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Nurses' Knowledge Regarding Prevention of Nosocomial Infections at a Specialized Hospital, Dhaka

Manira Parvin[1*]; Kamrun Naher[2]; Maksuda Akter Suma[3]; Megali Rema[4]; Nasrin Khatun[5]; Sohana Pervin[6]; Chayanika[7]; Yasmin Parvin[8]; Hasna Hena[9]; Farida Yeasmin[10]; Md. Jewel Rana[11]; Robina Sultana[12]; Khadiza Sikder[13]

[1,3,6,7,8]RN, BSPHN; [2,4,5,9,10,11]RN, BSN; [12]RN, MSN; [13]RN, MPH
[1,2,3,4,5,6,7,8,9,10,11]2nd Year Students of B.Sc. in Nursing and B.Sc. in Public Health Nursing (Post Basic); Session:2021-2022; College of Nursing, Mohakhali, Dhaka-1212
[12,13]Guides and Faculty of College of Nursing, Mohakhali, Dhaka-1212

Corresponding Author: Manira Parvin[1*]
moniraparvin1404@gmail.com

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Abstract:

- ***Background:***
  Nosocomial infection has become the burning issue of the day and it poses serious risk to health security. It has bad impact on health about 1.7 million people (Faizi, 2020). Knowledgeable nursing staff plays a major role in prevention of nosocomial infections.

- ***Aim:***
  The aim of this study was to assess the level of nurses' knowledge regarding prevention of nosocomial infections.

- ***Methods:***
  A descriptive type of cross-sectional study was conducted with a sample of 50 those were conveniently selected from National Institute of Disease of the Chest and Hospital (NIDCH), Dhaka, Bangladesh. Data were collected by the researchers using self-administered questionnaire with a set of 20 knowledge related questions. Data were analyzed by descriptive statistics (frequencies, percentages, mean) by using master sheet and scientific calculators.

- ***Results:***
  Majority of the nurses were female with mean the age of 33 and the range of age was 26-53 years. The result of this study showed that 42% respondents had good level of knowledge, 20% had average level of knowledge, and rest of 6% respondents had poor level of knowledge on prevention of nosocomial infections. This present study also showed that higher professional qualification influenced the higher level of respondents' knowledge on prevention of nosocomial infections.

- ***Conclusion:***
  This study found that nearly half of the respondents had good level of knowledge regarding prevention of nosocomial infections.

- ***Recommendation:***
  Provide educational training regarding prevention and control of nosocomial infections.

Keyword: *Nurse, Knowledge, Nosocomial Infections, Dhaka.*

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I. INTRODUCTION

A. Background and Significance of the Study

Nosocomial Infections considered as a major global issue today that has a bad impact on health about 1.7 million people [5]. It is also known as hospital acquired infection that affect previously uninfected patient within the first 48 hours of hospitalization, first three days of discharge or 30 days of a surgical procedure [2]. Nosocomial infections are a major source of increasing morbidity, mortality and costs in hospital settings. This infection can be developed in hospital, nursing home, rehabilitation facility, outpatient clinic, diagnostic laboratory or other health care setting common in developing countries [4]. The prevalence rate of nosocomial infections 5% in America and some part of Europe and 40% in Asian country. The incidence rate of nosocomial infections as most studies reporting data ranged from 3.6 to 12% in high-income countries and 5.7 to 19.1% in low and middle-income countries [21].

The highest frequencies of nosocomial infections were reported from hospitals in the Eastern Mediterranean and South-East Asia Regions (11.8 and 10.0%. respectively), with a prevalence of 7.7 and 9.0% respectively in the European and Western Pacific Regions." Annually, this results in 5000 deaths with a cost to the national health services. In adult and pediatric ICU types, the pooled rates of Blood Stream Infection (BSI) ranged between 5.3-7.3 per 1000 patient days and Central Line Associated Bloodstream Infection (CLABSI) rate ranged between 8.3-12.1 per 1000 central line day respectively in India [12]. In Bangladesh, 5% of patients hospitalized for>72h acquired nosocomial infection and have estimated overall rates of nosocomial infections ranging from 8 to 30% [9].

The causative organism may be bacterial, viral, fungal, parasitic which is transmitted by direct or indirect contact, droplet, airborne, vector borne etc. The name of common microorganisms is Staphylococcus aureus, Escherichia coli, Candida albicans and Pseudomonas species [12; 14]. Usually highest rate found in ICU, neonatal unit, burn unit, operation theater and medical-surgical ward. The various complications are Respiratory tract infection e. g- Ventilator Associated Pneumonia (VAP), urinary tract, surgical site, gastro-intestinal tract and blood stream infection, antibiotic resistance etc. This is particularly vulnerable who are immune compromised, children, the elder, after chemotherapy, radiotherapy, and burn [13;18].

A global threat and bad impacts occur on health, family, economy, society and country by increasing use of antibiotic, decreasing immunity, generating treatment cost and burden [19]. Nosocomial Infections which are preventable by maintaining hand-hygiene, wearing protective equipment like facemask and gloves, changing urinary catheters, isolation, sterilization, proper sanitation and hospital waste management, and prescribing antibiotics only when needed. Adequate attention, update knowledge and skills of nurses play an important role to prevent nosocomial infections. Ensure necessary training for nurses to introduce about nosocomial infections, effect, control and prevention also needed. World Health Organization (WHO) works for a safe and hygienic environment for prevention of nosocomial infection [3].

B. Justification

Nosocomial infections are acquired during the process of receiving care which was not present during the time of hospitalization [3]. Now a day's nosocomial infections are a major challenge for all health care system especially those who suffer with severe illness and immunosuppressant. For this reason, increase complications, length of hospitalization, and mortality as well as increase financial costs [13]. Nurses spend more time with patients in hospital and act as a front-line-worker. They conduct a vital role for the assessment, care, management, prevention from complications and effective health education to the patient with nosocomial infection in health care setting. There is at high risk of transmitting nosocomial infections from nurses to patients while delivering nursing care. It is very important for all nurses to have enough knowledge and preventive measures about nosocomial infections, to bring a positive impact upon health of every patient in hospital [5].

National Institute of Diseases of the Chest and Hospital (NIDCH) is the specialized hospital for the chest diseases in Bangladesh especially respiratory diseases. Patients come from whole country in this hospital for better management and treatment. These kinds of diseases are prone risk to spread nosocomial infection by coughing and sneezing. There is no sufficient research on the identification of nurses' knowledge regarding prevention of nosocomial infections. This is important to identify that factor in knowledge of nurses in NIDCH. The result of this study may beneficial for further prevention of nosocomial infections. For that reason, researcher wants to assess the level of nurses' knowledge regarding prevention of nosocomial infections at NIDCH, Dhaka.

