Assessing Knowledge and Compliance of Nurses with Infection Control Protocols

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ABSTRACT

Healthcare-associated infections (HAIs) remain a serious threat to patient safety worldwide, with a marked impact in the Philippines. Nurses, as frontline healthcare providers, play a key role in infection control, and their compliance with infection control protocols is essential in reducing HAIs. This study evaluated the knowledge and compliance levels of registered nurses in hospitals in Catanduanes, aiming to identify factors that influence their adherence to these protocols. Employing a cross-sectional correlational design, data were gathered from 58 nurses using WHO's Compliance with Standard Precautions Scale (CSPS) and a Knowledge Questionnaire (KQ) on HAIs. The mean knowledge score was 11.87, indicating a generally "good" understanding of infection control measures. Universal knowledge was demonstrated in hand hygiene, with 100% correct responses for statements like "Washing hands with soap or an alcohol-based antiseptic reduces the risk of pathogen transmission." In contrast, lower scores appeared for specific practices, such as "Rubbing hands until dry when using alcohol-based antiseptics" (41.67%) and "Disinfecting all spills with alcohol" (58.33%). Compliance averaged 70.92%, classified as moderate, with high adherence in areas such as hand hygiene (96.67%) and glove use (93.33%), but lower rates in PPE reuse (36.67%) and waste management (40.00%). A significant positive correlation ($r = 0.346$, $p = 0.007$) was found between knowledge and compliance, indicating that enhanced knowledge can improve adherence. In line with these findings, targeted training programs and adequate resource provision, particularly PPE, are recommended. Moreover, policy initiatives may focus on enhancing infection control infrastructure in regional hospitals. Future research may examine additional factors influencing compliance and extend similar studies to other regions to enhance infection control nationwide.

Keywords: Healthcare-associated infections, infection control, nurse compliance, knowledge assessment, Catanduanes, Philippines

INTRODUCTION

Healthcare-associated infections (HAIs) are a major public health issue globally and in the Philippines. They are among the most common complications in healthcare, affecting millions of patients worldwide each year and are linked to prolonged hospital stays, increased healthcare costs, and higher risks of further complications (Haque et al., 2020). On any given day, 1 out of 31 hospital patients acquires an infection while receiving medical care (Centers for Disease Control and Prevention, 2024). Specifically, the World Health Organization (WHO) (2022) reports that for every 100 patients in acute-care settings, seven patients in high-income nations and 15 patients in low- and middle-income countries acquire at least one HAI during their hospital stay. Common HAIs include bloodstream infections, urinary tract infections, pneumonia, and surgical site infections (Szabó et al., 2022; Haque et al., 2020). Alarmingly, approximately 10% of these patients succumb to their infections (WHO, 2022). Infection cost also adds up to extra $12.4 billion in society costs due to premature deaths and reduced productivity (CDC, 2024). Moreover, the COVID-19 pandemic and other major disease outbreaks have shown how healthcare environments can spread infections, affecting patients, healthcare workers, and visitors if proper infection prevention and control (IPC) measures are not followed (WHO, 2022; Edrada et al., 2020).

In 2020, with the pandemic the most common illness in the Philippines was acute respiratory tract infection, affecting around 710.2 thousand individuals. The morbidity rate for acute upper respiratory infection in the Philippines was approximately 653 per 100,000 people that year (Balita, 2024). In the country, common pathogens causing HAIs include *Clostridioides difficile, Acinetobacter baumannii*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus*, complicating treatment efforts due to their resistance to multiple antibiotics (Voidazan et al., 2020). Campo & Remon (2024) also reports that in the country, 28% of patients develop device-related HAIs. Sepsis or organ dysfunction leads to death in one-fourth to nearly half of ICU patients. Compliance with proper hand hygiene to prevent HAIs is notably low, with an adherence rate of only 38.7% (Campo & Remon, 2024).

To reduce HAIs, proper hand hygiene, use of personal protective equipment, and adherence to sterilization protocols are essential in (McAlearney et al., 2021). Studies also highlight the crucial role of nursing in infection control. Nurses are deemed essential in preventing and managing hospital infections because they are responsible for a significant portion of patient care and treatment (Ghabayen et al., 2023). Similarly, Althiyabi et al. (2024) emphasizes that because they oversee and deliver almost all healthcare services, nurses are crucial to any hospital's quality control programs (Althiyabi et al., 2024).

