

Hospital Acquired Infection in a General Surgery Ward

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Abstract: Hospital acquired infections are not only an important cause of morbidity and mortality but also increase economic burden. Risk of these infections is further increased when patients are exposed to invasive procedures. The aim of this study was to determine incidence rates of hospital acquired infections (HAI) in a general surgical ward and to develop preventive measures to reduce the risk of hospital-acquired infections. This is a prospective study conducted at III-rd Surgical Clinic of the University Hospital Centre "Mother Theresa" a tertiary care hospital in Tirana during the period 2010-2013. Data were collected on a questionnaire for all the patients who underwent surgery. Proctologic and laparoscopic interventions were excluded from the study. Patients were followed for up to 30 days for development of (HAI). In total, in the study participated 1211 patients with a mean age of 52.7 (\pm 14.5) years and range from 17 to 86 years. 66% of patients are males and 43.6% females. In our study 122 (10.1%) patients developed hospital infection. In total, 129 infections were observed in 122 patients during the hospital stay because in 7 (5.7%) out of 122 patients, more than one type of hospital infection were observed. Surgical wound infection was observed in 73 patients, with an incidence of 6%, Bronchopneumonia was observed in 21 (1.7%), Urinary infection in 16 (1.3%), Vascular access infection in 16 (1.0%) patients (table 2). The overall incidence over the 5-year study period was 10.1%. Surgical site infections remain common and are a major cause of postoperative morbidity. Careful preparation of the patient and care after surgery is especially important. Inconsistent application of infection control practices may contribute to high SSI rates. Implementation of surgical guidelines for perioperative care is essential for prevention of SSI.

Keywords: surgery, nosocomial infection, incidence, prevention

1. Introduction

The World Health Organization offers several definitions of a nosocomial infection/ hospital –acquired infection: An infection acquired in [a] hospital by a patient who was admitted for a reason other than that infection (1). An infection occurring in a patient in a hospital or other health care facility in whom the infection was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge, and also occupational infections among staff of the facility (2). As a general timeline, infections occurring more than 48 hours after admission are usually considered nosocomial. Nosocomial infections are also divided into two classes, endemic or epidemic. Most are endemic, meaning that they are at the level of usual occurrence within the setting. Epidemic infections occur when there is an unusual increase in infection above baseline for a specific infection or organism (3). Nosocomial infections occur worldwide, both in the developed and developing world. They are a significant burden to patients and public health. They are a major cause of death and increased morbidity in hospitalized patients. They may cause increased functional disability and emotional stress and may lead to conditions that reduce quality of life. Not only do they affect the general health of patients, but they are also a huge burden financially. The greatest contributors to these costs are the increased stays that patients with nosocomial infections require. The increased length of stay varies from 3 days for gynecological procedures to 19.8 days for orthopedic procedures. Other costs include additional drugs, the need for isolation, and the use of additional studies. There are also indirect costs due to loss of work (4). Nosocomial infections are most frequently infections of the urinary tract, surgical wounds, and the lower respiratory tract. 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. Infection rates are also higher in patients with increased susceptibility due to old age, underlying disease, or chemotherapy (5,6). Patients are exposed to a variety of microorganisms during a hospital stay, but contact between a patient and an organism does not necessarily guarantee infection. Other factors influence the nature and frequency of infections. Organisms vary in resistance to antimicrobials and in intrinsic virulence. Bacteria, viruses, fungi, and parasites can all cause nosocomial infections. There are multiple ways of acquiring such an organism. The organisms can be transferred from one patient to another (cross-infection). They can be part of a patient's own flora (endogenous infection). They can be transferred from an inanimate object or from a substance recently contaminated by another human source (environmental transfer). The organisms that cause most hospital acquired infections are common in the general population, in which setting they are relatively harmless (7). They may cause no disease or a milder form of disease than in hospitalized patients. This group includes *Staphylococcus aureus*, coagulase-negative staphylococci, enterococci, and Enterobacteria. Factors that increase a patient's susceptibility to nosocomial infections include young or old age, decreased immune resistance, underlying disease, and therapeutic and diagnostic interventions (8). The organisms that cause nosocomial infections are often drug-resistant. The regular use of antimicrobials for treatment therapy or prophylaxis promotes the development of resistance. Through antimicrobial-driven selection and the exchange of genetic resistance elements, multi-drug resistant strains of bacteria emerge. Antimicrobial-sensitive microorganism that are part of the endogenous flora are suppressed, while the resistant strains survive (9). Many strains of pneumococci, staphylococci, enterococci, and tuberculosis are currently resistant to most or all antimicrobials which were once effective (10). The aim of this study was to determine incidence rates of hospital acquired infections in a general

surgical ward and to develop preventive measures to reduce the risk of hospital-acquired infections.