C. Research Question

What is the level of nurses' knowledge regarding prevention of nosocomial infections at a Specialized Hospital, Dhaka?

D. Research Aim

To assess the level of nurses' knowledge regarding prevention of nosocomial infections at a Specialized Hospital, Dhaka.

E. Research Objectives

- To assess the level of nurses' knowledge regarding concept of nosocomial infections.

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- To assess the level of nurses' knowledge regarding management of nosocomial infections.
- To determine the level of nurses' knowledge about preventive measures of nosocomial infections.
- To identify the level of nurses' knowledge regarding impact of nosocomial infections.
- To state the socio-demographic characteristics of the respondents.

F. Research Variables:

➢ *Socio Demographic Variables.*
➢ *Knowledge Related Variables.*

➢ *Socio-Demographic Variables are:*

- Age
- Gender
- Marital status.
- Religion.
- Professional qualification.
- Length of government service.
- Duration of service experience in the current place.
- Special training on infection control.

➢ *Knowledge Related Variables Are:*

- Concept of nosocomial infections includes meaning, types, mode of transmission, etiology and risk factors, clinical features.
- Management of nosocomial infections.
- Preventive measures of nosocomial infections.
- Impact of nosocomial infections.

G. Operational Definition of the Key Variables

➢ *Nurse:*

Nurse refers to a person who have licensed as a Senior Staff Nurse and working in medical and surgical wards in National Institute of Disease of the Chest and Hospital, Dhaka and playing a vital role in prevention of nosocomial infection in health care settings.

➢ *Knowledge of Nosocomial Infection:*

Knowledge refers to the cognitive understanding of nurses regarding concept that includes (meaning, types, mode of transmission, etiology and risk factors, clinical features), management, preventive measures and impact of nosocomial infections. This knowledge was measured by a self-constructed, knowledge related structured questionnaire.

II. LITERATURE REVIEWS

Review of literature is a key step in research process. This chapter reviewed the literature which relevant to the present study and related information to get insight in to the assessment of the level of nurses' knowledge regarding prevention of nosocomial infections. This chapter include the over view of nosocomial infections, factors influencing nosocomial infections and level of knowledge regarding nosocomial infections as describe below;

A. Over View of Nosocomial Infections

The term "Nosocomial Infections" means hospital acquired and occurs within 48 hours or < 72 hour after hospitalization or, first three days of discharge or, 30 days of a surgical procedure [2;14]. There are four types of nosocomial infections. Urinary tract is most common among them. Other types are Central Line Associated Bloodstream Infection (CLABSI), Surgical Site Infection (SSI) and Ventilator Associated Pneumonia (VAP) [19].

The mode of transmission of nosocomial infections are; a. Direct/ indirect contact, b. Droplet infections, c. Air borne, d. Vector borne etc. The responsible reservoir is patient [19]. The most common source of spread of these infections is through the contaminated hands and fingers of the health care givers: doctors, nurses and other staffs [1;2]. The causative agent may be bacterial, viral, fungal, parasitic. The common micro-organisms for nosocomial infections are E. coli, S. Aureus, Klebsiella species, Coagulase- negative Staphylococcus, Candida albicans and Pseudomonas species [4;14;15].

The higher risk factors of nosocomial infections are immunocompromised patients, longer stay in hospital and malnutrition [4,18]. The following age groups of people are most susceptible to nosocomial infections are newborn and child, the elderly, patients during or after chemotherapy, radiotherapy and burns [13].

Sign and symptoms of Central line associated blood stream infections are fever, septicemia, inflammation, lymphangitis, or purulent discharge. Catheter associated urinary tract infections sign and symptoms are- dysuria, urine retention, hematuria. Surgical site infection signs and symptoms are pus and bed smell, purulent discharge abscess cellulitis and sign and symptoms of Ventilator associated pneumonia are purulent sputum, cough [6; 7].

Antibiotic Meropenem, Amikacin, Amoxicillin, Ciprofloxacin, Gentamycin is used to treat severe nosocomial infections [13;19]. Nurses must strictly follow the rules to improve their awareness and professional knowledge and practice and strictly follow the hand washing rules. Strengthen the cleaning management and disinfections. Strictly control the indoor temperature, humidity, and ventilation to reduce the causes of infections in wards. Infection control program should be taken to control nosocomial infections [6].

Nurses and other health care professionals can prevent nosocomial infections in their practice. It needs to focus on five key interventions: hospital environment hygiene, hand hygiene, use of personal protective equipment, safe use and disposal of sharps, and use of the principles of asepsis where appropriate [4]. Hand washing is effective measure to prevent nosocomial infections, proper sterilization of instrument, proper care of urinary catheter and isolation of highly contagious patients regarded as effective preventive measures

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to reduce nosocomial infection [10]. The role of an infection control nurse in preventing nosocomial infections is educating staff regarding infection prevention [16]. The most important general impact of nosocomial infection is longer hospital stays as well as financial costs [1;2]. These infections can lead to serious problems like sepsis and even death [8].

B. Factors Influencing Nosocomial Infections

- ***Age:*** There was significant association between age and nurses' knowledge on nosocomial infections prevention. The level of nurses' knowledge on nosocomial infection prevention increases with increasing age [22–24] whereas older age was associated with lower odds of being knowledgeable about nosocomial infections prevention compared to those of younger age [7;16]
- ***Professional Qualification:*** Level of knowledge was lower who completed Diploma in Nursing than those who completed B.Sc. in nursing; the level of knowledge was even higher who completed M.Sc. in nursing/MPH was statistically significant [11;16]
- ***Length of Govt. Service:*** The proportion of nurses with good knowledge increased with the duration of service experience which was statistically significant [1;2]
- ***Special Training on Infection Control:*** Respondents who underwent more training programs have good knowledge regarding healthcare associated infections [11;16].

C. Nurses' Knowledge Regarding Nosocomial Infections

In 2023, a descriptive type of cross- sectional study design was used to assess the nurses' knowledge regarding nosocomial infection at 250 bedded Mohammad Ali Hospital, Bogura, Bangladesh. 120 sample was selected by purposive sampling technique those who working in medical and surgical unit, Gynae and Labor ward. Majority of them were completed Diploma in Nursing. The semi structured questionnaire and a self-report method which composed of demographic variables and knowledge-based information on nosocomial infection. The finding of the study revealed that 40% nurses had a moderate level of knowledge in nosocomial infection. Among the all respondents, only 48% were received special training whereas 52% were not received any special training among the respondent [14].