Knowledge of standard control protocols has been identified as a key factor in predicting higher levels of compliance (Da'seh et al., 2023). However, recent evidence indicates that nurses might require enhanced knowledge or more effective application of their existing knowledge into practice. Nasiri et al. (2019) examined 18 studies involving 4,577 nurses and nursing students to assess their knowledge, attitudes, and practices related to infection control and prevention. The findings showed that while most nurses had adequate knowledge (40%-90%) and a positive attitude (37%-100%), their actual practices were generally average or poor. Asfaw (2021) also argued that nurses' understanding and implementation of measures to prevent HAIs were insufficient. Studies such as Alhumaid et al. (2021) also notes in terms of infection prevention and control (IPC) measures that gaps were noted in knowledge about occupational vaccinations, disease transmission modes, and risks from needle stick injuries for nurses. Involving 247 nurses in Jordan, Suliman (2018) also found that despite 90% of the participants having a good understanding of standard precautions, this knowledge alone did not lead to better compliance (Suliman, 2018). Locally, in Baguio Philippines, Campo & Remon (2024) found that while nurses generally had good knowledge about infection prevention, their actual compliance with infection control practices was suboptimal.

When infection practices are not properly followed, nurses can inadvertently contribute to the spread of infections. For instance, inadequate hand hygiene, improper handling of medical devices, and non-compliance with sterilization protocols can lead to the transmission of pathogens (Engel et al., 2022). For nurses, adherence to infection control guidelines are critical to mitigating the risk of HAIs (Blot et al., 2022; Szabó et al., 2022). But several studies have identified key factors affecting compliance with infection control measures among healthcare workers in different contexts. Powell-Jackson et al. (2020) indicated that compliance was influenced by factors such as age, gender, and job role, with younger and female workers performing better in hand hygiene. Key factors such as perceived behavioral control, subjective norms, and attitudes were also found to significantly impact individuals' intentions to adhere to these measures (Prasetyo et al. (2020). Other studies identified several contributing factors, including the increasing number of immunocompromised patients, invasive medical procedures, and the resistance of microorganisms to multiple antibiotics. Hospital infrastructure, the frequency of microbiological diagnostics, and healthcare worker-to-patient ratios were also found to play crucial roles in infection control (Friedrich, 2019).

Against this backdrop, the main objective of the study is to assess the level of knowledge and compliance with infection control protocols among registered nurses who work in selected hospitals in Catanduanes and the factors affecting compliance of infection control. In conducting this study, specific insights into infection control practices within the region's hospitals can be provided that allows for tailored interventions that address the unique challenges and needs of these facilities. In identifying gaps in nurses' knowledge and compliance with infection control protocols, the study can inform targeted educational and training programs to enhance the proficiency and adherence of healthcare workers to these essential practices helping improve infection

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control practices. Overall, improved infection control practices will increase safety for patients and healthcare workers, reduce healthcare-associated infections (HAIs), and lower treatment costs, leading to better patient outcomes and a safer work environment. Finally, insights gained can inform the development of more effective infection control guidelines, continuous professional development initiatives, and resource allocation strategies that support sustained improvements in healthcare quality. In the long run, these enhancements can lead to a better healthcare system capable of delivering safer and more efficient care for improved public health outcomes.

METHODOLOGY

Research Design

The study used cross-sectional correlational design. This means that the study looked at the relationship between nurses' knowledge of infection control protocols and their compliance as well as the factors affecting compliance of infection control at a single point in time. A cross-sectional study design is an observational study where the researcher measures both the outcome and exposures in the participants simultaneously (Wang & Zheng, 2020).

Respondents and Sampling

The study involved nursing professionals from various departments working in the three major hospitals in Catanduanes. According to recent statistics, the ratio of the population in relation to public health nurses in the Bicol region in 2022 is 1 out of 4052 (Balita, 2024), this means that the total number of available nurses in Catanduanes is approximately 67. Using this total population, Slovin’s formula was utilized to determine the total number of participants of the study. At 5% margin of error and 95% confidence interval, a total of 60 nursing professionals was surveyed for the study. Participants included registered nurses with at least three months of clinical experience and who are directly involved in patient care whether they are permanent or contractually hired in the selected hospitals.

