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Iatyllilang Kharbangar
M.Sc. Nursing, College of
Nursing, NEIGRIHMS,
Shillong, Meghalaya, India

Nochovono Tase
Professor-cum-Principal,
College of Nursing,
NEIGRIHMS, Shillong,
Meghalaya, India

Jodibala Haobijam
Associate Professor cum HOD,
College of Nursing,
NEIGRIHMS, Shillong,
Meghalaya, India

Dr. Himesh Barman
Professor cum HOD,
Department of Pediatrics,
NEIGRIHMS, Shillong,
Meghalaya, India

Dr. Clarissa Jane Lyngdoh
Additional Professor,
Department of Microbiology,
NEIGRIHMS, Shillong,
Meghalaya, India

A cross-sectional study to assess the knowledge and practices regarding prevention of healthcare associated infections (HAIs) in pediatric care units among nursing personnel working in selected hospitals of Meghalaya

Iatyllilang Kharbangar, Nochovono Tase, Jodibala Haobijam, Dr. Himesh Barman and Dr. Clarissa Jane Lyngdoh

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Abstract
Healthcare Associated Infections (HAIs) are those infections that manifest among patients only after 48 hours of hospital stay. HAIs can lead to significant morbidity, mortality and economic burden. As these infections are acquired under health-care, they are preventable.

This study aims to assess the knowledge and practices regarding the prevention of HAIs among Nursing Personnel working in pediatric care units in selected Hospitals of Meghalaya.

A cross-sectional study was conducted using a structured self-administered questionnaire among Nursing Personnel working in selected Hospitals of Meghalaya.100 Nursing Personnel were selected by total census enumeration sampling.

The study reveals that 69% had average knowledge, 24% had poor knowledge, and only 7% had good knowledge regarding HAI prevention. In terms of practice, 46% demonstrated fair practices, 44% had poor practices, and only 10% exhibited good practices.

A significant association was found between knowledge and age ($p = 0.003$) as well as years of working experience ($p = < 0.001$). On further analysis, there was a significant association between practice and age ($p = 0.049$). Additionally, A weak positive correlation was observed between knowledge and practice ($r = 0.396$, $p = < 0.001$).

The study reveals that majority of the Nursing Personnel have average knowledge and practices concerning the prevention of HAIs in pediatric care units and only a few demonstrate a high level of knowledge and effective practices.

Keywords: Knowledge, practices, healthcare associated infections (HAIs), nursing personnel, pediatric care units

Introduction

Healthcare Associated Infections (HAIs) refer to those infections that manifest among patients only after 48 hours of hospital stay. The infections may manifest even after the patient had been discharge to home. Infections remain to be a leading cause of disease in most part of the world. The most common types of Healthcare Associated Infections (HAIs) are Bloodstream infections (BSI), Surgical site infections (SSI), Urinary tract infections (UTI), Healthcare associated Pneumonia, and Gastrointestinal infections. It is clear that HAIs lead to extended hospital stays, long-term disabilities, increased antimicrobial resistance among microorganisms, additional healthcare costs, and significant expenses for patients and their families [1, 2].

Above all, one of the Simplest and effective method to control infection is to ensure the application of standard precautions for decreasing exposure with infection agents [3]. The key components of Standard precautions are hand hygiene, effective use of personal protective equipments (PPEs), personal hygiene and cough etiquette, prevention of sharp related injuries, safe handling of equipments for patient care, aseptic principles and environmental infection control. As a cost-effective intervention, hand hygiene plays an important role in infection control. One of the major barrier in the implementation of infection control programs in health care settings is the lack to adherence to hand hygiene practices.

Corresponding Author:
Iatyllilang Kharbangar
M.Sc. Nursing, College of
Nursing, NEIGRIHMS,
Shillong, Meghalaya, India

It can prevent upto 50% of avoidable infections [2, 4, 5].

The frontline personnel for IPC are infection control nurses. Given that they interact directly and spend a greater amount of time with patients, nurses make up the bulk of healthcare workers and are regarded as the foundation of the healthcare delivery system. Nurses not only care for patients and prevent illnesses associated with healthcare, but they are also essential in anti-microbial stewardship, patient education, and hand hygiene [2].

Need of the study

Hundreds of millions of people worldwide suffer from health care-associated illnesses (HAIs) each year, many of which are entirely preventable. No nation or healthcare system, no matter how advanced or developed, can declare itself immune to healthcare-associated infections (HAIs). In acute care hospitals, 7 patients in high-income nations and 15 in low- and middle-income countries (LMIC) will get at least one HAI per 100 patients. HAI kills 1 out of every 10 afflicted patients [5].

