

Characteristics of hospital and community
Acquired infection
Ina private hospital in cairo

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public health

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ABSTRACT

BACKGROUND: Hospital acquired infections (HAIs) become an increasing worldwide problem as every year many lives are lost because of the spread of infections in hospitals. It thus become very important to review and update the epidemiology and outcome of HAI to be contrasted with community acquired infections (CAIs). Understanding these variables will help us to prioritize resources and plan strategies for decreasing the mortality and morbidity associated with each type of infection. **METHODS:** a cross-sectional hospital based descriptive study design was done. The study included all liver, urinary system, gastro-intestinal system and prostate gland diseased patients admitted to the hospital and identified to have infection whether it was hospital acquired infection or community acquired infection during a two-year period (Jan. 2006 to Dec. 2007). **RESULTS:** One hundred and twenty five patients were included in the study. They were exposed to 167 episodes of infections (108 HAIs and 59 CAIs). The most common type of HAIs was blood stream infection, while the most common type of CAIs was UTI. Patients with liver and gastro-intestinal diseases showed more HAIs than CAIs, while urinary system and prostate patients showed more CAIs than HAIs. Gram negative organisms were the most common organisms found in our study (60 %). *E.coli* is the most common organism involved in both Hospital and community acquired infection with a total of 22.3%.

Key words:-

Hospital acquired infections - Community acquired infection - Infection control.

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ABBREVIATION

APIC	Association for professionals in infection control
BAL	Bronchoalveolar lavage
BMC	Bio medic cell
BSI	Blood stream infection
CAI	Community acquired infection
CAP	Community acquired pneumonia
CDC	Centers for disease control and prevention
<i>Cons</i>	<i>Coagulase negative staphylococci</i>
CRBSI	Catheter related blood stream infection
CRS	Catheter related sepsis
CSF	Cerebrospinal fluid.
CVC	Central venous catheter
CVL	Central venous line
<i>E.Coli</i>	<i>Escherichia coli</i>
<i>ESBL</i>	<i>Extended-spectrum-lactamase-producing enterobacteria</i>
ETT	Endotracheal tube
FBRI	Foreign body related infection
HAI	Hospital acquired infection
HAP	Hospital acquired pneumonia
HgA1c	Glucosylated hemoglobin
HIV	Human immunodeficiency virus
HL60	Human promyelocytic leukemia cells
IC	Infection control

ICU	Intestine care unit
IV	Intravenous
<i>K. Pneumoniae</i>	<i>Klebsiella pneumoniae</i>
MDROs	Multidrug resistant organisms
MMP	Matrix metallopeptidose
MOHP	Ministry of health and population
MRSA	<i>Methicillin resistant staphylococcus aureus.</i>
NAMRU-3	Naval medical research unit no.3
NHDS	National hospital discharge surgery
NI	Nosocomial infection
NNIS	National nosocomial infection surveillance
<i>P. Aeruginosa</i>	<i>Pseudomonas aeruginosa</i>
RSV	<i>Respiratory syncytial virus</i>
<i>S. aureus</i>	<i>Staph aureus</i>
SBP	Spontaneous bacterial peritonitis
SSI	Surgical site infection
TPN	Total parenteral nutrition
HAP	Hospital acquired pneumonia
VAP	Ventilated associated pneumonia
VRE	<i>Vancomycin- resistant enterococci</i>
VRSA	<i>Vancomycin resistant staphylococcus aureus</i>
UTI	Urinary tract infection
WHO	World health organization

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INTRODUCTION

Hospital acquired infection (HAI) (known as Nosocomial infection) is defined as one that was neither present, nor incubating, at the time of admission to hospital and which manifests itself 48 hours or more after hospital admission. HAI became an increasing world wide problem, as every year many lives are lost because of the spread of infections in hospitals. This is why a new revolution in the infection control field has been started all over the world. This has not been only consized to the well-developed countries, but also developing countries started to focus on such issue. In United States, it has been estimated that as many as one hospital patient in ten acquires a hospital acquired infection, or 2 million patients a year. Estimates of the annual cost range from \$4.5 billion to \$11 billion and up. Hospital acquired infections contributed to 88,000 deaths in the U.S. in 1995 (**Klevens *et al.*, 2007**).

In the late 1990s, Egypt became infamous in the world of public health as one of the most hepatitis C-infected countries in the world. This unhappy distinction was caused by many reasons, since it has been found that nearly (60%) of chronic dialysis patients are anti-HCV positive. (**Hassan and Khalil, 2000**). Moreover (The Lancet) stated that between 15 and 20 percent of the Egyptian rural population had been exposed HCV during the massive efforts to eradicate Schistosomiasis, since doctors who were involved in the effort recycled the same needles through a large number of patients and rarely sterilizing them beforehand. (**Frank *et al.*, 2000**).

As for **community acquired infections** are Infections present or incubating on admission to the healthcare facility and not associated with previous treatment/procedures at that health care facility (**Nutty, 2007**).

