

# An Assessment of the Level of Knowledge and Compliance with Infection Prevention and Control Standards Among Nurses in the Northern Regional Hospital

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**Abstract:** Background: Nosocomial infections are associated with a high risk of morbidity and mortality among hospitalized clients. They also predispose health care workers to an increased risk of infections. However, information on knowledge of infection prevention and control is scarce in Northern Ghana. Therefore, the objective of the study was to assess the knowledge and compliance of infection prevention and control practices among nurses at the Northern Regional Hospital Tamale, Ghana. Methods: The study was cross-sectional in design. Also, the data were gathered from randomly selected 268 nurses. In collecting the data, self-administered questionnaires were used. The data were analyzed using IBM SPSS V. 21. Results: From the results, the majority (60.5%) of the respondents had high IPC knowledge, 25.8% had moderate IPC knowledge level, and only 13.8% had low IPC knowledge level. The findings on IPC compliance showed that the majority (77.6%) of the respondents had a low IPC compliance level, 19.8% had a moderate IPC compliance level, and only 2.6% had a high IPC compliance level. Conclusion: In conclusion, most of the respondents had good knowledge of the IPC guidelines in the hospital. The present results may be useful in the formulation of policies for improved infection prevention at health facilities. We recommend that hospital authorities should intensify compliance with IPC guidelines.

**Keywords:** Infections, Control, Nosocomial, Compliance, Mortality, Morbidity

## 1. Introduction

Nosocomial infections are a big worry to leaders in the health care system, particularly in developing countries [1]. Compared with the developed countries, there is a higher risk of nosocomial infections in developing countries [2]. Health care workers spend the majority of their time with their clients. Therefore, they should possess knowledge of infection prevention and control practices (IPC) and comply with them to minimize the risk of infections.

However, in many developing countries, previous studies among healthcare staff showed low knowledge and compliance level of infection prevention and control practices [3–5]. For example, in Zimbabwe, the majority of

the nurses (72%) were said to lack knowledge on infection control principles, while 42% of the nurses also did not comply with infection control standards [3]. Moreover, in Ghana, a previous study showed that only 38.9% of the nurses recapped used needles before disposal [4]. However, this earlier study did not evaluate the level of knowledge of standard safety practices. Meanwhile, knowledge of health safety standard protocols is a key determinant of the compliance level of such protocols [6, 7]. Therefore, to minimize the risk of nosocomial infections, it is vital to understand the level of knowledge of health staff on standard safety protocols and the compliance level of such standards.

Inadequate IPC related practices increase the risk of infections among health care workers and their clients [8–10].

Furthermore, 62% and 31% of all mortalities in Africa, and Southeast Asia, respectively, are linked with infectious disease [11]. Thus, nosocomial infections put an extra burden on both patients and the health care staff [12].

Nurses play a significant role in maintaining effective disease inhibition and control. However, their activities may also lead to the spread of infection [13]. Hence, the establishment of the IPC protocol aims to protect both the public and the health care staff from contracting an infection at a point of seeking health service and health care provision, respectively. Hence, the infections can be reduced by the provision of adequate knowledge of IPC protocols [5, 14]. Therefore, the Ministry of Health and the Ghana Health Services developed a policy framework on IPC 2009 with the ultimate goal of improving the capacity of healthcare workers in preventing and controlling infections and maintaining safety in healthcare settings [15].

In Ghana, among health care workers, previous authors have attempted to investigate their knowledge of nosocomial infections as well as their attitudes toward standard prevention and control practices. However, those studies were conducted in the Southern part of the country [16–19], which creates a knowledge gap in the Northern zone.

Thus, health policymakers may not be aware of the knowledge and compliance level of safety protocols of infection prevention and control among health care staff in the region. Hence, the objective of this study was to assess the knowledge and compliance level of infection prevention and control among nurses in the Northern regional hospital.

## 2. Methods

The study adopted a facility-based descriptive cross-sectional study. We randomly recruited 268 nurses from Tamale Central Hospital, Ghana. Data were collected on socio-demographic variables, knowledge of IPC, and practices of IPC, using a structured questionnaire. Ethical approval of the study was obtained from the Internal Review Board (IRB) of the University for Development Studies (UDS) and the Tamale Central Hospital. Moreover, permission was obtained from the various Heads of departments in the hospital before data collection. Participating in this study was voluntary. Also, informed consent of participants was obtained from the study participants with the assurance of data confidentiality. The Statistical Package for Social Sciences (IBM SPSS v. 21 on window 10) was used for the data analysis. The results were presented as descriptive statistics.