In 2022, another descriptive cross sectional study design was used to evaluate the level of nurses' knowledge about prevention and control of nosocomial infection at Medical Teaching Hospitals, in Al-Najaf Al-Ashraf. A non-probability convenient sampling technique was selected to collect data. The sample size was 494 nursers, working at different wards. Among them 200 nurses were from Al-Sadder Teaching Hospital,152 nurses were from Al Furat Teaching Hospital and 14 Nurses were form Al Zahra at Teaching Hospital. In this study, majority 54.3% were female and their age ranging between 25-29 years (34.6%) and highest proportion of nurses work in Al-Sadder Teaching Hospital (40.5%). Result showed that the 61.34%nurses have moderate level knowledge, 30.36% have a good knowledge and 8.3%have poor knowledge regarding the prevention of nosocomial infection. The study suggested that nurses should receive more training in infection control methods [1;2].

In 2022, moreover, a facility-based cross-sectional study was conducted to assess knowledge toward hospital acquired infections prevention among nurses working at university referral hospitals in Southern Nations, Nationalities, and Peoples' Region, Ethiopia from 01 to 30 April 2021. The calculated sample size was 423 among them the response rate was 398. A simple random sampling technique was used to select study respondents in each working unit at a university referral hospital. Data were collected by self-administered questionnaire. Data were analyzed by using Epi-data version 4.6 software and then finally exported to SPSS version 25. The study revealed that, 45.5% of nurses had adequate knowledge whereas 54.5% of nurses had inadequate knowledge of HAI prevention. The gender, educational status, work experience, training on infection prevention were all significant factors associated with nurses' having good knowledge of HAI prevention [16].

In 2021, a descriptive study was used to assess the nurses' knowledge regarding nosocomial infections in different tertiary care hospitals in the federal capital, Islamabad and provincial capital, Lahore. The 80 respondents were selected using convenience sampling method and they working in different unit including ICU, anesthesiology unit, medical and surgical units, emergency room and operation theatre. A closed-ended questionnaire was used to interview the nurses. The study finding showed that 5 nurses out of 80 (6.25%) were found to have poor, 47 (59%) nurses had average knowledge and 28 (35%) nurses had excellent knowledge about the HAIs. Moreover, the nurses who underwent more training programs had good knowledge regarding healthcare associated infections. Researchers recommended that to keep this knowledge up to date, there is a need for the continuous education in the discipline of infection control for nurses and other healthcare workers [11].

In 2021, a descriptive cross-sectional study conducted from 13th November to 31st December, 2019 to assess the knowledge of nurses about nosocomial infection control in Governmental Hospital at Mukalla City, Hadhramount, Yemen. The sample size was selected 124 by convenience sampling technique. The data was collected by structured self-administered questionnaire. The study revealed the majority of nurses (54.3%) in knowledge at a good level regarding nosocomial infection prevention. The study recommended training course was necessary to increase nurses' knowledge toward nosocomial infection and should be regularly done and updated in view of changing knowledge, provide in services programs, promote supervision on health workers, reduce workload [1;2].

In 2020, a cross sectional descriptive study was conducted to assess the knowledge on prevention of nosocomial infections among nurses working in the private hospitals of Kabul city, Afghanistan. The sample size was 117 nurses from Emergency (34), surgery (30), internal (27) and obstetric (26) in private hospitals of city, Ferdows, Watan, Mawla Ali, Atiqullamarkhil, Derman and Millat in Kabul City, Afghanistan. Data was collected by using a structured self-administered questionnaire. The study findings showed that the level of the respondents' knowledge

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was weak (22.2%), intermediate (70.9%) and good (6.8%.). The outcomes of the statistics showed that the level of nurses' knowledge about prevention of nosocomial infections was mediocre (70.9%). Researchers recommended training course was necessary to increase nurses' knowledge and training course should be regularly done and updated in view of changing knowledge and practice towards prevention of nosocomial infection [5].

In 2019, another cross sectional descriptive study was used to assess a nurses' knowledge of infection control measure within tertiary care hospital in Saudi Arabia. The sample size was 60, convenient sampling technique was used to select sample working in medical and surgical units. The result of this study revealed that the majority of nurses (60%) had good knowledge and 40% had fair knowledge in infection prevention [15].

In 2018, a descriptive study was conducted about the knowledge on infection prevention among nurses in Bir hospital, Kathmandu. The sample size was the 100.Probability systematic sampling technique was used to select sample and semi-structured self-administered questionnaire and observation checklist was used for data collection. This study showed that 57.1% of respondents had adequate knowledge while 42.9% of respondents had inadequate knowledge with the mean score of 27.75 [17].

III. METHODS AND MATERIALS

This chapter describes the methodology used in the study. This study consists of brief description of study design, study period, study setting, study population, sample size, sampling technique, sample selection criteria, research instruments, validity, reliability, ethical consideration, data collection procedure, data processing and analysis, data presentation and interpretation, and grading criteria.

A. Study Design:

A descriptive type of cross-sectional study design was conducted with the aim of assessing the level of nurses' knowledge regarding prevention of nosocomial infections.

B. Study Period:

Duration of the study was from July 2023 to June 2024.

C. Study Setting:

The study was conducted at the "National Institute of Diseases of the Chest and Hospital", Mohakhali, Dhaka, Bangladesh. This is 670 bedded specialized hospital where all kinds of chest diseases patient are admitted throughout the country for better treatment facilities. The total number of nurses in this hospital are 500. In this hospital 7(seven) medical and 5(five) surgical wards where 200 nurses are working for providing medical and surgical care to the patients.

D. Study Population:

All nurses who were working in the "National Institute of Diseases of the Chest and Hospital" at Medicine and Surgery ward considered as the study population. Total number of populations was 200.

E. Sample Size:

The sample size of the study was 50 (fifty) according to 25% proportional estimation from the number of population (N= 200) [20].

F. Sampling Technique:

Convenient sampling technique was followed to select the required sample who were met the inclusion criteria.

G. Sample Selection Criteria:

➢ *Inclusion Criteria*

- Nurses who were available on duty during data collection
- Nurses who were voluntarily agreed to participate in the study.

➢ *Research Instrument:*

A structured questionnaire was developed by the researchers on the basis of study objectives and variables after reviewing the relevant literatures. The questionnaire was consisted of two parts; **Part-A**. was covered with socio-demographic information (age, gender, religion, marital status, professional qualification, length of Government Services, duration of service experience at current workplace, special training on infection control) and **Part-B.** was covered with knowledge related questions. There were 20 knowledge-based questions and each question had 4 (Four) options with single correct answer and 5 (Five) marks was allocated for each correct answer and no marks was for the incorrect answer. Thus, the total marks for 20 questions were (20x5) =100. There were 13 questions regarding concept of nosocomial infection includes (meaning-2 items, types-2 items, mode of transmission-5 items, etiology and risk factors-2 items, clinical features-2 items), 2 questions from management, 3 questions from preventive measures and 2 questions from impact of nosocomial infections.

