2019). Compared to other medical staff, nurses are the health care professionals who regularly interact with patients for 24 hours, which has a significant impact on the prevalence of HAIs (Parwa, Krisnawati, & Yanti, 2019). An attempt that nurses can make to stop HAIs is to improve their capacity to use conventional precautions. Maintaining good hand hygiene is among the most efficient ways to stop the spread of pathogens (WHO), 2009a).

Hand hygiene refers to actions taken to prevent hand-borne diseases by removing filth and debris as well as preventing or eradicating skin-infecting bacteria that can be acquired through contact between patients and the environment (The Ministry of Health of The Republic of Indonesia, 2017). The main cause of infection transfer is contaminated hands (Kwok, Gralton, & McLaws, 2015). HAIs and the spread of multi-resistant bacteria in healthcare institutions are primarily caused by improperly performed hand hygiene (The Ministry of Health of The Republic of Indonesia, 2017).

To encourage health professionals to practice better hand hygiene, WHO has launched the "Global Patient Safety Challenge: "Clean Care is Safer Care"" program in 2005. In addition, Additionally, the WHO introduced the "Save Lives: Clean Your Hands" campaign with a 5-moment hand hygiene plan, including before contact with patients, before performing aseptic procedures, after contact with patients and after exposure to patient bodily fluids (WHO), 2009b, 2021).

To prevent and control the spread of HAIs, nurses must be able to practice hand hygiene appropriately and accurately in accordance with hospital policies. The majority of hospitals' hand hygiene regimens fall short of the 70% mark, according to multiple earlier studies. Only over 60% of nurses at Cipto Mangunkusumo Hospital (RSCM) comply with hand hygiene standards, while 44.7 percent of nurses at MISI Rangkasbitung Hospital and 61.9 percent of nurses at R.W. Mongisidi Manado Hospital failed to effectively implement hand hygiene (Sinaga, 2016; Utami, 2016; Waney, Kandou, & Panelewen, 2016). Promoting handwashing campaigns is a difficult task for hospital infection control teams (Utami, 2016). Nurses are crucial to comply with hand hygiene, so a lack of nurses' compliance with hand hygiene can cause several consequences. Thus, it may be said that most nurses still do not adhere to hand hygiene standards.

According to a recapitulation report on the achievement of compliance indicators for the implementation of hand hygiene at Private Hospital in Manado between January 2019 and July 2020 that was obtained from the preliminary study's document tracing, only 77.67 percent of these indicators were met on average. Nurses' compliance with hand washing is essential because non-compliance cause a several consequences, such as: (1) increasing disease diagnosis, extending the length of treatment, and leading to patient death; (2) being the source of disease transmission to others through hospital visitors; (3) transferring germs to oneself, other patients, and medical professionals by becoming a carrier; and (4) lowering the standard of hospital services up to the facility's operating license is revoked (Fina, 2015).

A number of factors, including: (1) organizational factors, such as safety climate, facility accessibility, information and training, and peer review; (2) occupational factors, such as supervision, workload, barriers in applicating hand hygiene, and work stress; and (3) individual factors, such as motivation, experience, knowledge, risk perception, and attitude toward hand hygiene influence nurses' compliance with performing hand hygiene. From the foregoing description, issues are identified with the lack of indicators for the application of hand hygiene in accordance with the criteria established at Private Hospital in Manado. Based on the data and problems that arise, researchers are interested in examining/analyzing nurses' compliance in performing hand hygiene at Private Hospital in Manado.

The purpose of the present study is to analyze the factors that affect nurses' compliance in performing hand hygiene, including safety climate, facility accessibility, information and training, supervision, and risk perception factor. The study addressed these following research questions to guide the study, include:

1) How are organizational factors, occupational factors, and individual factors influencing nurses' compliance with hand hygiene at Private Hospital in Manado?
2) What recommendations can be delivered to enhance nurses' compliance with hand hygiene at Private Hospital in Manado?

This study contributes to the literature in the recognition of factors influencing nurses' compliance with hand hygiene. In an effort to raise the level of hospital patient safety in accordance with national requirements, policymakers may utilize this study as an evaluation and source of information in developing strategies to increase compliance with the implementation of hand hygiene.