Healthcare-associated infections (HAIs) are the primary cause of mortality among illnesses. Because of their age ranges, newborns are more prone to infections [6, 2].

In hospital-born infants, HAI is estimated to account for 4%-56% of all neonatal period deaths. Neonatal infection rates in LMICS are 3-10 times higher than in HICS. The incidence of health-care associated sepsis in neonates is 7.5 times higher than in adults (WHO {IPC} 7 March 2022) [7].

Objectives
1. To assess the knowledge regarding prevention of Healthcare Associated Infections (HAIs) among Nursing Personnel in selected Hospitals of Meghalaya.
2. To assess the Practices regarding prevention of Healthcare Associated Infections (HAIs) among Nursing Personnel in selected Hospitals of Meghalaya.
3. To find the association between knowledge of Nursing Personnel regarding prevention of Healthcare Associated Infections (HAIs) with selected demographic variables.

Materials and methods
Study setting: The study was conducted in two different; Ganesh Das Government Maternal and Child Hospital and NEIGRIHMS Hospital Shillong, Meghalaya.

Study population: The study was conducted among Nursing Personnel working in pediatric care units in Ganesh Das Government Maternal and Child Hospital and NEIGRIHMS Hospital Shillong, Meghalaya.

Sampling technique and sample size: A total census enumeration method was employed. All Nursing Personnel fulfilling the inclusion and exclusion criteria and working in the pediatric care units of the chosen hospitals were included in the research sample. The sample size was calculated using the "Prevalence estimation" formula [N= $Z^2 p(1-p)/d^2$] for the study. A total sample of 100 Nursing Personnel who met the inclusion criteria were selected for

the study.

Criteria for sample selection
Inclusion criteria
- Nursing personnel working in pediatric care unit.
- Nursing personnel who are willing to participate in the study.

Exclusion Criteria
- Nursing personnel who are not present at the time of data collection
- Student nurses.

Study instrument: A Structured questionnaire was developed by the researcher. The questionnaire was validated by experts from nursing and medical field.

Scoring interpretation
The interpretation for knowledge.

Score	Interpretation
≤12 (≤50%)	Poor Knowledge
13-18 (51%-75%)	Average Knowledge
>18 (>75%)	Good Knowledge

The interpretation for practices.

Score	Interpretation
≤12 (≤50%)	Poor Practice
13-18 (51%-75%)	Average Practice
>18 (>75%)	Good Practice

Method of data collection: Upon obtaining the official administrative consent from the Directorate of Health Services and the Medical Superintendent of the involved hospital, the final research was conducted from 15th January to 10th February, 2024 among the Nursing Personnel working in Pediatric care Units in the selected Hospitals: Ganesh Das Government Maternal and Child Hospital and NEIGRIHMS Hospital, Shillong, Meghalaya. A total of 100 Nursing Personnel working in Pediatric Care Units who fulfils the inclusion criteria were selected for the study. Written informed consent was obtained. The data was collected by a self-administered questionnaire. By adhering to a uniform protocol for data collecting, standardization was preserved. At every stage of the study period and beyond, participant confidentiality was guaranteed.

On completion of the data collection, an information booklet on Healthcare Associated Infections (HAIs) were then distributed to the Nursing personnel.

Statistical analysis: Analysis of the data was done on the basis of the objectives of the study using Descriptive Statics (Frequency, percentage, mean and standard deviation) and Inferential Statistics (Chi square test and Correlation Coefficient) using Statistical Package for Social Sciences (SPSS), Version 21.

Results

Table 1: Frequency and percentage distribution of Nursing Personnel according to their demographic characteristics. N=100

Demographic variables		Frequency (f)	Percentage (%)
Age (in years)	22-27	25	25
	28-32	45	45
	33-39	22	22
	>40	08	08
Gender	Male	22	22
	Female	78	78
Educational Qualifications	GNM	58	58
	B.Sc Nursing	30	30
	Post Basic B.Sc Nursing	12	12
Years of working experience	1-5	45	45
	6-10	33	33
	>10	22	22
Exposure to infection control programme	Yes	62	62
	No	38	38

The findings in table 1 shows the distribution of Nursing Personnel according to socio-demographic variables, out of 100 Nursing Personnel, 45(45%) are within the age group of 28-32 years. Majority78 (78%) Nursing Personnel are female. With regard to educational qualifications, majority of the nursing personnel have completed General Nursing and Midwifery (GNM) 58(58%). 45(45%) of Nursing Personnel had 1-5 years of working experience and 62(62%) had exposure to infection control programme.