The current management of community acquired infections, especially for UTIs, is usually empirical without the use of a bacterial culture or susceptibility testing to guide therapy. That's why understanding the community acquired infections profile plays a crucial role in guiding physicians during their empirical treatment and to provide physicians with information about the most common organisms causing different types of community acquired infections. (**Kalpana, 2001**).

Unfortunately, there is no much data about the extent of the problem and the characteristics of both hospital and community acquired infections and their associated risk factors. This has been attributed to the fact that published studies concerning the risk factors of community acquired infections in contrast to hospital acquired infections or its comparison are scarce, especially in developing countries including Egypt.

All these facts caught our attention to the magnitude and the importance of hospital acquired infection as well as the importance of infection control guidelines.

AIM OF THE WORK

The Study is entitled "**Characteristics of hospital acquired and community acquired infections in a private hospital in Cairo**". The main Goal of this study is to enhance infection control procedures in hospital and to assist the infection control practitioners in minimizing the number of infected patients through understanding the profile of both hospitals acquired infection and the community acquired infection. The specific objectives in this study are:

- Identifying the causative agents of both hospital acquired infections and community acquired infections separately concerning liver, urinary, gastro-intestinal and prostatic diseases.
- To identify some possible risk factors associated with each type of infection.

REVIEW OF LITERATURE

1.1 Introduction:

The following standardized definitions are used for the following medical terms.

Infection is invasion by and multiplication of pathogenic microorganisms in a bodily part or tissue, which may produce subsequent tissue injury and progress to overt disease through a variety of cellular or toxic mechanisms.

By definition **hospital acquired infections (HAI)** (also known as nosocomial infections) is defined as one that was neither present, nor incubating, at the time of admission to hospital and which manifests itself 48 hours or more after admission, it can be transmitted through various routes e.g. contact, droplet, air borne (**WHO, 2002**).

While **community acquired infections (CAI)** are Infections present or incubating on admission to the healthcare facility and not associated with previous treatment/procedures at that health care facility (**Nutty, 2007**).

N.B. each event of infection whether it was HAI or CAI is named as an episode of infection.

1.2 Classification of infection:

Infections have been classified according to as follows:-

1. Exogenous and endogenous infections
2. Preventable and non preventable infections
3. Colonization, subclinical and clinical infections

1.2.1 Exogenous and endogenous infections

A) Exogenous infections:

These result from transmission from external sources to patients through the following routes

- Air borne.
- Water and food borne.
- Contact including inoculation, either contaminated blood, contaminated infusion fluids or accidental injury from contaminated sharps or instruments.

B) Endogenous infections:

These occur when the causative organisms are present as a part of the patient's flora (Spleman, 2002).

1.2.2 Preventable and non preventable infections:

A) Preventable infections:

These are infections which could have been avoided if an event related to the infection had been alerted e.g. hand washing before handling an intravenous device may prevent transmission of organisms from hands of personnel to the intravenous site. Nosocomial infections that are most preventable are caused primarily by medical devices used for patient care (Haley *et al.*, 1985).

B) Non-preventable infections:

These are infections which occur regardless of all preventable strategies, e.g. immuno-compromised patients who develop gram negative septicemia from their own flora (endogenous source) (Habarth *et al.*., 2003).

1.2.3 Colonization, subclinical and clinical Infections:

A) Colonization

It is the presence and the multiplication of micro-organisms in or on a host with no clinical manifestations or detectable immune response.

B) Subclinical Infections:

An unapparent, asymptomatic infection, or an infection that has such a mild course.

C) Clinical Infections:

When sufficient damage is done resulting in clinical signs and symptoms. (Boots and Bowers, 2004)

1.3 History of infection control

Detection and care for hospital acquired infections started since the middle of the 19th century. In 1861, Semmelweis introduced hand washing with chlorinated water which caused dramatic reduction in the infection rate. In 1863, Florence Nightingale established important principles of nursing, hospital design and hygiene. This was followed by Lister in 1867, who introduced his antiseptic surgery, with extensive use of carbolic acid for packing wounds, sterilizing instruments and sutures, and decontamination of hands.

In 1869, Simpson pointed out that sepsis gangrene and pyemia were common in large urban hospitals than in rural practice. In 1894, Von Bergman established a technique and Hutinel provided basic isolation systems for diphtheria and other infectious diseases in children's and fever hospital (**Speller and Humhreys, 1998**).

The discovery of pathogenic bacteria in the beginning of the 20th century provided a new basis for the study of hospital acquired infection. Cruickshank in 1935 with Okell and Elliot in 1936 pointed out the importance of *streptococcus pyogenes* in burns and postoperative infections. Until the 2nd world war, aseptic surgery seemed adequate to keep the wound infection at a low level. By that time, wounds became readily infected in hospitals and the local application of mild antiseptics to wounds proved to be ineffective by Cruickshank in 1944. This continued until the end of the Second World War by the appearance of the penicillin, which gave considerable benefit (**Fraser, 1984**). Later, many of the methods of infection control; e.g. supplying clean air for operating room, procedures for wound dressing and the provision of isolation units were established for the present system of hospital infection control (**Wilms et al., 1977**).