METHODS

Participant characteristics and research design

This study is an analytical observational study with a cross-sectional design. Through the use of a simultaneous assessment method, this design enables the analysis of the impact of the independent variable on the dependent variable. Respondents in this study were limited by the following criteria: (1) were nurses who served patients directly; (2) had been working for more than 6 months; and (3) were willing to be the subject of research by signing a consent form after receiving an explanation (informed consent).

Sampling procedures

This study was done at Private Hospital in Manado from July 2020 to January 2022. The data was collected in August 2021. The sampling was conducted at random (random sampling). The research subjects were nurses who worked in 14 rooms at Private Hospital in Manado.

Sample size, power, and precision

Given the difference in nurse staffing numbers between the rooms, the sample size in each room was calculated accordingly. According to the sample size measurement, a total of 125 respondents were used to create the study sample. The formula below was used to calculate the sample size in this study:

$$n = \frac{N.z^2.p.q}{d^2.(N-1)+z^2.p.q} \quad (1)$$

$$n = \frac{186 \times (1{,}96)^2 \times 0.5 \times 0.5}{[(0.05)^2 \times (186-1)] + [(1{,}96)^2 \times 0.5 \times 0.5]} \quad (2)$$

$$n = 124.92 \quad (3)$$

$$n \approx 125 \quad (4)$$

Given:

n	=	Sample proportion
N	=	Total population
z	=	Normal standard value for α = 0.05 (1.96)
p	=	Estimated proportion
q	=	1 – p (100% – p)
d	=	Tolerated mistake (0.05)

The research tools included a closed questionnaire that respondents completed and an observation sheet that the researcher used to gauge the respondents' compliance with hand hygiene.

Measures and covariates

This study protocol was approved by the Research Ethics Committee of the Private Hospital in Manado (Reference No. Etik/SH-MN/IX/2021). The researcher directly collected the data with the assistance of staff members who had already received briefings from the researcher. Two nurses helped the researcher distribute and collect surveys, while one hospital employee evaluated the observation sheets of the respondent's hand hygiene compliance. For 1-2 hours throughout the shift, observation sheets are evaluated without the respondent's knowledge to prevent bias. Following the data collection and processing, a focus group discussion (FGD) was held with 14 participants, including the head nurses of each room and staff managers, to develop suggestions for enhancing nurses' compliance with the implementation of hand hygiene.

Data analysis

Prior to distributing the questionnaires to the respondents, validity, and reliability checks were carried out. The obtained data were then edited, scored, coded, and tabulated to process and analyze them. The data were then computerized for interpretation. Multivariable analysis approaches were used to evaluate huge volumes of data with ratio data scales that are expected to influence the dependent variable and the independent variable. Multiple linear regression was employed as the inferential analysis in this investigation. The influence between variables is considered significant if the ρ-value is < 0.05.

RESULTS AND DISCUSSION

Respondent characteristic identification

The frequency of the respondent's sociodemographic characteristic distribution can be seen in Table 1.

Table 1
Respondent characteristics at RS Private in Manado (n = 125)

No.	Respondent Characteristics	Frequency (n)	Percentage (%)
1.	**Age**		
	20 – 30	35	28.0
	31 – 40	47	37.6
	41 – 50	27	21.6
	51 – 55	16	12.8
2.	**Working period (in year)**		
	1 – 10	43	34.4
	11 – 20	62	49.6
	> 20	20	16.0
3.	**Sex**		
	Female	109	87.2
	Male	16	12.8
4.	**Education**		
	Bachelor in Nursing	88	70.4
	Bachelor in Nursing +Professional Education	20	16.0
	Master in Nursing	17	13.6

According to Table 1, the majority of respondents in this study (44 respondents, or 37.6%) were between the ages of 31 and 40 and had been employed for between 11 and 20

years (62 respondents, or 49.6%). 16 male respondents (12.8%) and 109 female respondents (87.2%) made up the study's sample. Most respondents had completed their undergraduate nursing degrees as their highest level of schooling (88 respondents with a percentage of 70.4%).