- *Validity:*

The validity of the questionnaire was assessed and reviewed by the three (3) experts (guide teacher and subject teacher) from College of Nursing, Mohakhali, Dhaka. Then the researchers modified the instruments based on experts' opinions.

- *Reliability:*

The reliability of the questionnaire was tested through pretesting with 10 nurses of same characteristics from selected medical and surgical ward of National Institute of Cancer Research and Hospital (NICRH), Dhaka. The questionnaire was tested for the purpose of checking reliability, acceptability of the questionnaire and making necessary correction and omission on the basis of pre-testing findings. Then, it was finalized for data collection.

- *Ethical Consideration:*

Approval was obtained from principal, College of Nursing, Mohakhali, Dhaka and written permission was taken

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from the authority of National Institute of Disease of the Chest and Hospital, Dhaka. **Memo no. P.F. /CN /208/1(4) and NIDCH/ACA/2024/150/1(7)**. Informed consent was obtained prior to the interview from study respondents after describing the objectives of the study to encourage them for voluntary participation. Confidentiality and anonymity of the respondents was strictly maintained. Respondents was assured that there was no any harm to participate in this study and they could refuse and withdraw them from the study at any time without any penalty.

- *Data Collection Procedure:*

The researchers were collected data by structured and self-administered questionnaire. Before data collection the researchers explained the objective of the study to the respondents and written consent was obtained from them. The respondents made answer of all questions and returned after completing it. The researcher thanked to the respondents for spending time to participate in this study.

- *Data Processing and Analysis:*

The collected data was checked, organized, coded, and analyzed manually. According to the objective of the study, the data was analyzed by using descriptive statistics like frequency, percentage and mean with the help of scientific calculator. The important variables were considered and analyzed to fulfill the objectives of the study.

- *Data Interpretation and Presentation:*

The results were presented by using tables, bar chart and pie chart with interpretation.

- *Grading Criteria*

To assess the level of nurses' knowledge regarding nosocomial infections, 20 structured questions was prepared which was contain 100 marks. The marks were categorized into following level-

Table 1: Grading Criteria

Sl. No	Knowledge Level (Grade)	Percentage (%)
1	Excellent	90-100
2	Very good	80-89
3	Good	70-79
4	Average	60-69
5	Poor	<60

IV. RESULTS

This chapter provides description of the results with appropriate interpretation according to objectives of this study. The results of the variables were provided according to objectives of the sample frequency, percentage, mean in tables and charts.

A. Part- A. Socio-Demographic Information

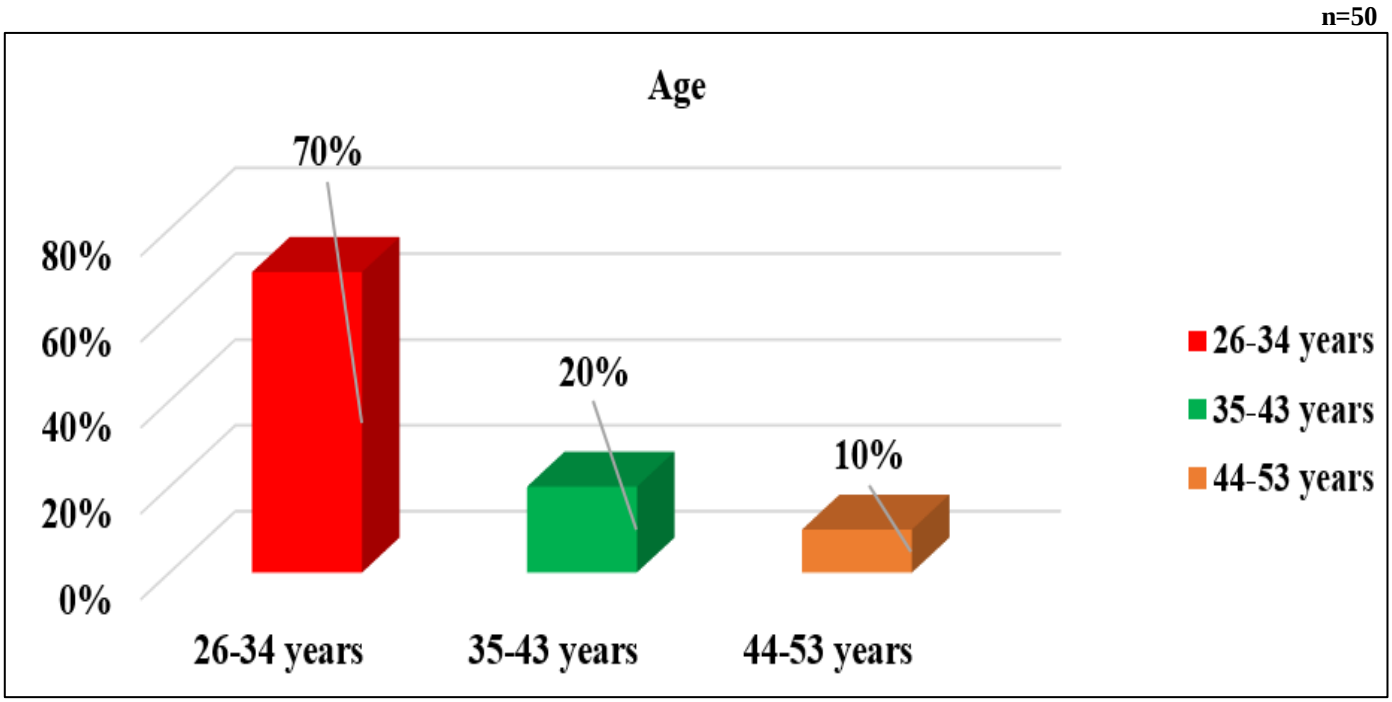

Fig 1: Distribution of Respondents by Age Group

- **Description: Figure 1**. The bar chart shows that 70% respondents were within the range of 26-34 years, 20% in between 35-43 years, and 10% respondents within 44-53 years of age respectively. The Mean age of respondents was 33 years.

