*Original Article*

# Prevalence and Pattern of Hospital Acquired Infection in Surgery Ward, Dhaka City

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## Abstract

***Background:*** Hospital acquired infection among the patients of post-surgery is a global issue linked to extra burden on individual health, health sector and overall economy of the country. Prevention is the utmost important intervention to overcome this issue.

***Objective:*** To investigate the prevalence and pattern of Hospital acquired infection among the post-surgical patients in Dhaka city.

***Methods:*** This is the cross-sectional study conducted in Shaheed Suhrawardy Medical college hospital (Oral and Maxillofacial surgery ward) and Dhaka Medical college Hospital (General surgery and Gynae ward). The cross-sectional design observed 180 participants who undergo surgery and fulfilled specific inclusion criteria. Convenience sampling, a non-probability sampling technique, was used for participant selection. Data were collected by face-to-face history taking and considering history sheets with a semi-structured questionnaire.

***Results:*** Among 180 hospital admitted patients, a significant frequency of patients developed HAI 57.78% and in 42.22% did not develop HAI. The Male patients was 30% and female 70%. The Male patients who developed HAI were 8.89%, Female 48.89%. where 20% reported consuming smoked tobacco, 33.33% smokeless tobacco and 46.67% consumed no tobacco. So, a total of 53.33% of the population used tobacco. The study identified a significant association ($p<0.05$) between tobacco consumers and developing HAI. The maximum number of patients, 48.33% developed surgical wound infection, 6.11% developed catheter induced UTI, 1.67% developed bloodstream infection and 1.67% developed soft tissue infection. Amongst 180 patients, more than half 53.33% attended daily with an attendant. Only 40% attended with 2 attendants daily, and 6.67% with 3 attendants daily. 62.22% of patients had up to 2 visitors daily and 37.78% had above 2 visitors daily. The study identified a significant association $p<0.05$ between number of visitors per day and developing HAI. C/S reports were identified for 27.78% patients. The C/S test reports were not available for 72.22% patients at the time of data collection. The reports revealed a larger number 16.67% E.coli infection, 6.67% infected by Klebsiella and 4.44% were infected by Staphylococcus aureus. A significant increase in hospital stay was required in the case of patients who developed HAI (57.78%).

***Conclusion:*** This study revealed the prevalence of Hospital acquired infection significantly among post-surgical patients. There is an urgent need to solve the issue by securing targeted intervention.

***Keywords:*** Hospital acquired infection, Post-surgical patients, IPC (Infection Prevention and Control).

## Introduction

Hospital Acquired Infection (HAI) is the infection that occurs after admission to the hospital. This infection is usually evident after 48 hours of admission or even after the discharge of the patient. The organisms are acquired during the hospital stay by procedural intervention in this type of infection.[1]

National guidelines for infection prevention and control in healthcare setting have been placed in Bangladesh by directorate general of health services (DGHS) and ministry of health and family welfare (MOHFW), Bangladesh. A detailed guidance on setting up and implementing IPC (Infection Prevention and control) system in most hospitals of Bangladesh has been provided.[2]

Hospital-based programs of surveillance, prevention and control of hospital acquired infections have been in place since the 1950s. The Study on the Efficacy of Nosocomial Infection Control Project (SENIC) was working in reduction of HAI from the 1970. They recognized appropriate infection control program to reduce HAI is arbitrary and work on it. HAI results in excess length of stay, mortality and healthcare costs. Continued surveillance, along with sound infection control programs ensure decreased HAI and thus overall burden on cost, medical care and resources. After a few decades, the estimation revealed that in 2002, 1.7 million HAI occurred in the United States, resulting in 99,000 deaths. Hospital acquired infection may be caused by any type of microorganisms - bacteria, fungi or combination of both and responsible for SSI,

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UTI, pneumonia, bloodstream infection or any other infection in the body. This type of infection is the most prevalent in the case of surgical site infection among post-operative patients. Infectious agents causing hospital acquired infections may come from endogenous or exogenous sources. The route of transmission may vary from direct contact, indirect contact, droplet transmission, vector borne, airborne or by common vehicle transmission.