Instrumentation and Measures

There are two instruments utilized in the study: WHO's Compliance with Standard Precautions Scale (CSPS) tool to determine the compliance of nurses with infection control and the Knowledge Questionnaire (KQ) by Campo & Renon (2024). CSPS consists of 20 items that are answered using a four-point Likert scale: never, seldom, sometimes, and always. Notably, items 2, 4, 6, 15, and 20 are phrased negatively. For scoring, "always" responses to positively worded items and "never" responses to negatively worded items received a score of 1, while other responses received a score of 0. This results in a total possible score range of 0 to 20, which is then expressed as a percentage. The study compliance with infection control prevention was adopted from Bahegwa et al. (2022) however there were three categories considered: A compliance score of 85% or above is categorized as high compliance, indicating strong adherence to standards. Scores between 70% and 84% are considered moderate compliance, reflecting partial adherence with some areas for improvement. Any score below 70% is classified as low compliance, suggesting significant gaps in meeting the required standards. This questionnaire has demonstrated satisfactory reliability, with a Cronbach's alpha of 0.73.

KQ, on the other hand, aimed to assess nurses' knowledge regarding the prevention and control of HAIs. This tool comprised 15 dichotomous items, each answerable with "true" or "false." Participants received one point for each correct answer, while incorrect responses were scored as zero. Scores of 75% or higher were categorized as good, scores between 50% and 74% were considered moderate, and scores below 50% were deemed poor. The test-retest reliability score for the knowledge on HAIs questionnaire was 0.76, indicating an acceptable level of reliability (Campo & Renon, 2024). Moreover, to ensure the overall reliability of the combined questionnaire, it will also undergo content validation by consulting with two expert researchers in the field and two infection control specialists.

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Data Collection and Procedures

Following content validation, approval for the study will be obtained from the Research Ethics Committee (REC) and subsequently from the hospital administrator. Eligible nurse participants will be identified in collaboration with the nursing manager of each hospital, who will provide a list of nurses meeting the inclusion criteria. Surveys will be distributed to these participants. After the questionnaires are completed, responses will be collected and reviewed for completeness. Any incomplete questionnaires will be promptly returned to respondents by the research assistant (RA), who will maintain appropriate distancing. Respondents will be given a few minutes to complete any missing items. Once all items are confirmed as answered, the questionnaires will be collected. Participants will be thanked for their time and participation.

The study will adhere to several ethical guidelines to ensure the protection of participants' rights and privacy. Participants will receive comprehensive information about the study's purpose, procedures, risks, and benefits, and informed consent will be obtained prior to participation. In line with the Data Privacy Act of 2012, all participant information will be kept confidential. Personal information collected during the study will be anonymized and used strictly for academic purposes, with data access restricted to the research team. Results will be reported in aggregate form to ensure that individual responses cannot be identified.

Participation in the study will be entirely voluntary. Participants will have the freedom to decline or withdraw from the study at any time without facing any penalties or loss of benefits. They will be informed of their right to withdraw, and the withdrawal process will be simple and clearly explained, allowing participants to notify the research team if they choose to discontinue their participation.

Data Analysis

Statistical analysis using IBM SPSS will provide a clear understanding of how different factors influence compliance and knowledge levels among nurses. To evaluate the level of knowledge regarding infection control protocols among nurses, the mean will be used as the measure of central tendency. The compliance level of nurses will be determined using frequency, percentage, and rank distribution. To examine the relationship between factors affecting compliance practices and the level of knowledge, Spearman Rank correlation will be employed.

RESULTS AND DISCUSSIONS

Demographic Profile of the Respondents

Table 1 presents the demographic profile of the respondents, summarizing key characteristics such as age, gender, educational background, working area, years of work experience, and infection control training history.

Table 1. Demographic Profile of the Respondents

A. AGE	Frequency	Percentage
18-24	8.00	13.33
24-34	19.00	31.67
35-44	18.00	30.00
45-54	9.00	15.00
55-64	6.00	10.00
65 above	0.00	0.00
B. GENDER	Frequency	Percentage
Male	8.00	13.33
Female	52.00	86.67