Analysis of Nurses' compliance in Performing Hand Hygiene in Private Hospital in Manado

The evaluation of nurses' compliance with the introduction of hand hygiene at Private Hospital in Manado produced the following findings:

Table 2
The evaluation of nurses' compliance with the introduction of hand hygiene at Private Hospital in Manado

Indicator	Category			
	Yes		No	
	n	%	n	%
Hand hygiene upon arrival in the treatment room.	107	85.6	18	14.4
Hand hygiene before doing nursing interventions.	105	84.0	20	16.0
Hand hygiene after exposure to patient body fluid.	93	74.4	32	25.6
Hand hygiene after giving nursing interventions.	102	81.6	23	18.4
Hand hygiene before going home.	91	72.8	34	27.2
Pour hand rub into the palm, then rub hands palm to palm in a circular motion.	102	81.6	23	18.4
Clean the back of each hand with the palm of the opposite hand.	105	84.0	20	16.0
Scrub between fingers by interlacing fingers and rubbing back and forth.	105	84.0	20	16.0
Clean the back of the fingers by rubbing the interlocked fingers into the palm.	106	84.8	19	15.2
Clean around each thumb with the opposite hand.	104	83.2	21	16.8
Rub the fingertips into the palm of the opposite hand.	114	91.2	11	8.8
Doing a handrub in 20–30 seconds.	100	80.0	25	20.0
Doing handwashing in 40–60 seconds.	109	87.2	16	12.8

The indication of hand hygiene before leaving for home, which has a 27.2% failure rate, is the one that nurses at the Private Hospital in Manado consistently fail to apply. According to the results of research, Private Hospital in Manado exhibit high levels of hand hygiene compliance. In the implementation of hand hygiene at the Private Hospital in Manado, the following results from the nurses' compliance value category were obtained in table 3. According to the Table 3, majority of the respondent (84.8%) has already had a high compliance in performing hand hygiene.

Table 3
Nurses' compliance category with hand hygiene at Private Hospital in Manado (n = 125)

Category	Frequency (n)	Percentage (%)
Low	0	0.0
Moderate	19	15.2
High	106	84.8
Total	**125**	**100.0**

Table 4
The result of the safety climate factors assessment at Private Hospital in Manado (n = 125)

Indicator	Category					
	Bad		Moderate		Good	
	n	%	n	%	n	%
Nursing protection commitment	25	20.0	10	8.0	90	72.0
Supervisor and coworker support	18	14.4	20	16.0	87	69.6
Workplace supervision	16	12.8	16	12.8	93	74.4
Composite value	**21**	**16.8**	**25**	**20.0**	**79**	**63.2**

Bivariate Analysis of the Factors Influencing Nurses' compliance Level in Performing Hand Hygiene in Private Hospital in Manado

1. Safety climate factor

The result of the safety climate factors assessment in Private Hospital in Manado can be seen in Table 4. According to assessments of safety climate variables, most respondents report a positive safety atmosphere for each indication, with the highest percentages being for workplace supervision (74.4%), supervisor and coworker support (69.9%), and nursing protection commitment (72.0%). A total of 63.2 percent was obtained by all indicators with good categories.

The cross-tabulation table between the safety climate and nurses' compliance in doing hand hygiene at a private hospital in Manado demonstrates that the higher the nurses' compliance in performing hand hygiene at a private hospital in Manado, the better the safety climate the nurse has.

Table 5
The cross-tabulation between the safety climate factors with nurses' compliance with hand hygiene at Private Hospital in Manado (n = 125)

Category	Nurses' Compliance				Total	
	Moderate		High			
	n	%	n	%	n	%
Bad	9	42.8	9	42.8	21	100.0
Moderate	7	28.0	7	28.0	25	100.0
Good	3	3.7	3	3.7	79	100.0
Total	**19**	**15.2**	**19**	**15.2**	**125**	**100.0**

Table 6
The result of the facility accessibility factors assessment at Private Hospital in Manado (n = 125)

Indicator	Category			
	Not Available		Available	
	n	%	n	%
Sink with clean and clear running water	0	0.0	125	100.0
Tissue or single-use hand towel	37	29.6	88	70.4
Antiseptic handwash soap	29	23.2	96	76.8
Alcohol hand rub	17	13.6	108	86.4
Trash can for already-used tissue	0	0.0	125	100.0
The handwash location is reachable	0	0.0	125	100.0
Handwashing poster	0	0.0	125	100.0
Illustrated handwash steps leaflet	0	0.0	125	100.0
Composite value	**21**	**17.0**	**104**	**83.0**

2. Facility accessibility factor

The result of the facility accessibility factors assessment in Private Hospital in Manado can be seen in Table 6.

