

(RESEARCH ARTICLE)



## Assessment of nurses' knowledge and practice regarding nosocomial infection at 250 bedded Mohammad Ali Hospital, Bogura, Bangladesh

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### Abstract

**Background:** Nosocomial infections, otherwise known as Hospital-acquired infections, are infections that are not present or incubating when the person is admitted to a healthcare facility (WHO, 1988). In other words, infections are considered nosocomial if they first appear 48 hours or more after hospital admissions or 30 days after discharge (Wikipedia 2007). Hospital-acquired or Nosocomial infection is the result of the transmission of pathogenic organisms to a previously un-infected patient from a source in a hospital's environment. The prevalence of nosocomial infection in developed countries is much lower than in developing countries, and studies show it is 15.5 per 100 patients in Europe and USA. In Intensive care units, the prevalence rate was 48 per 1000 patients. The most common infection was surgical site infection, which was 5.6 per 100 surgical procedures. Nosocomial infection significantly impacts the health of hundreds of millions of people and is considered a major global issue today by all stakeholders (Basson, 2006).

**Objective:** The aim was to assess nurses' knowledge and practice regarding nosocomial infection at 250 Bedded Mohammad Ali Hospital, Bogura, Bangladesh.

**Methodology:** This descriptive type of cross-sectional study design was used. A 120 sample size that was purposive sampling followed those who met the inclusion criteria to assess the knowledge and practice regarding nosocomial infection. The instruments for data collection were a semi-structured questionnaire and a self-report method composed of three parts: Demographic variables, knowledge and practice-based information on nosocomial infection.

**Results:** The findings of the present study revealed that the majority of the 55% were between 31-40 years, 91% were female, 96% were Muslim, and 63% were a Diploma in nursing in professional education. Regarding nurses' knowledge, an average of 40% had a moderate knowledge of nosocomial infection. It is expected that the study will provide a better understanding of the uses of contraceptive methods.

**Conclusion:** it is clear that nosocomial infections are a significant problem for both developed and developing countries. To achieve good health for every patient in the hospital, it is essential for all nurses to have a moderate level of nurse's knowledge on nosocomial infections and to practice standard protocols so that the spread of infection in any healthcare setting can be minimized. However, the nosocomial infection does not create a significant problem if maintained adequate aseptic precautions during any procedure. Senior staff Nurses, as a part of the health care team, play an essential role in providing care to both infectious and non-infectious patients in the same ward.

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**Keywords:** Knowledge; Practice; Nurse; Nosocomial infection