Table 2: Distribution of Nursing Personnel according to level of knowledge regarding prevention of Healthcare Associates Infections (HAIs). N=100

Level of knowledge	Range of score	Frequency (f)	Percentage (%)	Mean	Standard deviation
Poor	≤12 (≤50%)	24	24.0		
Average	13-18 (51%-75%)	69	69.0	14.80	2.92
Good	>18 (>75%)	7	7.0		

Table 2 shows that majority 69 (69%) of the Nursing Personnel, had average knowledge, 24 (24%) had poor knowledge and only 7(7%) had good knowledge regarding prevention of Healthcare Associated Infections (HAIs) with the Mean and Standard Deviation of 14.80±2.92 respectively.

Table 3: Distribution of Nursing Personnel according to level of practices regarding prevention of Healthcare Associates Infections (HAIs). N=100

Level of practice	Range of score	Frequency (f)	Percentage (%)	Mean	Standard deviation
Poor	≤10 (≤50%)	44	44.0		
Fair	11-15(51-75%)	46	46.0	11.36	3.02
Good	>15(> 75%)	10	10.0		

Table 3 show that 46(46%) of the participants had fair practice, 44(44.0%) had poor practice and only 10(10%) had good practice regarding the prevention of Healthcare Associated Infections (HAIs) with the Mean and Standard Deviation of 11.36±3.02 respectively.

Table 4: Association between Knowledge regarding prevention of Healthcare Associated Infections (HAIs) with selected demographic variables. N=100

Demographic Variables of The Nursing Personnel		Level of Knowledge						P-Value
		Good >18 (>75%)		Average 13-18 (51%-75%)		Poor ≤12 (≤50%)		
		(f)	(%)	(f)	(%)	(f)	(%)	
Age (in years)	22-27	00	0	12	12	13	13	0.003*
	28-32	05	5	36	36	04	04	
	33-39	05	5	16	16	01	01	
	>40	01	1	05	05	02	02	
Gender	Male	02	2	16	16	04	04	0.730
	Female	05	5	53	53	20	20	
Educational Qualification	GNM	03	3	40	40	15	15	0.910
	B.Sc. Nursing	03	3	21	21	06	06	
	Post Basic B.Sc. Nursing	01	1	08	08	03	03	

*P value ≤ 0.05 level of significance

The findings in the table 4, shows that there is no association between Knowledge regarding prevention of Healthcare Associated Infections (HAIs) with gender, educational qualifications and exposure to any infection control programme of the Nursing Personnel, whereas there is an association between Knowledge with age (p value, 0.003) and years of working experience (p value, <0.001) which is less than 0.05 level of significance. Hence it can be

concluded that the Knowledge of the Nursing Personnel is dependent on age and years of working experience of the nursing personnel.

Table 4: Association between Knowledge regarding prevention of Healthcare Associated Infections (HAIs) with selected demographic variables. N=100

Demographic Variables of the Nursing Personnel		Level of Knowledge						P-Value
		Good >18 (>75%)		Average 13-18(51%-75%)		Poor ≤12 (≤50%)		
		(f)	(%)	(f)	(%)	(f)	(%)	
Age (in years)	22-27	00	0.0	12	12.0	13	13.0	0.003*
	28-32	05	5.0	36	36.0	04	04.0	
	33-39	05	5.0	16	16.0	01	01.0	
	>40	01	1.0	05	05.0	02	02.0	
Gender	Male	02	2.0	16	16.0	04	04.0	0.730
	Female	05	5.0	53	53.0	20	20.0	
Educational Qualifications	GNM	03	3.0	40	40.0	15	15.0	0.910
	B.Sc. Nursing	03	3.0	21	21.0	06	06.0	
	Post Basic B.Sc. Nursing	01	1.0	08	08.0	03	03.0	
Years of working experience	1-5	02	2.0	24	24.0	19	19.0	<0.001*
	6-10	01	1.0	32	32.0	00	00.0	
	>10	04	4.0	13	13.0	05	05.0	
Exposure to infection control programme	Yes	03	3.0	46	46.0	13	13.0	0.309
	No	04	4.0	23	23.0	11	11.0	

*P value ≤ 0.05 level of significance

The findings in the table 4, shows that there is no association between Knowledge regarding prevention of Healthcare Associated Infections (HAIs) with gender, educational qualifications and exposure to any infection control programme of the Nursing Personnel, whereas there is an association between Knowledge with age (p value, 0.003) and years of working experience (p value, <0.001) which is less than 0.05 level of significance. Hence it can be concluded that the Knowledge of the Nursing Personnel is dependent on age and years of working experience of the nursing personnel.