Table 6 demonstrates that there are hand hygiene amenities available in every room investigated, including sinks with clean, clear running water (100.0%), trash cans for tissues (100.0%), reasonably priced hand washing stations (100.0%), hand washing posters (100.0%), illustrated leaflets about proper hand washing techniques (100.0%), and the availability of antiseptic soap (76.8%), wipes (70.4%), and antiseptic solutions (100.0%). (86.4%). The total percentage of all indicators for the factor of accessibility to facilities for hand hygiene reached 83.0 percent for the entire category.

Table 7
The cross-tabulation between the facility accessibility factors with nurses' compliance with hand hygiene at Private Hospital in Manado (n = 125)

Category	Nurses' Compliance				Total	
	Moderate		High			
	n	%	n	%	n	%
Not available/not complete	9	42.8	12	57.2	21	100.0
Available/complete	10	9.6	94	90.4	25	100.0
Total	**19**	**15.2**	**106**	**84.8**	**125**	**100.0**

The availability of hand hygiene facilities and nurses' compliance in performing hand hygiene at Private Hospital in Manado were cross-tabulated, and the results showed that the higher the availability of hand hygiene facilities, the higher the compliance of nurses in performing hand hygiene at Private Hospital in Manado.

3. Information and training factor

The result of the information and training factors assessment in Private Hospital in Manado can be seen in Table 8.

Table 8
The result of the information and training factors assessment at Private Hospital in Manado (n = 125)

Indicator	Category					
	Bad		Moderate		Good	
	n	%	n	%	n	%
Information and training on how to wash hands properly	0	0.0	34	27.2	91	72.8
Information & training on how to practice the five moments of hand hygiene	0	0.0	23	18.4	102	81.6
Composite value	**0**	**0.0**	**28**	**22.4**	**97**	**77.6**

From the 125 respondents surveyed, Table 8 reveals that 72.8 percent of them thought the hospital setting provided good information and training on how to wash hands properly and practice the five moments of hand hygiene (81.6%). At Manado's private hospitals, the overall percentage of indicators on information factors and hand hygiene instruction that fall into the sufficient and good categories combined is 22.4 percent and 77.6 percent, respectively.

A conclusion that can be drawn from the cross-tabulation table between information and training factors and nurses' compliance with performing hand hygiene at Private Hospital in Manado is that the higher the quality of the information and training given to nurses regarding hand hygiene, the higher the compliance of nurses with performing hand hygiene at Private Hospital in Manado.

4. Supervision factor

The result of the supervision factor assessment in Private Hospital in Manado can be seen in Table 10.

It can be seen from Table 10 that none of the respondents gave the supervision factor indicator a poor category assessment. The workers will receive a reprimand from the leader of the room if they receive the highest rating in the good category (91.2%). The head nurse's warning to the nurse to follow through with the implementation of hand hygiene following requirements is the highest assessment in the sufficient category (25.6%). All indicators in the supervision component collectively fall into the sufficient and good categories at a rate of 17.6 and 82.4 percent, respectively. As a result of the percentage of sufficient categories being 17.6 percent higher than 15 percent, respondents' perceptions of the supervisory supervision element at Private Hospital in Manado cannot be categorized in the good category.

Table 9
The cross-tabulation between the information and training factors with nurses' compliance with hand hygiene at Private Hospital in Manado (n = 125)

Category	Nurses' Compliance				Total	
	Moderate		High			
	n	%	n	%	n	%
Bad	0	0	0	0.0	0	0.0
Moderate	10	35.7	18	64.3	28	100.0
Good	9	9.3	88	90.7	97	100.0
Total	**19**	**15.2**	**106**	**84.8**	**125**	**100.0**

Table 10
The result of the supervision factors assessment at Private Hospital in Manado (n = 125)

Indicator	Category					
	Bad		Moderate		Good	
	n	%	n	%	n	%
Hand hygiene supervision by the head nurse	0	0.0	18	14.4	107	85.6
Standard hand hygiene promotion by the head nurse	0	0.0	23	18.4	102	81.6
The head nurse's reminder about hand hygiene com-pliance following standard	0	0.0	32	25.6	93	74.4
Hand hygiene motivation by the head nurse	0	0.0	21	16.8	104	83.2
The head nurse's warning when the nurses doesn't implement hand hygiene	0	0.0	11	8.8	114	91.2
The head nurse's punishment when the nurses don't implement hand hygiene	0	0.0	25	20.0	100	80.0
Newest information about hand hygiene announced by the head nurse	0	0.0	20	16.0	105	84.0
Hand hygiene distinction announced by the heard nurse	0	0.0	16	12.8	109	87.2
Hand hygiene exemplified by the head nurse	0	0.0	19	15.2	106	84.8
Composite value	**0**	**0.0**	**22**	**17.5**	**103**	**82.4**