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## 1. Introduction

Nosocomial infections, otherwise known as Hospital-acquired infections, are infections that are not present or incubating when the person is admitted to a healthcare facility [1]. In other words, infections are considered nosocomial if they first appear 48 hours or more after hospital admissions or 30 days after discharge [2]. Williams, while defining Hospital Acquired Infection, said, “any infection that is acquired in a hospital, whether from ordinary risk or from one peculiar to hospital, whether the results appear in the hospital or after the patient has gone home, this including infections from one person to another and infection from one tissue to another in the same person”. Hospital-acquired or Nosocomial infection is the result of the transmission of pathogenic organisms to a previously un-infected patient from a source in a hospital's environment. Most nosocomial infections manifest while the patient is still in the Hospital; occasionally, hospital-acquired infections may have onset after the patient has left the Hospital; these cases have also been recognized as Hospital-acquired infections. Nosocomial infection, also called Hospital-acquired infection, occurs in a patient who is admitted to Hospital for a long or short period for some therapeutic or diagnostic purposes. Nevertheless, the patient has no evidence of infection before admission to the Hospital. Patients have no signs and symptoms of nosocomial infection before hospitalization; however, when they remain hospitalized for some time, they come in contact with beds, linens and utensils that the other patients and their attendants have contaminated and acquire nosocomial infection. The causative organism of nosocomial infection may be bacterial, viral parasites found in the air and utensils and can spread from one person to another. The prevalence of nosocomial infection in developed countries is much lower than in developing countries, and studies show it is 15.5 per 100 patients in Europe and USA. In Intensive care units, the prevalence rate was 48 per 1000 patients. The most common infection was surgical site infection, which was 5.6 per 100 surgical procedures. Nosocomial infection greatly impacts the health of hundreds of millions of people and is considered a major global issue today by all stakeholders. The picture is gloomier in developing countries, affecting more than 25% to 30% of patients admitted to healthcare settings. World Health Organization must play its role in this world to ensure a safe and hygienic environment. Nosocomial infections are medical accidents that occur during treatment and are an ever-present risk associated with hospitalization. Nosocomial comes from the Greek word “Nosokomeion”, which means Hospital. So this type of infection is also known as Hospital-acquired infection [3]. During the middle Ages, hospital infections were considered to be divine wrath. In the 12th century, the church persecuted, suggesting that medical procedures were the cause of diseases and infection. In the 17th century, nosocomial infections were attributed to particles circulating in hospital air. Improving the hospital ventilation system was thought to be the solution. Late in the 19th century, Louise Pasteur discovered that germs or bacteria were the cause of nosocomial infections and demonstrated the importance of ensuring that conditions were aseptic or free of disease-causing microorganisms [3]. However, with the advent of modern medicine and large urban hospitals in this century, overcrowding and ignorance increased the danger to patients. There was a significant risk of death from nosocomial infection following many procedures, from childbirth to amputation [4]. Nosocomial infections statistics by country showed an estimated 2 million cases annually, or about 10% of American hospital patients have a nosocomial infection [5]. Southern Asia Extrapolation statistics showed the incidence of nosocomial infection, accordingly; Bangladesh 10, 39,268 warnings, Bhutan 16,070 warnings, India 78, 31,401 warnings, Pakistan 11, 70,561 warnings[6]. Furthermore, the survival rate statistics for nosocomial infections noted that 13.16% of selected infections resulting from medical care led to death in the US from 2000-2002 [7]. It is reasonable to expect medical and nursing care to be safe, but hospitals have always been dangerous. Each healthcare setting is unique, with its own risk for infection. Hospital environment, therapeutic regimen and inadequate resistant power of the patients are risk factors that contribute to the development of nosocomial infection[8]. Moreover, the bacteria that cause diseases are becoming increasingly resistant to antibiotics. Over the last three decades, the number of nosocomial infections has increased dramatically and constitutes 30% of undesirable occurrences that undermine patient safety and health care quality. The detection and prevention of nosocomial infection represent 25% to 30% of the treatment cost. So, infection control reflects directly on any hospital's efficiency and ability to provide safe, quality care. The savings generated by such measures can be reinvested in the healthcare system [3]. A study from Kenya revealed that 100% of participants practised hand hygiene, 88% using water and soap, while 12% of the participants reported using alcohol-based hand rub during hand hygiene. However, when observed for practice, a lower proportion, 17% of the participants, performed hand hygiene before a procedure. The study aimed to assess nurses' knowledge and practice regarding nosocomial infection at 250 Bedded Mohammad Ali Hospital, Bogura, Bangladesh.

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## 2. Material and methods

A Descriptive type of cross-sectional study was conducted to assess the nurses' knowledge and practice regarding nosocomial infection at 250 Bedded Mohammad Ali Hospital, Bogura, Bangladesh, from July 2020 to December 2020.

The 250 Bedded Mohammad Ali Hospital, Bogura, was selected for this study. Because this hospital provides a lot of nosocomial infection patients, and it is one of the famous and oldest popular public hospitals in north Bengal of Bangladesh. The study's target population was all nurses those who working in the medicine and surgical unit, Guyane, and Labour wards of 250 Bedded Mohammad Ali Hospital, Bogra. Of the total number of nurses, 200 were given placement in those wards. The sample was selected from the medicine, surgery, orthopedic, and nephrology departments and 120 nurses selected as a sample size at 250 bedded Mohammad Ali Hospital, Bogura, Bangladesh.

### 2.1. Inclusion criteria

- Nurses who are working in the selected wards of the hospital.
- Nurses who are willing to participate in this study.
- Senior staff nurses who had at least 6 months of working experience in this hospital.

### 2.2. Exclusion criteria

- Nurses who are not willing to participate in this study.
- Nurses who are not available at the time of data collection.