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n=50

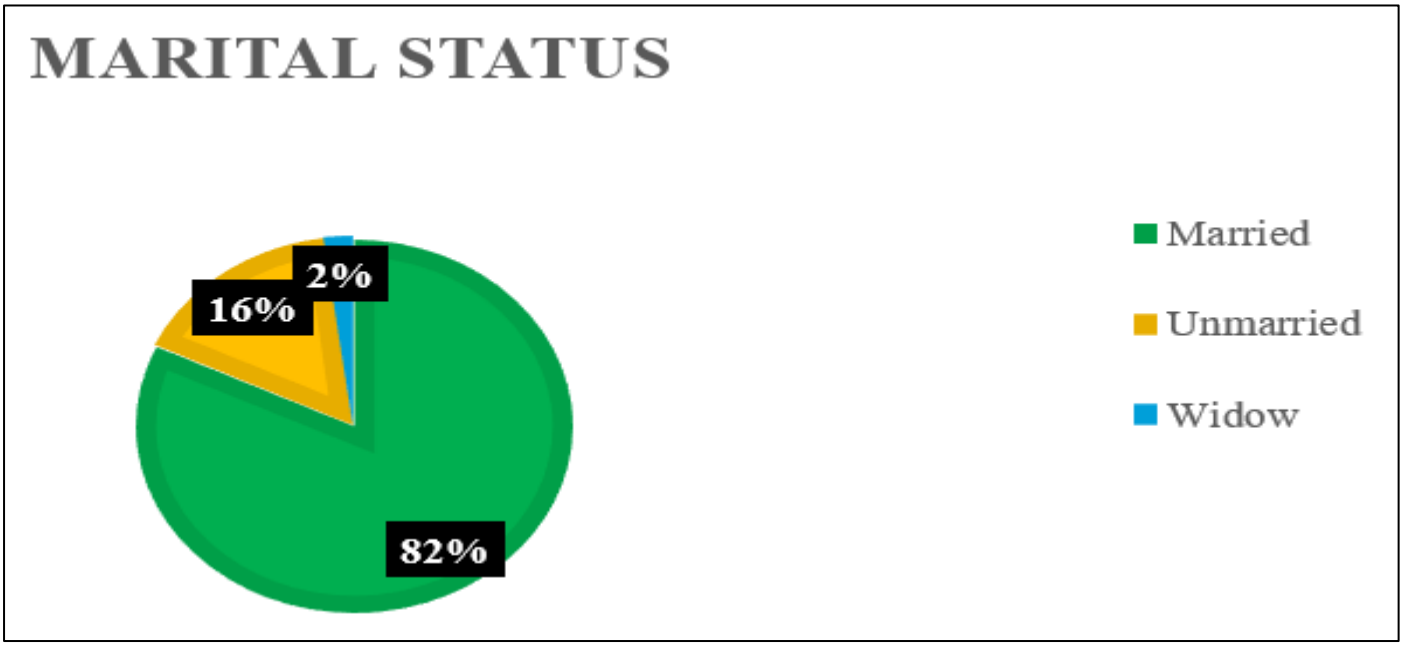

Fig 2: Distribution of Respondents by Marital Status

- **Description: Figure 2**. The pie chart shows that 82% respondents were married, 16 % unmarried and 2% widow.

n=50

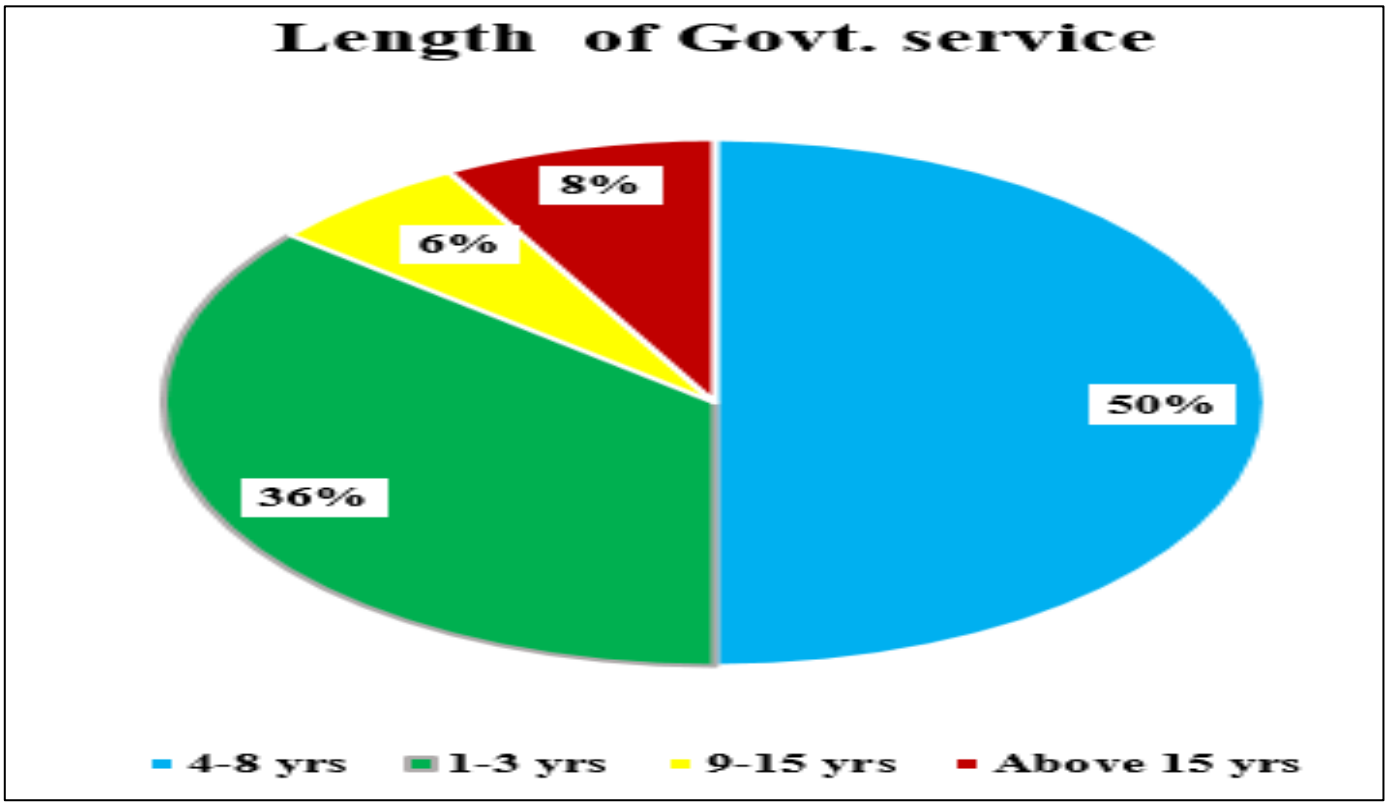

Fig 3: Distribution of Respondents by Government Service Experience

- Description: Figure 3. The pie chart shows that 50% respondents had 4-8 years, 36% had 1-3 years, 6% had 9-15 years, and 8% had above 15 years of Government service experience.