Table 5: Association between practices regarding prevention of Healthcare Associated Infections (HAIs) with selected demographic variables. N=100

Demographic Variables of the Nursing Personnel		Level Ofpractices						P-Value
		Good >15 (> 75%)		Fair 11-15 (51- 75%)		Poor >15 (> 75%)		
		(f)	(%)	(f)	(%)	(f)	(%)	
Age (in years)	22-27	01	1	08	08	16	16	0.049*
	28-32	04	4	21	21	20	20	
	33-39	04	4	10	10	08	08	
	>40	01	1	07	07	00	00	
Gender	Male	02	2	08	08	12	12	0.521
	Female	08	8	38	38	32	32	
Educational Qualifications	GNM	05	5	26	26	27	27	0.894
	B.Sc. Nursing	03	3	14	14	13	13	
	Post Basic B.Sc. Nursing	02	2	06	06	04	04	
Years of working experience	1-5	02	2	19	19	24	24	0.053
	6-10	04	4	13	13	16	16	
	>10	04	4	14	14	04	04	
Exposure to infection control programme	Yes	06	6	30	30	26	26	0.828
	No	04	4	16	16	18	18	

*P value ≤ 0.05 level of significance

The findings in the table 5, shows that there is no association between practices regarding prevention of Healthcare Associated Infections (HAIs) with gender, educational qualifications, years of working experience and exposure to any infection control programme of the Nursing Personnel, whereas there is an association between practice with age (p value, 0.049) which is less than 0.05 level of significance.

Table 6: Correlation between knowledge and practices of Nursing Personnel regarding prevention of Healthcare Associated Infections (HAIs), N=100

Variables	Pearson's correlation coefficient (r)	P- Value
Knowledge	0.396	*<0.001
Practice		

*p- value ≤0.05 level of significance

Findings in table 6: The Pearson's Correlation coefficient test reveals that there is a weak positive correlation between knowledge and practice of Nursing Personnel regarding prevention of Healthcare Associated Infections (HAIs) as the r= 0.396 and as the P-value is <0.001 therefore it is statistically significant.

Discussion
In the present study majority of the Nursing Personnel 45 (45%) belong to the age group of 28-32 years, 78 (78%) are females and 22(22%) are males, 58(58%) have completed their GNM training, 45(45%) have 1-5 years of working experience and 62(62%) have been exposed to infection control program. Similarly, Jayashree Das, *et al*. (2022) reported that majority 80% of the staff nurses were females and 20% were males [8]. The findings is similar to another study conducted by Moses O, (2017) 48.9% are in the age group of 21-29, 65.9% were females while 34.1% were male, 48.9%, have completed their diploma in nursing and majority 58% had a working experience of 1-5 years [9].

With reference to knowledge, majority 69 (69%) of the Nursing Personnel, had average knowledge, 24 (24%) had poor knowledge and only 7(7%) had good knowledge regarding prevention of Healthcare Associated Infections (HAIs). This finding is supported by a study conducted by Alrubaiee G *et al*. (2017) reported that majority (87%) had a fair level of knowledge, and only 4% had a good level of knowledge respectively [10].

With regard to practice, 46(46%) of the participants had fair practice, 44(44.0%) had poor practice and only 10(10%) had good practice regarding the prevention of Healthcare Associated Infections (HAIs). Similarly a study by Gupta *et al*., (2020) reported that 57% had average practice and more than 30% of nurses followed inadequate practices regarding infection prevention [11].

The findings in the present study shows that there is a significant association between knowledge on prevention of Healthcare Associated Infections with selected demographic variables (age and years of working experience) at ≤0.05 level of significance. Kanwalpreet Sodhi, *et al*. (2022) found that there was a significant association between knowledge and years of working experience [12].

In the present study, there is a significant association between the practices regarding the prevention of Healthcare Associated Infections (HAIs) with the age group of the Nursing Personnel at ≤0.05 level of significance. However, in a study conducted by Tesfahun Zemene Tefere, *et al*. (2023) it was found that there was a significant an association between the practice of nurses with the years of working experience and status of training on infection prevention [13].

In the present study, there is a weak positive correlation between the Knowledge and Practices of the Nursing Personnel regarding the prevention of Healthcare Associated Infections (HAIs) at ≤0.05 level of significance, which was supported by a study carried out by Alwaday MM, *et al*. (2018), where it was found that there is a positive relationship between the knowledge and practice score using the Pearson correlation coefficient [14].

Conclusion
The study shows that majority of the Nursing Personnel had average knowledge and practices, however, only a small number of Nursing Personnel have good knowledge and practices regarding the prevention of Healthcare Associated Infections (HAIs) in pediatric care units. In addition more than 30% of the Nursing Personnel had poor practices. Therefore there is a crucial need to address the inadequacy in Knowledge and Practices as nurses are the frontline workers and play vital role health care delivery.

Conflict of interest
Not available.

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