Collected information is compiled, analyzed, and edited using the software SPSS (version 24.0) (IBM) Chicago, Illinois. At first, the research proposal was approved by the institutional ethical committee from Bogura Nursing College, Bogura. Before conducting the study, a written permission letter was issued by the Principal of Bogura Nursing College, Bogura, to facilitate approval from the hospital's hospital superintendent and Nursing superintendent.

## 3. Results

**Table 1** Socio-demographic characteristics of participants (n=120)

| Age group (years)                                       | Frequency | Percentage |
|---|-----------|------------|
| ≤ 30  | 18        | 15         |
| 31-40   | 66        | 55         |
| 41-50   | 31        | 26         |
| >50   | 5         | 4          |
| Total   | 120       | 100        |
| <b>Distribution of respondents by Gender</b>            |           |            |
| Male  | 11        | 9          |
| Female  | 109       | 91         |
| <b>Distribution of respondents by marital status</b>    |           |            |
| Married   | 108       | 90         |
| Single  | 12        | 10         |
| <b>Distribution of respondents by religion</b>          |           |            |
| Muslim  | 115       | 96         |
| Hindu   | 4         | 3          |
| Christian   | 1         | 1          |
| <b>Distribution of respondents by general education</b> |           |            |
| SSC   | 40        | 33         |
| HSC   | 68        | 57         |
| Master's Degree   | 12        | 10         |

| <b>Distribution of respondents by Professional Educational status</b> |    |    |
|---|----|----|
| Diploma in Nursing  | 76 | 63 |
| BSc in nursing/PHN  | 35 | 29 |
| MSc/MPH   | 9  | 8  |

Data were analyzed manually following the tally marks and percentages of all variables using the scientific calculator. All tables of the variables were created manually for results and then converted into tables, bar graphs, and pie charts by using the computer. All of these were included in the result sheet of the document. The relevant tables were then prepared for the final presentation. The above table shows that 15% were within  $\leq 30$  years of age, 55% were within 31-40 years, 26% were 41-50 years, and 4% were  $>50$  years of age. The mean age of respondents is 33.90 years. Table 1 shows that 9% were male and 91% were female among the respondents. The above table shows that the respondents 96% were Muslim, 3% were Hindu, and 1% were Christian among the respondents. Table 1 shows that 33% were SSC, 57% were HSC, and 10% were Master's Degrees in general education among the respondents. 63% were diploma in nursing, 29% were BSc in nursing/PHN, and 8% were MSc/MPH of professional degrees among the respondents (Table 1). Table 2 shows that the majority, 83%, answered the option of Hospital-acquired infection, 8% answered the option of infection usually appearing 48 hours or more, and 8% answered the option of spreading of infection by a hospital environment. The rest of the 1% answered the option of none of them among the respondents. 46% answered the option of bacteria, 57% the option of the virus, 3% the option of protozoa, and 2% answered the option of fungus about the knowledge on causes of nosocomial infection among the respondents (Table 2). The table shows that the highest, 68% answered the option of UTI, 14% answered the option of RTI, 12% answered the option of Surgical Infection, and 6% the option of Septicemia about the knowledge on common of nosocomial infection among the respondents. The above table 2 shows that 2% answered the option of doctors, 17% the option of nurses, 12% the option of admitting a patient after 48 hours, and 69% the option of all of their knowledge of high-risk nosocomial infection among the respondents. Table 2 shows that 25% answered the option of Isolation procedures, 58% the option of proper hand washing procedure, 7% the option of annual vaccination, and 10% the option of Infection control service for the knowledge of universal precautions to prevent nosocomial infection among the respondents. Table 3 shows that 12% answered the option of using a standard bathroom, 47% the option of hand washing, 12% the option of contact with the infected patient, and 29% the option of none of them about the knowledge no proper practice for preventing nosocomial infection among the respondents.