Table 11
The cross-tabulation between the supervision factors with nurses' compliance with hand hygiene at Private Hospital in Manado (n = 125)

Category	Nurses' Compliance				Total	
	Moderate		High			
	n	%	n	%	n	%
Bad	0	0	0	0.0	0	0.0
Moderate	6	35.7	16	72.7	22	100.0
Good	13	9.3	90	87.3	103	100.0
Total	**19**	**15.2**	**106**	**84.8**	**125**	**100.0**

The cross-tabulation table between supervision parameters and nurses' compliance with doing hand hygiene at Private Hospital in Manado demonstrates that nurses' compliance with performing hand hygiene at Private Hospital in Manado increases with the quality of supervisory oversight.

5. Risk perception factor

The result of the risk perception factors assessment in Private Hospital in Manado can be seen in Table 12.

Table 12
The result of the supervision factors assessment at Private Hospital in Manado (n = 125)

Indicator	Category					
	Bad		Moderate		Good	
	n	%	n	%	n	%
Risk of being infected by pathogen when working	0	0.0	21	16.8	104	83.2
Working in a place with the risk of being infected	0	0.0	23	18.4	102	81.6
Working place with the risk infection	0	0.0	16	12.8	109	87.2
Composite value	**0**	**0.0**	**20**	**16.0**	**105**	84.0

Table 12 reveals that data from 125 respondents revealed that most respondents had a positive perception of the likelihood of infection at work being very low (83.2%), the likelihood of being threatened while working being high (81.6%), and the likelihood of contracting infectious diseases in the workplace (87.2%). 84.0 percent is the total proportion of all indicators with good categories.

Table 13
The cross-tabulation between the risk perception factors with nurses' compliance with hand hygiene at Private Hospital in Manado (n = 125)

Category	Nurses' Compliance				Total	
	Moderate		High			
	n	%	n	%	n	%
Bad	0	0	0	0.0	0	0.0
Moderate	5	33.3	15	66.7	20	100.0
Good	14	14.3	91	85.7	105	100.0
Total	**19**	**15.2**	**106**	**84.8**	**125**	**100.0**

The cross-tabulation table between risk perception factors and nurses' compliance in performing hand hygiene at the Private Hospital in Manado leads to the conclusion that the better the nurse's risk perception, the higher the nurses' compliance in performing hand hygiene at the Private Hospital in Manado.

Multivariate Analysis of the Factors Influencing Nurses' compliance Level in Performing Hand Hygiene in Private Hospital in Manado

In this study, multivariate analysis was conducted with multiple linear regression tests. The test results of multiple linear regression analysis can be seen in Table 14.

Table 14
The cross-tabulation between the risk perception factors with nurses' compliance with hand hygiene at Private Hospital in Manado (n = 125)

Variable	ρ-value	β	Status
Safety climate	0.001	0.265	Significant
Facility accessibility	0.017	0.205	Significant
Information and training	0.002	0.193	Significant
Supervision	0.019	0.163	Significant
Risk reception	0.022	0.182	Significant

According to data from Table 14, all variables had a substantial impact on nurses' compliance with performing hand hygiene in Private Hospital in Manado. This was discovered after repeated linear regression tests. These variables had the following ρ-values: safety climate (0.001), accessibility of hand hygiene facilities (0.017), information and training (0.002), supervisor supervision (0.019), and perception of risk (0.022).

Analysis of the Organizational Factors Influencing Nurses' compliance Level in Performing Hand Hygiene in Private Hospital in Manado

1. Safety climate factor

Based on an analysis of the study's findings, it was discovered that elements related to the safety climate had a

substantial impact on nurses' compliance with practicing hand hygiene. According to Table 4, the majority of responders experience a safe environment in terms of workplace supervision, support from supervisors and coworkers, and commitment to nursing protection. The findings of this study are consistent with those of Sands & Aunger (2020) and Caris et al. (2017), who found a positive relationship between the safety climate and nurses' compliance with performing hand hygiene. In other words, the safer the environment, the more compliant a person will be with performing hand hygiene.