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C. EDUCATIONAL BACKGROUND		
Bachelor's degree	53.00	88.33
Master's degree	7.00	11.67
Doctoral degree	0.00	0.00
D. WORKING AREA		0.00
Medical Ward	23.00	38.33
Surgical Ward	0.00	0.00
Critical Care Unit	2.00	3.33
Pediatric Ward	5.00	8.33
Emergency Depart	6.00	10.00
Others	24.00	40.00
E. YEARS OF WORK EXPERIENCE		0.00
Less than 6 years	34.00	56.67
6-10 years	13.00	21.67
11-15 years	7.00	11.67
16 and above	14.00	23.33
F. HAS ATTEDED TRAINING COURSE ON INFECTION CONTROL PROTOCOLS		
Yes	32.00	53.33
No	28.00	46.67
G. INFECTION PREVENTION AND CONTROL TRAINING IN PREVIOUS YEAR		
None	39.00	65.00
Once	12.00	20.00
Two or more	9.00	15.00

In terms of age, the majority of respondents are between 24 and 44 years old, with this age group making up 61.67% of the sample. The sample is predominantly female (86.67%), and most hold a Bachelor's degree (88.33%). The largest group of nurses works in the medical ward (38.33%), with other departments like pediatrics and emergency making up smaller portions. Regarding work experience, more than half of the respondents (56.67%) have less than six years of experience, while 23.33% have 16 or more years of experience. In addition, 53.33% have attended a training course on infection control protocols, yet 65% reported having no infection prevention training in the previous year.

Knowledge of Nurses in Infection Control Protocols

Table 2 presents the knowledge of nurses regarding infection control protocols, including their understanding of various infection prevention measures, as shown by the percentage of correct responses (%CR) for each statement. The table ranks the statements from highest to lowest based on correct response rates, interprets the responses as "good," "moderate," or "poor" based on predefined thresholds, and provides a mean score and standard deviation for further analysis.

In terms of rankings, the statement “Washing your hands with soap or an alcohol-based antiseptic decreases the risk of transmission of healthcare-acquired pathogens” received the highest correct response rate at 100%, indicating a universal understanding among nurses. This is followed closely by statements such as “If my hands are not visibly dirty, there is no need to wash my hands prior to patient contact” (98.33%) and “Inappropriate disinfection procedure increases the risk of getting healthcare-acquired infections among healthcare workers” (98.33%), which also showed a strong comprehension with scores well above 90%.

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In contrast, the lowest scoring statements include "When using alcohol-based antiseptics, I should keep rubbing my hands until dry" (41.67%) and "All spills (body fluids or medications) should be disinfected with alcohol" (58.33%). These responses are interpreted as indicating moderate to poor knowledge in these areas.

Table 2. Knowledge Of Nurses with Infection Control Protocols

Statement	CA	CR	%CR	$\bar{x}$	σ	in
Gloves provide complete protection against acquiring or trasmitting infection	FALSE	19	31.67	11.87	1.43	Good
Healthcare-associated pathogens are also found on intact patient skin	TRUE	56	93.33			
Washing your hands woth soap pr an alcohol-based antiseptic decreases the risk of transmission of healthcare-acquired pathogens	TRUE	60	100.00			
If my hands are not visibly dirty, there is no need to wash my hands prior to patient contact	FALSE	59	98.33			
Use of an alcohol-based antiseptic for hand hygiene is an effective as soap and water if hands are not visibly dirty.	TRUE	33	55.00			
Gloves should be worn if blood or body fluid exposure is anticipated	TRUE	58	96.67			
When using alcohol-based antiseptics, I should keep rubbing my hands until dry.	TRUE	25	41.67			
There is no need to wash hands before doing procedures that do not involve bodily fluids.	FALSE	58	96.67			
Hand hygiene should be performed before and after direct patient contact.	TRUE	57	95.00			
I can wear the same pair of gloves for multiple patients as long it is not visibly contaminated.	FALSE	58	96.67			
Wearing gloves does not replace the need for hand washing	TRUE	40	66.67			
Inappropriate disinfection procedure increases the risk of getting healthcare-acquired infections among healthcare workers	TRUE	59	98.33			
It is safe to recap needles before disposing them on the sharp's container	FALSE	47	78.33			
Infectious waste such as body fluids are disposed on a black bag	FALSE	48	80.00			
All spills (body fluids or medications) should be disinfected with alcohol	FALSE	35	58.33			
CR = Correct responses; % CR = Percentage of correct responses; $\bar{X}$ = mean; σ = Standard Deviation; IN = Interpretation						
Interpretation: scores greater than or equal to 75% - good, 50% to 74% - moderate, less than 50% - poor						

The results suggest that nurses have a solid foundational knowledge regarding general infection control principles, particularly those relating to hand hygiene and PPE use. However, knowledge gaps exist in areas that involve more specific or technical practices, such as the appropriate handling of spills and the duration for using alcohol-based rubs. This may indicate that infection control training focuses more on core principles, potentially overlooking detailed procedural knowledge that nurses might encounter less frequently.