**Table 2** Distribution of Knowledge on different variables (n=120)

| <b>Variables</b>                                  | <b>Frequency</b> | <b>Percentage</b> |
|---|------------------|-------------------|
| <b>Nosocomial infection</b>                       |                  |                   |
| Hospital-acquired infection                       | 100              | 83.33             |
| Infection usually appears within 48 hours or more | 10               | 8.33              |
| Spreads of infection by the hospital environment  | 9                | 7.50              |
| None of them                                      | 1                | 0.83              |
| <b>Causes of nosocomial infection</b>             |                  |                   |
| Bacteria  | 50               | 41.67             |
| Virus   | 69               | 57.50             |
| Protozoa  | 4                | 3.33              |
| Fungus  | 2                | 1.67              |
| <b>Transmission route of nosocomial infection</b> |                  |                   |
| By Contact Transmission                           | 18               | 15.00             |
| By Droplet transmission                           | 40               | 33.33             |
| By Air born transmission                          | 5                | 4.17              |

|   |     |       |
|---|-----|-------|
| All of them.  | 57  | 47.50 |
| <b>Most common nosocomial infection</b>                     |     |       |
| UTI   | 81  | 67.50 |
| RTI   | 17  | 14.17 |
| Surgical infection  | 15  | 12.50 |
| Septicemia  | 7   | 5.83  |
| <b>High risk for nosocomial infection</b>                   |     |       |
| Doctors   | 2   | 1.67  |
| Nurses  | 20  | 16.67 |
| Admitted patient after 48 hours                             | 15  | 12.50 |
| All of them   | 83  | 69.17 |
| <b>Preventive measures for nosocomial infection</b>         |     |       |
| Proper hospital waste disposal                              | 31  | 25.83 |
| Proper sterilization and disinfection procedure             | 9   | 7.50  |
| Correct hospital designing                                  | 5   | 4.17  |
| All of them   | 75  | 62.50 |
| <b>Universal precaution to prevent nosocomial infection</b> |     |       |
| Isolation procedures  | 30  | 25.00 |
| The proper hand-washing procedure                           | 70  | 58.33 |
| Annual vaccination  | 8   | 6.67  |
| Infection control service                                   | 12  | 10.00 |
| <b>Use of gloves during nursing care procedure</b>          |     |       |
| Yes   | 108 | 90.00 |
| No  | 5   | 4.17  |
| Not sure  | 7   | 5.83  |

**Table 3** Distribution of practice for preventing nosocomial infection (n=120)

| Variables                         | Frequency | Percentage |
|-----------------------------------|-----------|------------|
| Use common bathroom               | 15        | 12.00      |
| Hand washing                      | 55        | 47.00      |
| Contact with the infected patient | 15        | 12.00      |
| None of them                      | 35        | 29.00      |
| Total                             | 120       | 100.00     |

#### 4. Discussion

This descriptive cross-sectional study aimed to assess the nurses' knowledge and practice regarding nosocomial infection at 250 Bedded Mohammad Ali Hospital, Bogura, Bangladesh. This chapter presents a summary of the study, findings concerning those previously reported in the literature, and a discussion. In addition, the suggestions for