A World Health Organization prevalence study and other studies have shown that these infections most commonly occur in intensive care units and in acute surgical and orthopedic wards. Hospital Acquired Infections occur worldwide, both in the developed and developing world. Increased morbidity in hospitalized patients, overall quality of life, economy and public health are directly associated with HAI.[3] This research can inform, to some extent, about the current public health issues and preventive measures being practiced in our community.

## Materials and Methods

The study was a cross-sectional study conducted in Dhaka Medical College and Shaheed Suhrawardy Medical college Hospital. The data for this study was collected as part of a cross- sectional study conducted from January to June 2012 in the General Surgery and Gynae & Obstetric wards of Dhaka Medical College hospital (Maximum number of patients admitted) and the Oral and Maxillofacial ward of Shaheed Suhrawardy Medical College Hospital. The data was re-examined, and the manuscript was extensively revised between June 2024 and July 2025 to contextualize the original findings within the current academic and policy landscape. The revision includes an updated literature review and a discussion of the study's implications for the "National guidelines for infection prevention and control" (DGHS and MOHFW, 2020), which were published after the original data collection period.

The aim of the study was to draw the focus on morbidity caused by HAI. Thus, the study would contribute further planning and will encourage implementation of "National guidelines for infection prevention and control by DGHS and MOHFW" published in 2020 combating against HAI. A total of 180 participants were selected purposively who were admitted to the different ward of hospitals. The study included the patients who developed HAI post operatively till discharge. The symptoms of redness, swelling, fever, pain, wound discharge were considered for SSI. Burning micturition, fever, suprapubic pain and routine R/E considered for catheter induced UTI in general surgery and gynae ward patients. Pain, swelling, fever, and abscess considered for soft tissue infection in case of post oral and maxillofacial surgery patients. Post operative stay >15 days considered as extended day of hospitalization in this study. The exclusion criteria were those who have infection prior to the procedure (elective/emergency), those having implant surgery and later develop SSI, those who don't have any sign of infection on discharge on the 7th day of surgery. Data were collected by semi-structured questionnaire through both face-to-face histories taking from either the respondents or their attendants and their history sheets were considered as well. Each study participant was informed that his participation was voluntary. Additionally, they were assured of confidentiality of all information collected. Informed verbal consent was received from each of the participants. Data collection, processing, entry and analysis were done by stringent protocol to ensure reliability and accuracy. Data analysis was done by IBM SPSS v24 software. Prior to conducting the study ethical clearance was taken from the appropriate ethical committee of NIPSOM. The results were arranged in table and charts. A clear and concise format has been created for optimal and utmost understanding.

## Results

**Table-I:** HAI development of participants according to gender profile (n=180)

| Gender | n | % | HAI developed | % | HAI didn't develop | % |
|---|---|---|---|---|---|---|
| Male | 54 | 30% | 16 | 8.89 | 38 | 21.11 |
| Female | 126 | 70% | 88 | 48.89 | 38 | 21.11 |
| Total | 180 | 100% | 104 | 57.78 | 76 | 42.22 |

The study revealed a significant presence of HAI among patients. Over half (57.78%) of patients developed HAI. 8.89% males and 48.89% females develop HAI. 42.2% of participants did not develop HAI (Table-I).

**Table-II:** Tobacco profile of the participants (n=180)

| Use of Tobacco | n | % |
|---|---|---|
| Smoke | 36 | 20.00 |
| Smoke less | 60 | 33.33 |
| No Tobacco | 84 | 46.67 |
| Total | 180 | 100.00 |

The study revealed that a significant number of patients were using tobacco. 20% of patients reported to consuming smoked tobacco, 33.33% to smokeless, while 46.67% reported to consuming no tobacco (Table-II).

**Table-III:** Relationship between tobacco profile and HAI among the participants (n=180)

| HAI | Tobacco | | | |
|---|---|---|---|---|
| | No tobacco | Tobacco | Total | Statistics |
| Yes | 34 (18.89%) | 70 (38.89%) | 104 (57.78%) | df = 1 |
| No | 50 (27.78%) | 26 (14.44%) | 76 (42.22%) | p value* = 19.32 |
| Total | 84 (46.67%) | 96 (53.33%) | 180 (100%) | p< 0.05 |

*p value obtained by chi-square test; The study identified a significant association (p<0.05) between tobacco consumers and developing HAI (Table-III).