## 3. Results

Table 1 below shows the demographic characteristics of the respondents. The majority (54.5%) of the respondents were within the ages (years) of 21 – 30. With the sex of the study subjects, the majority (69.8%) of the respondents were females. Also, most (48.1%) of the subjects were general nurses, and the majority (76.9%) of them had the highest college education.

**Table 1.** Demographic characteristics of respondents.

		Frequency (n=268)	Percentage
Age group (years)	21 - 30	146	54.5%
	31 - 40	109	40.7%
	41 - 50	9	3.4%
	51 - 59	4	1.5%
Sex of the respondent	Male	81	30.2%
	Female	187	69.8%
Highest level of education/training	University	62	23.1%
	College	206	76.9%

Table 2 below shows the respondents' IPC knowledge variables. In this study, most (94.0%) of the respondents knew that hospital-acquired infections can be transmitted through medical equipment. Moreover, many (206) of them disagreed that nosocomial infections are infection from home. Also, about 65.3% of them agreed to know WHO five

moments of hand hygiene. Moreover, 90.3% of the respondents agreed that standard safety measures apply to all patients and 87.3% of them knew that all staff and patients should be considered vulnerable to infections. With glove use, 89.6% of them knew that one cannot handle body fluids with bare hands if gloves are not available.

**Table 2.** Respondents IPC knowledge variables.

Variable		Frequency (n=268)	Percentage
Hospital-acquired infections (HAIs) may possibly be transmitted by medical equipment.	True	252	94.0%
	False	16	6.0%
	Not applicable	0	0.0%
Nosocomial infections are brought from the house to the hospital by patients	True	56	20.9%
	False	206	76.9%
	Not applicable	6	2.2%
Respondent knows the 5 moments of hand hygiene proposed by World Health Organization	True	175	65.3%
	False	65	24.3%
	Not applicable	28	10.4%
Know that some equipment can be stored in antiseptic solutions for about 36 hours	True	52	19.4%
	False	202	75.4%
	Not applicable	14	5.2%

Variable		Frequency (n=268)	Percentage
In beds shortages, patients with communicable disease can be admitted in the same ward with others with noncommunicable diseases	True	50	18.7%
	False	202	75.4%
	Not applicable	16	6.0%
In using clean water, micro-organisms are destroyed	True	54	20.1%
	False	211	78.7%
	Not applicable	3	1.1%
I know that safety precautions should be applied to all patients	True	242	90.3%
	False	19	7.1%
	Not applicable	7	2.6%
Familiar with hospital-acquired infection standards.	True	212	79.1%
	False	46	17.2%
	Not applicable	10	3.7%
Know that all staff, and patients should be considered potentially infectious	True	234	87.3%
	False	33	12.3%
	Not applicable	1	0.4%
If gloves are unavailable, I can handle body fluids with bare hands.	True	19	7.1%
	False	240	89.6%
	Not applicable	9	3.4%
Used needles can be recapped after use and before their disposal	True	107	39.9%
	False	154	57.5%
	Not applicable	7	2.6%
	Not applicable	7	2.6%

Table 3 below indicates the IPC compliance variables among the study respondents. The Hand hygiene was practiced by majority (98.9%) of the respondents before and after patient contact. Additionally, most (81.0%) of them disagreed with the shaking of linen to release dust. Moreover, only 51.1% of the respondents had access to guidelines/Training manuals in their

unit. Also, about 58.2% of them always put on a mask and glasses when performing invasive and body fluid procedures. Besides, about 58.2% of the hospital staff always put on nose mask and glasses when performing invasive and body fluid procedures. Concerning the shaking of linen, the qualitative data equally supported the quantitative data.

**Table 3.** Respondents IPC compliance variables.

Variable		Frequency (n=268)	Percentage
I have always washed my hands before, and after a contact with patients.	Agree	265	98.9%
	Disagree	3	1.1%
	Not applicable	0	0.0%
When I am to perform an invasive and body fluid procedure, I put on a nose mask and glasses	Agree	156	58.2%
	Disagree	91	34.0%
	Not applicable	21	7.8%
In this hospital, the leaders monitor knowledge of infection prevention and control	Agree	151	56.3%
	Disagree	107	39.9%
	Not applicable	10	3.7%
We have access to IPC Guidelines/Training manuals in our unit	Agree	154	57.5%
	Disagree	105	39.2%
	Not applicable	9	3.4%
Our hospital has IPC committee in place to monitor IPC activities	Agree	137	51.1%
	Disagree	105	39.2%
	Not applicable	26	9.7%
Screening of patients are being done to detect colonization even if no evidence of infection	Agree	101	37.7%
	Disagree	154	57.5%
	Not applicable	13	4.9%
Vaccination is provided to staff	Agree	32	11.9%
	Disagree	213	79.5%
	Not applicable	23	8.6%
We wear PPE when handling linens	Agree	123	45.9%
	Disagree	126	47.0%
	Not applicable	19	7.1%
Linens are shaking out to release dust from the linen	Agree	21	7.8%
	Disagree	217	81.0%
	Not applicable	30	11.2%

## 4. Discussion

In this study, the knowledge level and practices of IPC were assessed among nurses in Tamale Regional Hospital.