Castro-Sánchez, Holmes, & Pittet (2017) contend that the medical industry should foster a culture of safety. The health management system was to be integrated into this, and there was a commitment to make the safety atmosphere a priority. The safety climate, as defined by the Centers for Disease Control and Prevention (CDC) (2022) in "Guideline for Isolation Precautions: Preventing Transmission of Infection Agents in Health Settings" is how employees and management perceive safety demands in the hospital setting. According to the study's findings, all of the safety climate indicators fall into the "good" category. The components of the states that received the largest number of yes responses from respondents were those that dealt with workplace monitoring.

The findings of this study demonstrate that the safety atmosphere significantly affects nurses' compliance with performing hand hygiene because, either way, the safety climate always motivates responders to comply with the application of hand hygiene. Safety rules and procedures are one of the elements that influence a safe environment and the use of hand hygiene (Hahn & Murphy, 2008). Nurses' compliance in performing hand hygiene can be impacted by safety policies and procedures in the form of standard operating procedures (SOPs). Observations at the research location indicate that there are standard operating procedures (SOPs) for hand washing available in every room, which may also encourage respondents to follow the SOPs and practice good hand hygiene.

2. Facility accessibility factor

According to the data, there is a big impact on nurses' compliance with practicing hand hygiene depending on whether there are facilities for it. Table 6 reveals that almost all survey respondents believed hospitals had all the necessary hand hygiene equipment. The findings demonstrated a statistical test value of ρ-value 0.017, which demonstrated a significant relationship between the availability of facilities and nurses' compliance in practicing hand hygiene.

The findings of this research are consistent with the theory put forth by Alene et al. (2022), which states that one of the factors that determine behavior is a potential factor that permits and facilitates one's behavior or actions. One of these factors is the facilities and their accessibility. The availability of supporting facilities and facilities to administer hand hygiene is significant in the context of compliance with the application of hand hygiene (Berendes et al., 2022). The findings revealed that while a small percentage of respondents had a moderate degree of compliance, practically all of those who said that hospitals were available and provided complete facilities had a high level of compliance. A tiny percentage of respondents, however, claimed that the Private Hospital in Manado lacked some essential hand hygiene services. This is because the delivery of hand hygiene facilities has been requested, however, there are difficulties due to locations and vendors from outside the area.

Another factor is the staff members' lack of care for reporting the availability of hand sanitizer in public areas when it runs out before the replacement is supposed to happen. It is said that there is not enough glycerin alcohol available for hand rubbing. Bottles of hand-rubbing alcohol need to wait until cleaning is finished. According to Alene et al. (2022), the use of hand hygiene in health care would depend on the availability of the necessary facilities and equipment, such as access to sufficient soap and water, alcohol-based hand sanitizer, and a hand washing basin near the workspace. The findings revealed that there was only one indicator in the entire category, namely the presence of sinks and running water, based on the indicators of the accessibility of hand hygiene facilities observed.

This study's findings are consistent with those of Waney et al. (2016) earlier work. With a ρ-value of 0.003, Waney et al. (2016) study demonstrates a link between nurse motivation and the use of hand hygiene by nurses at the Tkt. III R.W. Mongisidi Manado Hospital's inpatient installation in 2016 (Waney et al., 2016). This study supports the findings of Agustanti's investigation conducted in 2017 at the Bougenvile room of Dr. Soedirman Kebumen Hospital, which found a relationship between facilities and 5-moment hand hygiene compliance with a ρ-value of 0.000 (Agustanti & Rokhanawati, 2017).

The findings of this study are consistent with Notoatmodjo's theory, which claims that the availability of hand hygiene facilities can stop the spread of infection. According to the WHO, a multifaceted approach is required to increase compliance with practicing hand hygiene. The strategy entails transforming the system by putting sinks and antiseptic soap at every point of care, in addition to alcohol-based hand massages (Notoatmodjo, 2010).

The aforementioned description leads to the conclusion that there is a strong relationship between the accessibility of facilities and nurses' compliance with performing hand hygiene. A multimodal approach must be used to improve hand hygiene implementation. This approach should focus on each individual's habits and the environment of the institution, such as the use of posters to promote hand hygiene, as well as strong supporting management for hospital programs in addition to the availability of hand hygiene facilities.