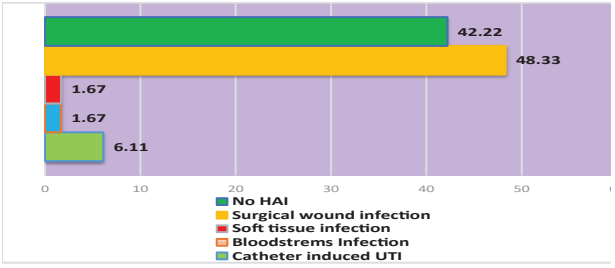


**Figure-1:** Distribution of participants who developed HAI according to sites of infection (n=180)

The site of infection revealed the distribution among the patients. The maximum number of patients, 48.33%, developed surgical wound infection and another significant portion, 6.11%, suffered from UTI. A smaller group, 1.67%, exhibited soft tissue infection and another 1.67% suffered from bloodstream infection. 42.22% of participants did not develop HAI (Figure-1).

**Table-IV:** Attendance profile of the participants (n=180)

| Number of Daily Attendant | n | % |
|---|---|---|
| 1 | 96 | 53.33 |
| 2 | 72 | 40.00 |
| 3 | 12 | 06.67 |
| Total | 180 | 100.00 |

The study found that while more than half of the participants, 53.33%, were attended daily with one attendant, 40% were attended with 2 attendants and 6.67% with 3 (Table-IV).

**Table-V:** Relationship between Visitors profile and HAI among the participants (n=180)

| Hospital Acquired Infection | Visitors | | | |
|---|---|---|---|---|
| | Up to 2 visitors daily | Above 2 visitors daily | Total | Statistics |
| Yes | 36(20%) | 54(30%) | 90(50%) | df=1 |
| No | 76(42.22%) | 14(7.78%) | 90(50) % | p-value*=37.82 |
| Total | 112(62.22%) | 68(37.78%) | 180(100%) | p< 0.05 |

*p value obtained by chi-square test; The study identified a noteworthy association (p<0.05) between visitors and developing HAI (Table-V). This suggests that number of visitors per day is extremely significant to HAI development.

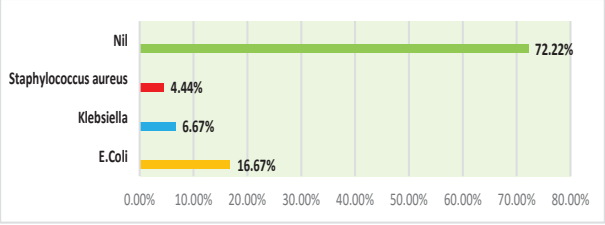


**Figure-2:** Type of microorganisms according to C/S report done (n=180)

C/S reports were identified for 27.78% patients. The C/S test reports were not available for 72.22% patients at the time of data collection. Larger number, 16.67% exhibited E.coli infection, 6.67% were infected by Klebsiella and 4.44% were infected by Staphylococcus aureus (Figure-2).

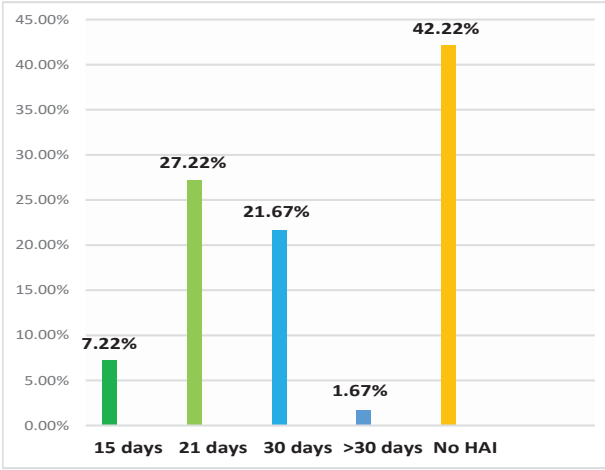


**Figure-3:** Distribution of the patients developed HAI according to Increased Duration of stay at the hospital (n=180)

The study revealed that hospital stay increased to 15 days for 7.22% patients, 21 days for 27.22% patients and 30 days for 21.67% patients. Hospital stays extended to more than 30 days for 1.67% of patients (Figure-3).