Supporting studies emphasize these findings. For instance, Campo & Remon (2024) noted a generally strong awareness of fundamental hand hygiene practices but found that compliance with detailed infection control protocols was suboptimal among nurses in the Philippines. Suliman (2018) similarly observed that while nurses understood core precautions, there were compliance gaps in technical practices. Furthermore, Nasiri et al. (2019) found that while most nurses had high knowledge scores on basic principles, their adherence to specific actions, such as proper disposal of infectious waste, was less consistent. These studies suggest that

while general training is effective, there is a need for targeted education on specific infection control procedures to fill these gaps.

Overall, these findings imply that while the nursing staff in the study has a sound general understanding of infection control protocols, there are knowledge gaps in more specialized practices. This suggests a need for more comprehensive training programs that not only reinforce basic infection control practices but also address less commonly practiced procedures, such as managing spills and proper waste disposal. Addressing these gaps could enhance nurses' overall compliance with infection control measures and improve patient safety.

Compliance Practices of Nurses in Infection Control

Table 3 presents the frequency of nurses' adherence to various infection control protocols, showing the percentage of responses across the categories of "Never," "Seldom," "Sometimes," and "Always."

The table highlights the extent to which nurses follow specific infection control practices, with the percentage of best responses (BR) indicating the frequency of adherence to these protocols.

The highest adherence rates are found in practices like “decontaminating hands immediately after removal of gloves” (with 58 responses marked “Always”) and “wearing gloves when exposed to body fluids, blood products, and excretions” (56 responses marked “Always”). These responses suggest that basic hand hygiene and glove use are routine for most nurses. Conversely, the lowest adherence rate appears for “only using water for hand washing,” with only 15 respondents marking “Always,” and “reusing surgical masks or disposable PPE,” with only 11 responses in the “Always” category. This indicates less frequent adherence to certain protocols, either due to resource limitations or differing perceptions of necessity.

Table 3. Nurses' Adherence to Infection Control Protocols by Frequency of Practice

Statement	Never	Seldom	Sometimes	Always	BR
I wash my hands between patient contacts	1	1	8	50	50
I only use water for hand washing	27	6	12	15	27
I use alcohol hand rubs as an alternative if my hands are not visibly soiled	3	6	22	31	31
I recap used needles after giving an injection	34	9	7	18	34
I put used sharp articles into sharps boxes	3	0	2	55	55
The sharp box is only disposed when it is full	15	4	10	31	31
I remove PPE in a designated area	1	2	6	51	51
I take a shower in case of extensive splashing even after I have put on PPE	2	3	12	43	43
I cover my wound(s) or lesion(s) with waterproof dressing before patient contacts	1	2	9	48	48
I wear gloves when I am exposed to body fluids, blood products, and any excretion of patients	0	1	3	56	56
I change gloves between each patient contact	0	0	12	48	48
I decontaminate my hands immediately after removal of gloves	0	0	2	58	58
I wear a surgical mask alone or in combination with goggles, face shield, and apron whenever there is a possibility of a splash or splatter	2	3	13	42	42
My mouth and nose are covered when I wear a mask	0	0	4	56	56
I reuse surgical mask or disposable PPE	22	3	8	11	22
I wear a gown or apron when exposed to blood, body fluids, or any patient excretions	3	4	16	23	23

Waste contaminated with blood, body fluids, secretions, and excretions are placed in red plastic bags irrespective of patient's infective status	17	8	11	24	24
I decontaminate surfaces and equipment after use	2	0	10	48	48
I wear gloves to decontaminate used equipment with visible soils	0	1	7	52	52
I clean up spillage of blood or other body fluid immediately with disinfectants	0	1	7	52	52
BR = Best responses					

To analyze more the data in Table 3, Table 4 continues from Table 3 by presenting the compliance levels of nurses with infection control protocols, ranked from highest to lowest percentage of best responses (%BR). The results highlights the specific infection control practices with the highest and lowest adherence rates, helping to clarify which areas are strong points and which may need improvement.