The IPC compliance is influenced by knowledge of IPC components. For instance, hand hygiene, use of personal protective equipment, sterilization, disinfection, vaccination, active surveillance of suspected infections, outbreak investigation, and management [20]. Regarding the

knowledge level and practices of IPC, in the present study, most (94.0%) of the respondents knew that HAIs can be transmitted through medical equipment (syringes, needles, catheters, stethoscope, and thermometers). Moreover, about 65.3% of the respondents agreed to know standard hand hygiene practices. Moreover, about 65.3% of the respondents agreed to know standard hand hygiene practices. Similarly, in an earlier study by Alrubaiee *et al* [21] in Yemen, most of the participants (72.9%) possessed fair level of knowledge on hand hygiene practices with about 35.3% also possessing a good level of knowledge on personal protective equipment. Also, in that study, 67.1% had a poor level of knowledge concerning safe injection practices. In contrast, in Kenya, a previous study found low standard precaution practice including, hand hygiene [22].

In this study, about 90.3% of the respondents agreed they apply standard precautions to all patients regardless of their diagnosis, and 87.3% of them knew that all staff and patients are vulnerable to infections. With glove use, 89.6% of them knew that one cannot handle body fluids with bare hands if gloves are not available. Also, the majority (60.5%) of the respondents had high IPC knowledge, 25.8% had moderate IPC knowledge level, and 13.8% had low IPC knowledge level. In line with the present observations, in a previous study in Nigeria among nurses, showed that 66% of them showed good knowledge of IPC [23]. Also, a similar study in Ghana by Ocran *et al.* [24] in the Central Regional Hospital showed that about 88.7% of the healthcare workers were well-informed on HAIs. Conversely, an earlier cross-sectional study conducted by Geberemariam *et al.* [25] in Ethiopia found that about 53.7% of the participants were knowledgeable on IPCs.

With compliance with safety protocols, hand hygiene was practiced by the majority (98.9%) before and after patient contact. The present results corroborate with the findings of Russell *et al.* [26] study, where there was high adherence to numerous IPC practices, such as appropriate hand hygiene, before and after patient care activities (99.4%). However, another study by Geberemariam *et al.* [25] indicated that 69.4% (450) indicated that they regularly wash their hands after attending to a patient, 56.1% (364) before patient care, 64.2% (416) after removing gloves and 63.6% (412) before care of wounds. Appropriate hand washing before and after patient contact may reduce the risk of HAIs to about 6%, and about 14% risk reduction in *Clostridium difficile* infection [27].

In the current study, it was observed that about 58.2% of the respondents always put on a mask and glasses anytime they are performing an invasive or body fluid procedures. This observation is low when compared to a previous study by Russell *et al.* [26], in which 69.6% of the respondents adhered to IPC practices relating to wearing of goggles or eye shields when exposed to bodily fluids. However, another study found lower proportions of adherence to IPC standards when compared with the present results. In that study by Hayeh *et al.* [5], the total level of compliance with IPC guidelines was about 45.1%. Moreover, the authors found that about 58.2% of the hospital staff always put on a mask and glasses in their line of duty.

Meanwhile, low level of practices and adherence to IPC standards have been associated with the increasing rates of HAIs especially in developing countries such as Ethiopia [25]. The IPC practices are an important factor in the health care system and is implicated in key areas including epidemiology, infectious diseases, health system strengthening as well as social sciences. The IPC compliance may protect not only patients but the healthcare workers and the general public from the risk of contracting infections from the healthcare settings [28].

## 5. Conclusion

The majority (60.5%) of the participants in the study reported a high IPC knowledge. Also, the compliance level of IPC practices was high (77.6%). Nonetheless, we recommend that education on the standard practices of infection prevention and control at health facilities be intensified among health staff in Northern Regional Hospital, Ghana to improve

## Conflict of Interest

All the authors do not have any possible conflicts of interest.

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