practice and recommendations for future research will also be addressed. The present study findings revealed that the socio-demographic information was 15% were within  $\leq 30$  years of age, 55% were within 31-40 years, 26% were 41-50 years, and 4% were  $>50$  years of age; 9% were male and 91% female; 90% were married whereas 10% were single; 96% were Muslim, 3% Hindu and 1% were Christian; 33% were SSC, 57% were HSC, and 10% were Master's Degree of general education; 63% were Diploma in Nursing, 29% were BSc in nursing/PHN, and 8% were MSc/MPH of professional Degree; 14% were within  $\leq 5$  years of service, 58% were within 6-10 years of service, and 28% were  $>10$  years of services; 48% were received special training, whereas 52% were not received any special training among the respondents. A study by Motamed et al. (2006) indicated that most nurses were between 30-40 years old, which is compatible with the present study. Another study conducted by Abdollahi et al. (2003) revealed that most of the nurses 70% were male, which is the opposite of the present study [9, 10]. In regard the knowledge related finding of the present study that the majority 83% answered the option of Hospital acquired infection, 8% answered the option of infection usually appears 48 hours or more, 8% answered the option of spreads of infection by hospital environment and rest of 1% answered the option of none of them; 18% were responded knowledge related option of three types, 63% two types, 17% four types and 2% six types on types of nosocomial infection; 46% were answered the option of bacteria, 57% the option virus, 3% the option of protozoa and 2% answered the option of fungus about the knowledge on causes of nosocomial infection; 15% were answered the knowledge on the option by contact transmission, 33% the option of by droplet transmission, 4% the option of by air born transmission and the 48% the option of all of them knowledge on route of transmission of nosocomial infection; 68% were answered the option of UTI, 14% were answered the option of RTI, 12% were answered the option of surgical infection and 6% the option of septicemia about the knowledge on common of nosocomial infection; 2% answered the option of doctors, 17% the option of nurses, 12% the option of admitted patient after 48 hours and 69% the option of all of them about the knowledge on high risk for nosocomial infection; 17% were answered the option of infected patients, 7% answered the option of operational instrument, 5% answered the option of same toilet use and the 71% the option of all of them about the knowledge on factor affecting nosocomial infection; majority 31% answered the option of increase length of stay hospital, 2% the option of financial loss, 1% the option of mental stress and 66% the option of all of them about the knowledge on consequence of nosocomial infection; 26% answered the option of proper hospital waste disposal, 7% the option of proper sterilization and disinfection procedure, 4% the option of correct hospital designing and 63% the option of all of them about the knowledge on preventive measure of nosocomial infection; 17% answered the option of 7 steps, 59% the option of 6 steps, 22% the option of 10 steps and 2% the option of 4 steps about the knowledge on steps of hand washing to prevent the spread of nosocomial infection; 25% were answered the option of Isolation procedures, 58% the option of Proper hand washing procedure, 7% the option of annual vaccination and the 10% the option of infection control service for the knowledge on universal precaution to prevent nosocomial infection; 38% were answered the option of Air born, 4% the option of Spatter, 50% the option of droplet and the 8% the option of parental for the knowledge on acquiring an infection through mucosal tissue; 50% was answered the option of contaminated blood, use unsterilized instruments, improper hand washing, 4% the option of sexual contact, 4% the option of use sterilized instruments and 42% the option of proper hand washing about the knowledge on transmitted from patient to patient; majority of 90% answered the option of Yes, 4% the option of No and 6% the option of Not sure about the knowledge on use gloves during nursing care procedure; 12% answered the option of use common bath room, 47% the option of hand washing, 12% the option of Contact with infected patient and 29% the option of None of them about the knowledge on proper practice for preventing nosocomial infection; 79% were answered the option of Yes, 8% the option of No, and the 13% the option of Not sure for the knowledge on dispose gloves, syringe, catheter etc. after use; 87% were answered the option of Yes whereas the 13% the option of No for the knowledge on maintain therapeutic relationship with the patient; highest 80% was answered the option of Yes, whereas the lowest of 20% the option of No about the knowledge on practice hand washing with soap before and after performing nursing procedure; 82% were answered the option of Yes whereas the lowest 18% the option of No for the knowledge on provide health education to the patient and family members avoid nosocomial infection; 62% were answered the option of Yes whereas the lowest 38% the option of No for the knowledge on enough facilities of hand washing and disinfectants to prevent nosocomial infection among the respondents. A study conducted in India regarding the knowledge, attitude and practice of a different group of HCWs about infection control concluded that training positively impacts the improvement of KAP in healthcare personnel. They also suggested that developing a continuous training program for all HCWs is necessary [11]. A study in Kenya showed that 100% of subjects practised hand hygiene; 87.8% used soap and water, while 12.2% used alcohol-based hand rub for hand hygiene. However, when observed practically, a tiny proportion (16.7%) of the participants practiced hand hygiene before any procedure. A large number (100%) performed hand hygiene after touching any infected materials, for example, after emptying a catheter bag. This shows that the nurses are more concerned about their lives than the patients. Using standard precautions is the key to minimizing hospital-acquired infections. Therefore, all healthcare professionals and nurses must follow standard guidelines since they are more exposed to patients. Nurses' awareness and attitudes greatly influence the control and prevention of nosocomial infection [12]. A study conducted by Devrajani, Shah, and Devrajani, Qureshi (2009) revealed that the nurses also had good knowledge about safety precautions as (40%) were agree and 44 (36.7%) strongly agreed about safety precautions [13]. Okechukwu et al. also