3. Information and training factor

Based on the analysis's findings, it was discovered that training and information had a substantial impact on nurses' compliance with performing hand hygiene. Table 8 reveals that nearly all respondents felt that there had been adequate information and instruction for hand hygiene, including the right way to wash hands and the five hospital-specific hand hygiene moments. This finding is consistent with the study done by Berendes et al. (2022), which found that nurses' compliance with the application of hand hygiene is significantly influenced by knowledge and training, with the majority of the respondents having good information and training.

The findings of this study support the notion put forth by Pittet (2017), according to which one of the elements that facilitate the development of health behavior is the possession of health-related abilities, which are acquired through information and training. The findings revealed that, among practically all respondents with enough knowledge and training, a small fraction had a high degree of

compliance in the use of hand hygiene, while the majority had a high level of compliance. Most respondents who reported having received good information and training, however, also reported having a high degree of compliance. The majority of the information and training indicators about the five moments of hand hygiene in the hospital setting are found in the study's information and training indicators, which are all in the "excellent" category.

According to the survey's findings, over half of the respondents frequently provided information and instruction regarding the five critical periods for hand hygiene in a hospital setting. Information and training are organizational elements that support health compliance, according to DeJoy et al. (2000) in their study on the drivers of compliance behavior for self-protection applications in the workplace.

Based on the analysis's findings, the results demonstrated that knowledge and training had a favorable impact on people's willingness to practice good hand hygiene. Therefore, it can be claimed that responders are more obedient when practicing hand hygiene or vice versa, depending on how well they were informed and trained on its implementation. According to the researchers' findings, nurses' compliance with performing hand hygiene has a substantial impact on information and training. The degree of compliance in the practice of hand hygiene will depend on how well the information and instruction are received. According to research by Abd Rahim & Ibrahim (2022), respondents who receive quality information and instruction about practicing excellent hand hygiene have higher compliance rates than those who do not.

Analysis of the Work Factors Influencing Nurses' compliance Level in Performing Hand Hygiene in Private Hospital in Manado

1. *Supervision factor*

The findings demonstrated a substantial relationship between nurses' compliance and supervision when it came to hand hygiene. The outcomes of statistical analyses with a ρ-value of 0.019 = 0.05 serve as proof of this. Assisting, advising, training, and supporting nurses in performing hand hygiene in accordance with rules and procedures is what supervision does. Continuous supervision is required in order to improve the nurses' knowledge and compliance with hand hygiene.

The findings of this study are consistent with those of Tahir's study, which found a relationship between nurse supervision and compliance with hand hygiene standards at internal medicine ward in RSUP Dr. M. Djamil Padang with a ρ-value < 0.05 (Ananda, 2021). Research carried out by Fina (2015) in the treatment room of RSUD dr. Rasidin Padang also lends credence to this study. With a ρ-value of 0.038, this study demonstrates a strong association between supervision and compliance among nurses performing hand hygiene.

The findings of this study are consistent with Haenen et al. (2022) research, which holds that the head nurse's supervision should be conducted objectively with the goal of coaching. The purpose of supervision is to undertake direct and routine observations in addition to monitoring whether nurses wash their hands properly and according to regional regulations and procedure; and how the supervisor monitors proper adherence to the hand hygiene recommendations (Haenen et al., 2022). If an issue is discovered, urgent direct support will be given. This viewpoint is in keeping with Nursalam's assertion that, in order to conduct competent supervision, supervisors must be aware of the appropriate times and actions for supervision (Nursalam, 2014).

To ensure that hand hygiene is successfully implemented, supervisors should always give their subordinates ongoing information about the practice. Because the hospital director and all nurses are committed to carrying out infection prevention and control programs, which include hand hygiene compliance, the implementation of hand hygiene is successful. Every morning, following a five-minute handover, the room's head is advised to provide a briefing on hand hygiene and jointly demonstrate the handwashing technique.

Analysis of the Individual Factors Influencing Nurses' compliance Level in Performing Hand Hygiene in Private Hospital in Manado

1. *Risk perception factor*

According to the research analysis, nurses' compliance with practicing hand hygiene was significantly impacted by their perceptions of danger. Table 12 reveals that the majority of respondents had positive perceptions of risk. This finding is consistent with Haenen et al. (2022) study, which found that nurses' compliance with the application of hand hygiene is significantly correlated with their perceptions of danger. In Sahara's study, the majority of the respondents had favorable opinions of risk.