## Discussion

This study was conducted to determine the prevalence and pattern of HAI among admitted patients of surgery ward in Dhaka. Total research revealed a concerning prevalence of HAI among the patient's undergoing surgery. The total of which was 104(57.78%). Another study conducted in post operative patients of Dhaka Medical College hospital found HAI cases in 30% of patients.[4] SSI may reach up to 41.7% on 6th day of surgery.[5] Gender profile of male was16(8.89%) and female were 88(48.89%). This difference was due to methodological variation e.g. as the respondents were selected from surgery (general and maxillofacial) and gynecological ward, the percentage of female measured more due to gynecological ward. Gender distribution does not have any association with HAI.[4] Hospital acquired infections include Surgical wound infection, UTI, Bloodstream infection (surgery or gynae ward) and soft tissue infection (oral and maxillofacial surgery ward).[6,7,8] The study focused on assessing the site of infection in post-surgical patients. The findings identified that a significant portion of patients, 87 (48.33%), suffered from surgical wound infections while 11 patients (6.11%) suffered from catheter induced UTI. Both bloodstream infection and soft tissue infection affected 3 patients (1.67%) each. Another study revealed the total prevalence was 3.76% where HAI among the patient of surgical intensive care unit was 25% conducted in Military hospital, Pune, India.[9] In Bangladesh CMH of Dhaka found total 8.33% was HAI where 53.33 % patient developed surgical site infection.[10] The study identified a significant association (p<0.05) by doing chi-square test between number of visitors and development of HAI .This suggests an investigating link between that number of visitors and developing HAI. Dhaka Medical College hospital found the direct association between HAI and increased number of visitors per patient per day.[10,11]

The study observed an increased tendency of tobacco habit 96 (53.33%) reported consuming tobacco, 84(46.67%) consumes no tobacco. Contrasting national survey, the higher prevalence of smokeless tobacco because one third of the population was from the ward of gynae and obstetrics. The study identified a significant association (p<0.05) between tobacco consumers and developing HAI. Tobacco use causes increased rate of surgical site infection and HAI.[12]

C/S reports were identified for 50(27.78%) patients. The C/S test report was not available for 130(72.22%) patients at the time of data collection. There are many challenges prevailing on diagnostic test which were pivotal to decreasing Antimicrobial resistance rates.[13] The predominant microorganisms found in

the reports were E. coli 30(16.67%), Klebsiella 12(6.67%), Staphylococcus aureus 8(4.44%), The national study aligns with the same that investigated the prevalence of micro-organisms responsible for infection of surgery ward where E. Coli showed the highest prevalence 55.9% followed by other organisms were Pseudomonas sp. (33.3%), Staphylococcus aureus (5.9%), Klebsiella sp. (4.9%)[14] klebsiella causes blood stream and surgical site infection.[15] UTI is mostly caused by E.coli, klebsiella and staphylococcus saprophyticus.[16] Staphylococcus aureus is the most common source of odontogenic infection.[17,18]

The study revealed that hospital stay increased to 15 days for 7.22% patients, 21 days for 27.22% patients and 30 days for 21.67% patients. Hospital stays extended to more than 30 days for 1.67% of patients. Extended hospital stay was not required for the 42.22% patients who did not develop HAI. Undoubtedly extended hospital stay creates a huge burden on economy, health and prosperity.[19] Several national and international studies revealed the same situation regarding HAI.[3,20]

The study is a point prevalence survey. Data was taken for two weeks from multiple centers in 2012. Dhaka Medical college hospital and Shaheed Suhrawardy Medical college hospital are the busiest tertiary level hospitals. Many post-surgical infection cases are being referred to here from periphery of the country. So, SSI rate may be very high incidentally. It might not be an exact representation of the whole situation. Conducting the study in a broad scale in different Govt. hospitals would enable to prosecute a more accurate comparison.

The research team delved deeper, with focus on practices that prevailed among patients. This will enable us to investigate the links between such practices and the chances of developing HAI. Supporting previous documents suggests correlations between these practices and HAI.[20]

## Conclusion

The findings regarding Hospital acquired infection in Dhaka resonate with broader public health issues. Although this is a global issue, high frequency of infection in the post operative ward indicates a breach of asepsis either in the operating theatre, post operative ward or other wards. Even though the study is on a small scale, the revelations are quite alarming. Further large-scale studies are necessary, and best suited actions should be implied accordingly.

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