showed that 77.5% of respondents had good knowledge about using safety precautions. A national study has also shown that the spread of hospital-acquired infections can adequately be controlled by observing safety precautions and hand hygiene. These findings are supported by literature where good practices about control and prevention of infection from one patient to another patient and these practices should apply to every patient if the patient has an infectious disease or not. For the nurses' knowledge of different preventive transmission measures from the hospital environment, it was found that over half (52.9%) of the participants had a good knowledge of routine hospital cleaning. The majority (81.1 and 82.8%) had an acceptable level of knowledge on safe waste handling and disposal and patient care equipment reprocessing, respectively. However, over half of the Yemeni nurses (60%) had poor knowledge of safe linen handling. In general, regarding the overall nurses' knowledge of the different infection prevention and control measures, it was found to be fair (87%). It was even higher than what was found by Abdulraheem et al. in Northern Nigeria, Shamaa and Talaat in Egypt, and Isara and Ofili in the Federal Medical Centre [14]. About practice-related findings of the current study that 92% rated the option yes, 5% the option no, whereas 3% the option does not no idea about nosocomial infection and have knowledge about the appropriate use of personal protective equipment, 75% mentioned the option of Yes, 21 % the option of No whereas 4% the option of do not know. They also reacted 85% were mentioned the option of Yes, 9% the option of No whereas 6% the option of don't know; 85% were mentioned the option of Yes, 8% the option of No whereas 7% the option of don't know for the teach the patient to maintain personal hygiene in the ward; 83% were mentioned the option of Yes, 13% the option of No whereas 4% the option of don't know for the practice appropriate sterilization procedure in Ward; 82% were mentioned the option of Yes, 15% the option of No whereas 3% the option of don't know for the clean the ward by cleaner in the present of you; 81% were mentioned the option of Yes, 11% the option of No whereas 8% the option of don't know for the change the bed linen after discharge of patient in your ward to prevent nosocomial infection; 80% were mentioned the option of Yes, 16% the option of No whereas 4% the option of don't know for the ever fumigation in the infectious ward to prevent cross infection; 86% were mentioned the option of Yes, 9% the option of No whereas 5% the option of don't know for the maintain aseptic techniques during provide nursing care; 86% were mentioned the option of Yes, 12% the option of No whereas 4% the option of don't know for the use in separate disposable syringe for prevent nosocomial infection one each other patient among the respondents.

#### *Limitations of the study*

There was a small sample size in the study. This is a small representation of nurses at 250 Bedded Mohammad Ali Hospital, Bogura; the study's results may be limited to one particular area. The small sample size and selection samples only from the limited population at 250 Bedded Mohammad Ali Hospital, Bogura, were the limitations of our study. Thus, the large scales studies with larger sample sizes selected randomly from all parts of society are recommended to obtain more generalized results for further study in the health sector.

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## **5. Conclusion and Recommendations**

In conclusion, nosocomial infections are a significant problem for developing countries. To achieve good health for every patient in the hospital, it is essential for all nurses to have a moderate level of nurse's knowledge on nosocomial infections and to practice standard protocols so that the spread of infection in any healthcare setting can be minimized. However, the nosocomial infection does not create a significant problem if maintained adequate aseptic precautions during any procedure. Senior staff Nurses, as a part of the health care team, play an essential role in providing care to both infectious and non-infectious patients in the same ward. Although, Proper nursing practices in preventing the spread of nosocomial infection and their management contribute to promoting and creating an appropriate environment which prevents new infections and controls the existing ones. Nurses stated they had the necessary competencies to practice safe patient care. There is a need to improve better knowledge and positive practice to prevent nosocomial infection. This can be achieved by providing educational and motivational activities and improving nursing services to promote health and reduce nosocomial infection and its consequences. There is a need for more research studies to increase nurses' knowledge and practice regarding nosocomial infection because there were few research studies in this field. A similar study can be undertaken on a large scale. A comparative study between urban and rural areas may be conducted to generate the study findings.

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## **Compliance with ethical standards**

### *Disclosure of conflict of interest*

No conflict of interest to declared.

### *Statement of ethical approval*

The study was approved by the Institutional Ethical Committee.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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