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n=50

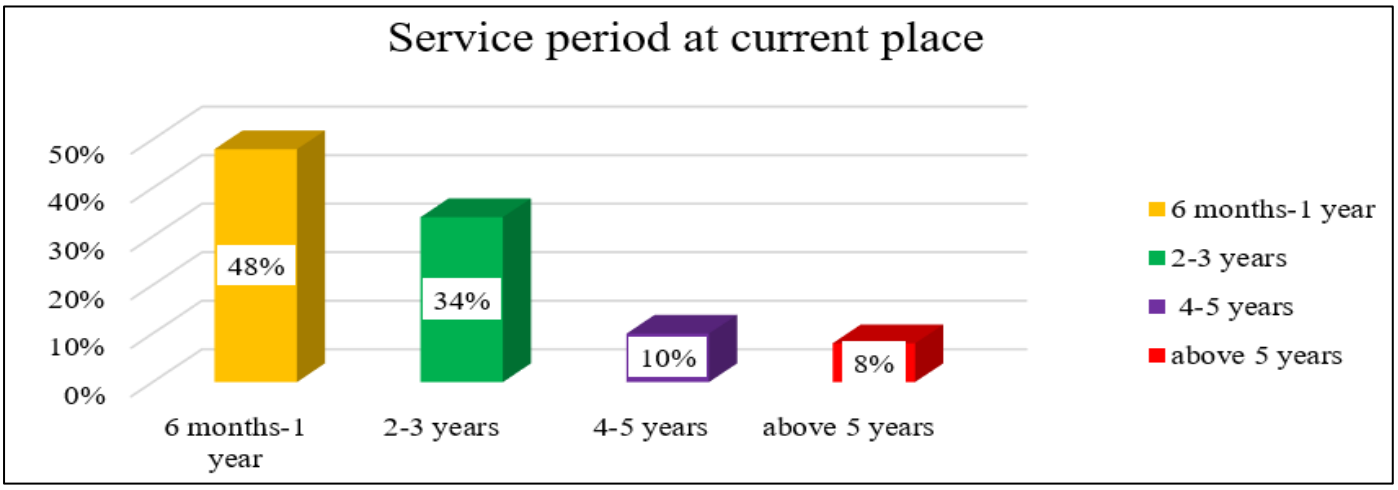

Fig 4: Distribution of Respondents by Duration of Service Experience at Current Workplace

- **Description: Figure 4.** The bar chart shows that 48% respondents had 6months-1 year, 34%% had 2-3 years, 10% had 4-5 years, and above 5 years of service experience at current work place.

Table 2: Distribution The Respondents' Socio-Demographic Characteristics **n=50**

Variables	Category	Frequency *(f)*	Percentage (%)
Sex	Male	2	4
	Female	48	96
Religion	Islam	35	70
	Hindu	11	22
	Christian	4	8
Professional Qualification	Diploma in Nursing Science and Midwifery	35	70
	Bachelor of Nursing Science/Post Basic B.Sc.	12	24
	M.Sc./MPH in Nursing	3	6
Special Training on Infection Control	Yes	2	4
	No	48	96

- **Description: Table:2.** Presents the socio- demographic characteristics of the respondents that 96% were female and 4% were male. Majority of them were Muslim 70%, Hindu 22%, and Christian 8%. On the other hand, 70% respondents had Diploma in Nursing Science and Midwifery degree, 24% had B.Sc. Nursing / Post Basic and 6% had M.Sc./MPH in Nursing. Most of them 96% had no special training on Infection Control, and only 4% had special training on Infection Control.

B. Part-B. Knowledge based Information

A structured questionnaire was used to collect data from the respondents where 20 questions and each question contained 04 options. In this analysis part on the correct answer and incorrect answer mention in the tables.

Table 3: Distribution of Nurses' Knowledge Regarding Concept of Nosocomial Infections **n=50**

S/No	Items	Correct Answer		Incorrect Answer	
		(f)	*(%)*	*(f)*	(%)
1.	The term "Nosocomial Infections" means hospital acquired infections.	50	100	00	00
2.	Nosocomial infections occur within 48 hours after hospitalization.	21	42	29	58
3.	The most common site of nosocomial infections is urinary tract	23	46	27	54
4.	Hematuria is an example of catheter associated urinary tract infection (CAUTI).	32	64	18	36
5.	The mode of transmission of nosocomial infections is air droplet.	30	60	20	40
6.	The responsible reservoir of nosocomial infections is patient.	41	82	9	18
7.	Nosocomial infections are widely spread by uncleaned hands and fingers.	38	76	12	24
8.	The common micro-organism for nosocomial infections is S. Aureus.	29	58	21	42
9.	The common source of nosocomial infections is unclean hands of health care workers.	45	90	5	10
10.	The higher risk of nosocomial infections is immunocompromised patients.	34	68	16	32

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11.	The following age groups of people are most susceptible to nosocomial infections are newborn and child.	38	76	12	24
12.	The sign of surgical site infection (SSI) is pus and bad smell.	38	76	12	24
13.	The most common symptom of nosocomial infections is fever.	42	84	8	16

- **Description: Table 3.** shows that, 100% respondents given correct answer to the meaning of nosocomial infections, 90% provided correct answer to the common source of nosocomial infections, 84% provided correct answer to the most common symptoms of nosocomial infections, 82% provided correct answer on the responsible reservoir of nosocomial infections, 76% provided correct answer that nosocomial infections are widely spread by uncleaned hands and fingers, 76% provided correct answer to the following age groups of people are most susceptible to nosocomial infections and the sign of surgical site infection (SSI), 68% provided correct answer on the higher risk of nosocomial infections, 64% provided correct answer hematuria is the example of catheter associated urinary tract infection (CAUTI), 60% provided correct answer on the mode of transmission of nosocomial infections, 58% provided correct answer to the common micro-organism for nosocomial infections, and 46% respondents provided correct answer to the most common site of nosocomial infections. On the other hand, more than half of (58% and 54%) respondents provided incorrect answer to nosocomial infection occurs within 48 hours after hospitalization and the most common site of nosocomial infections is urinary tract respectively. Moreover, nearly half of (42% and 40%) the respondents provided answer incorrectly to the common micro-organism for nosocomial infection is S. Aureus and to the mode of transmission of nosocomial infection is air droplet sequentially.