2. Material and Methods

This is a prospective study conducted at III-rd Surgical Clinic of the University Hospital Centre "Mother Theresa" a tertiary care hospital in Tirana during the period 2010-2013. Data were collected on a questionnaire for all the patients who underwent surgery. Proctologic and laparoscopic interventions were excluded from the study. Patients were followed for up to 30 days for development of surgical site infection. Infected cases were identified using CDC, USA definition for surgical site infections. Along with sociodemographic data various other data were collected regarding surgical intervention, duration of operation, length of stay (LOS) wound contamination class (CDC, 1999: clean, clean contaminated, contaminated, dirty) and use of antibiotic prophylaxis. Also were evaluated the incidence of urinary tract infection, venous accesses and lower respiratory tract infections.

Statistical Analysis

The statistical program SPSS 16.0 was used for the analysis of data. Continuous variables were presented as mean and standard deviation (SD) while categorical variables were presented as percentage. Chi square test was used to compare the proportions between categorical variables and ANOVA-one way to compare the length of stay between categories of wound contamination class. A p value ≤ 0.05 was considered statistically significant.

3. Results and Discussion

In total, in the study participated 1211 patients with a mean age of 52.7 (± 14.5) years, median age 51 years and range from 17 to 86 years. 66% of patients are males and 43.6% females. The mean age of male cases ($M = 57.8 \pm 17.8$) with statistically significant difference as compared to women is ($M = 45.9 \pm 18.2$), $p < 0.01$. Sociodemographic characteristics of patients are shown in table 1. In our study 122 (10.1%) patients developed hospital infection. In total, 129 infections were observed in 122 patients during the hospital stay because in 7 (5.7%) out of 122 patients, more than one type of hospital infection were observed. Surgical wound infection was observed in 73 patients, with an incidence of 6%, Bronchopneumonia was observed in 21 (1.7%), Urinary infection in 16 (1.3%), Vascular access infection in 16 (1.0%) patients (table 2). The trend of HAI over a 4-year period in a general surgical ward in a tertiary health facility in Albania was presented. The overall incidence over the 5-year study period was 10.1%. The observed rate of HAI is comparable to other studies from European countries. Studies from the country, (11,12) but lower than rates reported from some other countries. However, direct international comparisons of HAI are often difficult due to methodological differences resulting from definitions of HAI, type of HAI covered and the health units surveyed (13-15). Consistent with other studies, surgical wards continue to be hot spots for HAI. This is often due to the breached skin defenses resulting from invasive surgical procedures. Urinary tract infections (UTI) emerged as the predominant HAI similar to other studies. Pneumonia and blood stream

infections were however not as prominent as reported by some other studies.(16,17). This can be explained by the infrequent use of central intravenous catheters and mechanical ventilators, making urinary catheters the most commonly used invasive device and hence the high prevalence of UTI as established by other studies. Gram-negative bacilli have been commonly associated with hospital-acquired infections. Our findings also showed a predominance of gram-negative bacilli. A study reported a similar ratio of gram-negative bacilli to gram-positive cocci as 4:1. *Staphylococci* were also prominent particularly in blood stream infections similar to other studies (18,19). A noticeable gap in this surveillance system was the lack of routine screening for Methicillin Resistant *Staphylococcus Aureus* (MRSA) which has been made mandatory in some countries.

4. Conclusion

Hospital acquired infections are not only an important cause of morbidity and mortality but also cause severe economic burden throughout the world. Risk of these infections is further increased when patients are exposed to invasive procedures. Breach in intact skin and mucosal lining after surgeries provide opportunity to nosocomial pathogens to invade the internal milieu of the body. Surveillance of these infections is a vital step as it provides an insight into the magnitude of problem and hence helps the authorities to take radical measures and therefore curtail these infections.

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Table 1: Sociodemographic characteristics of patients (N=1211)

Variables	N	%
Gender		
Female	528	56.4
Male	683	43.6
Age, M (SD)	52.7 (±14.5)	
Agegroup, years		
≤20	102	8.4
21-40	442	36.5
41-60	423	34.9
>60	244	20.1
Years		
2010	258	21.3
2011	322	26.6
2012	392	32.4
2013	239	19.7

Table: Frequency of hospital acquired infection

Type of hospital infection	N (%)	95%CI
Surgical site infection	73 (6)	4.73 – 7.49
Bronchopneumonia	21 (1.7)	1.05 - 2.59
Vascular accesses	12 (1.0)	0.52 - 1.74
Urinary tract infections	16 (1.3)	0.74 – 2.11
Total	122 (10.1)	8.46 – 11.93