The highest compliance rates are seen in practices like "decontaminating hands immediately after removal of gloves" (96.67%) and "wearing gloves when exposed to body fluids, blood products, and excretions" (93.33%), both classified as high compliance. This indicates that critical infection control measures, such as hand hygiene and glove use, are well followed by most nurses. Conversely, the lowest compliance rates are observed in "reusing surgical masks or disposable PPE" (36.67%) and "wearing a gown or apron when exposed to blood, body fluids, or any patient excretions" (38.33%), both categorized as low compliance. These findings suggest that while core infection control practices are consistently adhered to, some protective measures involving PPE usage and waste management see less frequent compliance, possibly due to resource or operational challenges.

Table 4. Nurses' Compliance Levels with Infection Control Protocols Based on Best Responses (%BR)

Statement	%BR	in
I wash my hands between patient contacts	83.33	moderate compliance
I only use water for hand washing	45.00	low compliance
I use alcohol hand rubs as an alternative if my hands are not visibly soiled	51.67	low compliance
I recap used needles after giving an injection	56.67	low compliance
I put used sharp articles into sharps boxes	91.67	high compliance
The sharp box is only disposed when it is full	51.67	low compliance
I remove PPE in a designated area	85.00	high compliance
I take a shower in case of extensive splashing even after I have put on PPE	71.67	moderate compliance
I cover my wound(s) or lesion(s) with waterproof dressing before patient contacts	80.00	moderate compliance
I wear gloves when I am exposed to body fluids, blood products, and any excretion of patients	93.33	high compliance
I change gloves between each patient contact	80.00	moderate compliance
I decontaminate my hands immediately after removal of gloves	96.67	high compliance
I wear a surgical mask alone or in combination with goggles, face shield, and apron whenever there is a possibility of a splash or splatter	70.00	low compliance

My mouth and nose are covered when I wear a mask	93.33	high compliance
I reuse surgical mask or disposable PPE	36.67	low compliance
I wear a gown or apron when exposed to blood, body fluids, or any patient excretions	38.33	low compliance
Waste contaminated with blood, body fluids, secretions, and excretions are placed in red plastic bags irrespective of patient's infective status	40.00	low compliance
I decontaminate surfaces and equipment after use	80.00	high compliance
I wear gloves to decontaminate used equipment with visible soils	86.67	high compliance
I clean up spillage of blood or other body fluid immediately with disinfectants	86.67	high compliance
	70.92	moderate compliance
% BR = Percentage of best responses; IN = Interpretation		
High Compliance: 85% and above *Moderate Compliance: 70% - 84%* *Low Compliance: Below 70%*		

Overall, the data suggest that the primary reason for high compliance with basic hygiene protocols is their universal emphasis in infection control training and hospital policies, which align with the findings from Campo & Remon (2024) that emphasize routine practices are typically better adhered to. Conversely, lower compliance with practices involving PPE reuse and certain protective garment protocols may reflect real operational challenges within the healthcare settings, such as PPE shortages, which became more prominent during the COVID-19 pandemic. These results highlight a potential gap in resource allocation, which affects adherence to certain protocols and thus impacts overall infection control.

These findings align with previously cited literature. Studies by Nasiri et al. (2019) and Powell-Jackson et al. (2020) emphasized that adherence to infection control practices varies based on the perceived importance and accessibility of the resources needed to follow each protocol. Engel et al. (2022) further noted that compliance with more resource-intensive protocols tends to be lower due to logistical constraints. Additionally, Campo & Remon (2024) observed that while core infection control practices are well adhered to, resource limitations often prevent consistent compliance with protocols requiring additional PPE. These sources collectively suggest that compliance is highest for practices that are both emphasized in training and easily accessible in daily routines, supporting the patterns observed in this study.

Ultimately, the findings indicate that nurses generally demonstrate high compliance with core infection control practices, particularly hand hygiene and glove use, which are essential for preventing the spread of infections. However, the lower compliance observed in PPE reuse and certain protective garment protocols highlights the need for improved resource management and training to address these specific gaps. Enhancing access to PPE and reinforcing the importance of these additional protocols could improve adherence rates, ultimately contributing to more comprehensive infection control measures within healthcare settings. This could lead to better patient safety outcomes and a more resilient healthcare environment overall.