Table 4: Level of Nurses' Knowledge Regarding Concept of Nosocomial Infections **n=50**

Variable	Level	Grading Criteria	*(f)*	(%)	Obtain Score
Concept of Nosocomial Infections	Excellent	90-100%	5	10	300
	Very good	80-89%	7	14	385
	Good	70-79%	13	26	650
	Average	60-69%	15	30	625
	Poor	<60%	10	20	350
Total			50	100	2310
Mean of Total Score=46.2					

- **Description: Table 4.** shows that among all of the respondents 30% had average knowledge, 26% had good knowledge, 20% had poor knowledge, 14% had very good and 10% had excellent knowledge on the concept of nosocomial infections. The mean score was 46.2 means having poor knowledge on concept of nosocomial infections.

Table 5: Distribution of Nurses' Knowledge Regarding Management of Nosocomial Infections **n=50**

S/No	Items	Correct Answer		Incorrect Answer	
		(f)	(%)	*(f)*	(%)
14.	Inj. Meropenem is used to treat severe nosocomial infections.	44	88	6	12
15.	Infection Control Program should be taken to prevent nosocomial infections.	40	80	10	20

- **Description: Table 5.** represents that 88% respondents given correct answer on inj. Meropenem is used to treat severe nosocomial infections and 80% provided correct answer to infection control program should be taken to prevent nosocomial infections. A few of nurses provided answer wrongly in this aspect (12% and 20% respectively).

Table 6: Level of Nurses' Knowledge Regarding Management of Nosocomial Infections **n=50**

Variable	Level	Grading Criteria	*(f)*	(%)	Obtain Score
Management of Nosocomial Infections	Excellent	90-100%	34	68	340
	Very good	80-89%	-	-	-
	Good	70-79%	-	-	-
	Average	60-69%	-	-	-
	Poor	<60%	16	32	80
Total			**50**	**100**	**420**
Total mean score=8.4					

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- **Description: Table 6.** shows that majority 68% had excellent knowledge and rest of the respondents 32% had poor knowledge on management of nosocomial infection. The mean score was 8.4 that means having poor knowledge on the management of nosocomial infections.

Table 7: Distribution of Nurses' Knowledge Regarding Preventive Measures of Nosocomial Infections **n=50**

S/N	Items	Correct Answer		Incorrect Answer	
		(f)	(%)	*(f)*	(%)
16.	Hand washing is effective measure to prevent nosocomial infections.	36	72	14	28
17.	The personal protective equipment for prevention of nosocomial infections are cap, mask, gloves, gown and shoe cover.	45	90	5	10
18.	The role of an infection control nurse in preventing nosocomial infections is educating staff regarding infection prevention.	36	72	14	28

- **Description: Table 7**. shows that most of the 90% respondents given correct answer to the personal protective equipment for prevention of nosocomial infection are cap, mask, gloves, gown, shoe cover, 72% provided correct answer that handwashing is effective measure to prevent nosocomial infection, and 72% respondents were provided correct answer that educating staff regarding infection prevention is the role of an infection control nurse. In the total items of preventive measures of nosocomial infections, less than half of the nurses provided incorrect answer in this regard (28%, 10% and 28% sequentially).

Table 8: Level of Nurses' Knowledge Regarding Preventive Measures of Nosocomial Infections **n=50**

Variable	Level	Grading Criteria	*(f)*	(%)	Obtain Score
Prevention of Nosocomial Infections	Excellent	90-100%	28	56	420
	Very good	80-89%	-	-	-
	Good	70-79%	-	-	-
	Average	60-69%	10	20	100
	Poor	<60%	12	24	60
Total			**50**	**100**	**580**
Mean of Total Score= 11.6					

- Description: Table 8. shows that most of respondents 56% had excellent knowledge, 24% had a poor knowledge, and 20% had average knowledge on preventive measures of nosocomial infection. The mean score was 11.6 that means poor knowledge on the preventive measures of nosocomial infections.

Table 9: Distribution of Nurses' Knowledge Regarding Impact of Nosocomial Infections **n=50**

S/N	Items	Correct Answer		Incorrect Answer	
		(f)	(%)	*(f)*	(%)
19.	The most important general impact of nosocomial infection is longer hospital stays.	**41**	**82**	**9**	**18**
20.	The serious impact of nosocomial infections on health is sepsis.	**36**	**72**	**14**	**28**

- **Description: Table 9.** shows that 82% respondents given correct answer to the most important general impact of nosocomial infection is longer hospital stays. The 72% respondents provided correct answer to the serious impact of nosocomial infections on health is sepsis. Among of them 18% provided incorrect answer to the most important general impact of nosocomial infection is longer hospital stays. 28% provided incorrect answer to the most serious impact of nosocomial infections on health is sepsis.

Table 10: Level of Nurses Knowledge Regarding Impact of Nosocomial Infections **n=50**

Variable	Level	Grading Criteria	*(f)*	(%)	Obtain Score
Impact of Nosocomial Infections	Excellent	90-100%	30	60	300
	Very good	80-89%	-	-	-
	Good	70-79%	-	-	-
	Average	60-69%	-	-	-
	Poor	<60%	20	40	85
Total			**50**	**100**	**385**
Mean of Total Score =7.7					

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- **Description: Table 10.** represents that 60% respondents had excellent knowledge. On the other hand, 40% respondents had poor knowledge regarding impact of nosocomial infection. The mean score was 7.7. That means good knowledge regarding impact of nosocomial infections.

Table 11: Distribution Respondents Overall Level of Knowledge on Nosocomial Infection According to Grading Criteria **n =50**

Variable	Level	Grading criteria	*(f)*	(%)	Obtain Score
Overall Level of Nurses' Knowledge on Nosocomial Infection	Excellent	90-100%	8	16	1360
	Very Good	80-89%	8	16	385
	Good	70-79%	21	42	650
	Average	60-69%	10	20	725
	Poor	<60%	3	6	575
Total			**50**	**100**	**3695**
Mean of Total Score=73.9					

- **Description: Table 11.** reveals the nurses' overall level of knowledge regarding prevention of nosocomial infections. Among all the respondents' 42 % had good level of knowledge, 20% had average knowledge, 16% had excellent and very good knowledge regarding prevention of nosocomial infection. Mean of total knowledge score 73.9 of prevention of nosocomial infection means good knowledge on the prevention of nosocomial infections.