The findings of this study support the hypothesis underlying the Health Belief Model (HBM). The theory states that a person's propensity to be deterred directly depends on perceived dangers and calculations of advantages and losses. The perceived risk of the impending risks is assessed first. The degree to which a person considers whether pain or disease actually poses a threat to him is shown by this. The assumption is that if the perceived threat increases, prevention behavior will also increase (Machfoeds & Surayani, 2009).

According to the study's findings, the majority of respondents who perceived a good risk had a high level of compliance with practicing excellent hand hygiene–nearly half of them. This demonstrates how someone will always comply with hand hygiene instructions when they perceive a low risk, and vice versa. This could be brought on by additional elements that influence perception, such as newly learned information. Perception and knowledge are closely related (Abd Rahim & Ibrahim, 2022). A person's understanding of infectious disease transmission improves with further exposure to it. A person's view of the risk of potential illnesses at work will be shaped by their level of knowledge, which will ultimately influence how consistently they practice proper and appropriate hand hygiene.

Nurses' compliance with practicing hand hygiene is significantly impacted by the results of risk perception research. Researchers claim that respondents' level of awareness of the proper use of hand hygiene has an impact on how they perceive risk. A good perception of danger will develop if the respondents' level of knowledge is high. A person's behavior will improve as a result of this.

Strategic Issue and Recommendation on Nurses' compliance Enhancement in Performing Hand Hygiene in Private Hospital in Manado

The strategic issues in this study are supported by information from completed research that satisfies the following criteria: (1) The evaluation of these variables

indicates that 15% of them fall into the "poor" or "incomplete" category, and (2) these variables significantly affect nurses' compliance. Two of the five variables under investigation match the mentioned criteria.

According to the study's findings, some respondents continue to believe that the Private Hospital in Manado's safety climate falls into the poor category. This is due to the fact that some nurses still do not care about or comprehend the significance of practicing hand hygiene. This is also a result of inadequate supervision and encouragement from supervisors and coworkers to implement hand hygiene in the nurse's working environment. This can be avoided by re-socializing all employees on the value of performing proper hand hygiene (the right way and at the right time) in line with applicable standards so that everyone is aware of its significance and is able to perform it consistently and correctly. As a means of assisting in the execution of hand hygiene in accordance with SOPs and serving as an example for every staff member under it, it is crucial to maximize the role of superiors. It's also advised to strengthen the team and hire new infection control personnel for each treatment room. Staff actions can be better monitored with the help of the infection control team. This is anticipated to increase worker compliance with the practice of hand hygiene in hospitals and service sectors.

The availability of hand hygiene facilities in hospitals is another component that becomes a strategic concern in addition to climate safety issues. Some respondents claimed that the Private Hospital in Manado lacked sufficient hand hygiene facilities. This is a result of challenges associated with establishments and suppliers imported from outside the area, which makes it difficult for the required materials to be delivered. Additionally, the insufficient availability of hand hygiene facilities at Private Hospitals in Manado is a result of staff members' lack of concern when reporting the presence of hand rubs in public places. This can be avoided by paying attention to the minimum and maximum stock levels of goods that are adjusted to the lead time, beginning with the demand for these items and ending with the availability of goods in hospitals. Additionally, socialization and education campaigns aimed at raising hand hygiene awareness among all staff members, as well as regular reporting on the achievement of hand hygiene compliance for all hospital staff, will reveal areas where hand hygiene implementation falls short of predetermined standards.

CONCLUSIONS AND SUGGESTIONS

Healthcare-Associated Infections (HAIs) are common infectious diseases found in hospitals and other healthcare facilities. To reduce the risk of infection, hand hygiene is essential for medical professionals, including nurses. Compliance with hand hygiene is impacted by factors such as climate safety, facility accessibility, information and training, supervision, and risk perception. Safety environment also influences compliance with hand hygiene. Nurses' compliance with performing hand hygiene can be improved by using posters, strong management backing, and supervisors providing continuing information.

Hospital management teams should re-socialize with staff, optimize their roles, and implement hand hygiene compliance reporting. This study can be replicated by adding other factors or changing the research subject to other hospitals or healthcare staff.

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