Relationship between Nurses Knowledge of Infection Control Protocol and their Compliance of Infection Control

Table 5 presents the relationship between nurses' knowledge of infection control protocols and their compliance with these protocols. The correlation is positive with a coefficient of r = 0.346r=0.346 and is statistically significant at the p=0.007 level, indicating a moderate association between the two variables. This positive correlation suggests that as knowledge of infection control protocols increases, compliance with these protocols also tends to increase.

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Table 5. Correlation between Nurses' Knowledge of Infection Control Protocols and Compliance with Infection Control Practices

Knowledge	Compliance
Pearson Correlation	.346**
Sig. (2-tailed)	.007
N	60

** Correlation is significant at the 0.01 level (2-tailed).

The significant positive correlation observed in Table 5 implies that higher knowledge levels are associated with improved compliance to infection control protocols among nurses. This relationship may be interpreted as reflecting the importance of adequate knowledge in fostering adherence to infection control practices. This finding supports the idea that when nurses are more informed about infection control procedures, they are better equipped and more motivated to follow them closely.

The results reflect the role of knowledge as a foundational factor in compliance with infection control measures. These findings align with several studies. For instance, Da'seh et al. (2023) emphasized that knowledge of infection control measures is a key predictor of adherence. Similarly, studies by Nasiri et al. (2019) and Campo & Remon (2024) reported that nurses with better knowledge of infection control had higher compliance rates, as they better understood the rationale behind these practices. Additionally, Alhumaid et al. (2021) found that gaps in knowledge regarding specific infection prevention protocols could contribute to suboptimal compliance, affirming that comprehensive knowledge is essential to improving compliance.

Overall, the findings emphasizes that knowledge alone can drive adherence. This result suggests that increasing nurses' knowledge through targeted training programs may positively influence compliance rates, particularly in areas where adherence is currently moderate or low. With this, by improving knowledge, healthcare institutions can potentially increase compliance with infection control measures, leading to a reduction in healthcare-associated infections and contributing to safer hospital environments. Investing in regular knowledge assessments and providing tailored educational interventions could thus help address existing gaps in compliance and strengthen infection control practices overall.

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study point to the importance of both knowledge and compliance with infection control protocols among nurses in the selected hospitals in Catanduanes. The moderate positive correlation between nurses' knowledge and their adherence to infection control practices suggests that a solid understanding of these protocols can enhance compliance. In practical terms, this indicates that improving knowledge levels may lead to better adherence, potentially reducing HAIs and increasing overall patient safety. The study also highlights that while nurses generally follow basic hygiene practices like handwashing, there are gaps in compliance with more resource-intensive protocols, such as the appropriate use of PPE and handling of medical waste, pointing to resource challenges within the healthcare facilities.

On a theoretical level, these findings align with previous research showing that knowledge plays an important role in promoting compliance with infection control measures. The data indicates that nurses with higher knowledge scores tend to follow protocols more closely. Educational initiatives that focus on infection control protocols can help improve compliance. Continuous education and professional development for nurses are essential steps toward enhancing the quality of patient care. In Catanduanes, targeted training on specific areas such as PPE use and waste management could address the compliance gaps identified, linking practical knowledge to the effective application of infection control practices.

For healthcare administrators and policymakers, these findings provide practical guidance. Hospital management and local health authorities should prioritize resources for infection control to ensure that supplies

like PPE remain consistently available. Infection control training programs tailored to the specific needs of healthcare facilities in Catanduanes could further improve compliance. These programs can help bridge the gap between knowing the protocols and applying them consistently in daily tasks. Emphasizing the importance of infection control within healthcare settings could also strengthen adherence among nursing staff.

Applying these findings more broadly, healthcare institutions throughout the Philippines and in other low-resource settings could benefit from incorporating regular assessments of infection control knowledge and compliance into their quality control programs. Hospitals should consider periodic training sessions that cover both basic principles and specific aspects of infection control, customized to address local challenges. National healthcare authorities might also develop policies that strengthen infection control infrastructure in regional hospitals, helping them maintain high standards of patient care and safety.

Moving forward, future research can explore additional factors that impact compliance with infection control protocols, including cultural beliefs, job satisfaction, and organizational support. Studies could also examine the long-term effects of specific training programs on compliance and patient outcomes. Similar studies in other regions of the Philippines could offer a better understanding of infection control practices across the country. Expanding research in this area may guide policy and intervention strategies to address both local and national challenges in infection prevention and control.

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