Table 12: Distribution of Nurses' Knowledge on Nosocomial Infections by Their Professional Qualifications and Length of Govt. Service **n=50**

Variable	Categories	Knowledge		
		(f)	(%)	Mean
Professional qualification	Diploma in Nursing Science and Midwifery	35	70	71.28
	B.Sc. in Nursing/ Post Basic	12	25	78.33
	M.Sc. /MPH in Nursing	3	6	86.66
Length of Govt. Service	1-3 years	18	36	74.43
	4-8 years	25	50	73.4
	9-15 years	3	6	85
	Above 15 years	4	8	66.25

Description: Table 12. shows nurses' knowledge on prevention of nosocomial infections by their professional qualification of the respondents. Result shows that the respondents those who had M.Sc. in Nursing degree had very good knowledge (*M*-86.66) on prevention of nosocomial infections compared to B.Sc. in Nursing/ Post Basic and Diploma in Nursing Science and Midwifery had good knowledge (*M*-78.33 and *M*-71.28) respectively. Those respondents 9-15 years length of Govt. service had very good knowledge (*M*-85) on prevention of nosocomial infections compared to whose length of Govt. service was 1-3 years and 4-8 years had good knowledge (*M*-74.43 and *M*-73.4) respectively, and above 15 years had average knowledge (*M-66*.25). So, this table indicates that respondents who had M.Sc. in Nursing and whose length of Govt. service was 9-15 years are more knowledgeable regarding prevention of nosocomial infections.

V. DISCUSSION

A descriptive type of cross-sectional study was conducted at National Institute of Diseases of the Chest and Hospital, Mohakhali, Dhaka, Bangladesh, to assess the nurses' knowledge regarding prevention of nosocomial infections. The significant findings of the study were discussed in details in this chapter.

A. Demographic Characteristics of the Subjects:

The study showed that the respondents mean age was 33 years. The range of age were 26 to 53 years and maximum 70% age group was 26-34 years. Majority 82% of them were married and most of them 70% had Diploma in Nursing Science and Midwifery degree. Nearly similar results were found in Ethiopia, i.e. majority of respondents 53.3% age between 26-30 years. Most of them were unmarried and majority of the respondents 85.7% were B.Sc. than Diploma degree. Similar results also found in the study of Bangladesh, Pakistan and Yemen, i.e. 63%, 66% and 63.7% respectively. They found that majority of respondents had Diploma in Nursing Science and Midwifery degree [22;23;24].

Regarding the gender of the current study, most of the respondents 96% were female and majority of them 70% were Muslim. Nearly similar results were found in previous study in Bangladesh. They found that maximum of respondents was female 91% and 96% of them were Muslim. On the other hand, another study conducted in Afghanistan but they found that most of the respondents were male 54.7% [5;14]. Length of govt. service experience in this study majority 50% of the respondents with the range of 4-8 years. Similar findings were in the study of Afghanistan. They found that maximum 95% had job experience with the range 1-9 years [5]. The present study showed that only 4% respondents

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had special training on nosocomial infections. Similar results were found in previous study in Bangladesh. They reported that 24% had Infection Control Training regarding the prevention of nosocomial infection [14].

B. Knowledge Related Information Regarding Prevention of Nosocomial Infections of Respondents:

The study showed that nearly half of the respondents (42%) had good level of knowledge regarding prevention of nosocomial infections. Only, 20% had average level of knowledge. In this aspect, the equal number of respondents had excellent and very good knowledge (16% and 16% respectively). Rest of them only 6% had poor knowledge regarding prevention of nosocomial infections. The overall level of nurses' knowledge regarding nosocomial infections in this study is good with the mean score of 73.9. The similar studies were conducted in Bangladesh, Pakistan and Afghanistan showed 40% and 46.5%, more than 70.9% respectively in different levels of knowledge among nurses [14;24;5].

This study also showed that, Nurses having higher educational qualification having higher level of knowledge on prevention of nosocomial infection. The respondents who completed Diploma & B.Sc. in Nursing had good knowledge (*M-71.28* and *M*-78.33 sequentially) whereas, the respondents who completed the M.Sc. in Nursing had very good knowledge in this regard. This finding was consistent with the results from a study was conducted in Ethiopia, they found that B.Sc. degree and above nurses had better knowledge than Diploma in nursing [22].

This study revealed that only 4% of the respondents received training but surprisingly their level of knowledge was not satisfactory with the results of those respondents who did not receive any training on infection control. They have good knowledge (*M*-72.5) in this regard. Nearly similar a study conducted in Pakistan, they found that there was a relationship between nurses' knowledge and their training on infection control which was inconsistency with current study [11].

C. Limitation of the Study:

- The study findings cannot be generalized the nurses of whole country because the study was conducted in only one hospital with a small sample size (*f* 50).
- A non-probability sampling, that is convenient sampling technique was used.
- Only knowledge was assessed but assessment of practice of nurses is most important to find out the actual perspective in the regards.

VI. CONCLUSION

This chapter presents the conclusion of the study based on the research findings, the strengths and limitations, and the recommendations of the study. This descriptive study was conducted to identify the level of Nurses' knowledge regarding Prevention of Nosocomial Infections. The total 50 respondents recruited from NIDCH. Respondents Knowledge were assessed by structured questionnaires. Data were analyzed by descriptive statistics including frequency, percentage and mean. The study shows that nearly half of the respondents (42%) had good level of knowledge regarding prevention of nosocomial infections. Only, (20%) had average level of knowledge. In this aspect, the equal number of respondents had excellent and very good knowledge (16% & 16% respectively). Only rest of them (6%) had poor knowledge regarding prevention of nosocomial infections. The mean score of Knowledge was (*M*-73.9%) which was indicated the good level of Knowledge. Nurses' Knowledge should be uplift up to 100%.

As Nosocomial infections are the most common problems and face difficulties by the health institutions in developing and developed countries as well, protecting patients from acquiring nosocomial infections is one of the main professional responsibilities for nurses. Nurses play a vital role for identify the problem, patient care, management, prevention of serious impact and effective health education to the patient with nosocomial infections. This study found that with preventive measures concerning nosocomial infections, nurses had poor knowledge due to limitation of training. So, nurses need to obtain adequate knowledge for preventing nosocomial infection by continuous training and education.

RECOMMENDATION

This present study showed that higher professional qualification that means higher education influenced the knowledge of respondents regarding prevention of Nosocomial Infections. Researcher recommended the following ideas:

- Provide encouragement to the nurses to improve their knowledge by continuous education.
- Provide training on Infection Control regarding nosocomial infections.
- Apply evidence-based practice in work place.
- Establish committee in hospital and promote supervision on nurses when dealing with patients to protect themselves, patients and attendants.
- A large scale of project should be conducted for further study with involving 3-4 hospital nurses to find out the real situation and also for generalization of the study.
- An observational study may use to find-out the nurses practice regarding the prevention of nosocomial infections.

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