INTRODUCTION

Nosocomial infections are the major source of morbidity and mortality in long-term care facilities ***(Linda, 2006***).

The purpose of infection control is to prevent or limit the acquisition and spread of pathogenic micro-organisms, by using scientifically based knowledge and thorough planning, surveillance, education and research as part of the overall policy of achieving high quality health care ***(CDC, 2006).***

Nosocomial infections constitute a major problem in Egypt requiring more interest and attention than it does presently receives. Firstly, it is responsible for a good deal of morbidity and mortality in patients admitted to different hospital sections, Secondly, we have no records, statistics, or analyses concerning the problem and no universal program or approach to control such infections **(** ***Rasslan & Abd Elsabour, 2004)*****.**

Psychiatric patients have been found to suffer from a number of infections in a higher frequency than other populations, and the prevalence of infections in psychiatric patients may vary substantially among countries ***(Olga & Patricia, 2008)*****.**

Aim of the Study

This study aims to assessing nosocomial infection control measures in psychiatric inpatients

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This aim was achieved through answering the following questions:

1- What are the health personnel practice, knowledge and attitude regarding to Infection control measures?

N.B. Health personnel include(psychiatrists and nurses) and housekeepers.

2- What are the patient's behaviors related to infection control?

3- What are the available facilities in the patient's environment?

Research Hypothesis:

As the psychiatric inpatients deal very little with invasive procedures, therefore, they may neglect infection control measures.

Nosocomial Infection

Terms Related to Infection

Infectiion means that an invasion and multiplication of microorganisms in body tissues, which may be clinically unapparent or result in local cellular injury due to competitive metabolism, toxins, intracellular replication or antigen antibody response (immune response). The infection may remain localized, subclinical and temporary if the body's defensive mechanisms are effective ***(Linda, 2006***). A local infection may persist and spread by extension to become an acute, sub acute or chronic clinical infection or disease state. A local infection may also become systemic when the microorganisms gain access to the lymphatic or vascular system ***(Phipps et al, 2002).***

Moreover, infection means that an Invasion by and multiplication of pathogenic microorganisms (bacteria, virus, fungus 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. An instance of being infected, an agent or a contaminated substance responsible for one's becoming infected. The pathological state resulting from having been infected **(CDC, 2006).**

Definitions of Nosocomial Infection

Infectious disorders are conditions caused by infectious agents called microorganisms. ***(Barbara & Timbes, 2001)***

The term nosocomial originating or taking place in a hospital, acquired in a hospital, especially in reference to an infection. It comes from two Greek words: "nosus" meaning "disease" + "komeion" meaning "to take care of." Hence, nosocomial should apply to any disease contracted by a patient while under medical care. However, nosocomial has been whittled down over the years and now just refers to hospitals -- it is now synonymous with hospital-acquired ***(Medicine Net Authored, 2004***).

A hospital-acquired infection, also called a nosocomial infection, is an infection that first appears between 48 hours and four days after a patient is admitted to a hospital or other health-care facility **(*Andreoli, 2001).***

Further more, nosocomial infection means that any clinically recognizable microbial disease that affects the patient as a consequence of his being admitted to hospital or attending for treatment; or such disease affecting a member of the hospital staff as a consequence of work, whether or not the symptoms of disease appear while the affected person is in or working in the hospital ***(Akguns et al. 2001).***

Nosocomial infections are preventable. Nosocomial infections not only prolong the hospital stay and increase the cost of hospitalization; they also result in increased morbidity and mortality. Therefore it is the responsibility of all health care workers to practice preventive measures ***(Falagas, et. al, 2000).***

The Infection Control Manual is developed to increase awareness among all health care workers regarding the prevention and control of nosocomial infections and to increase compliance with safety measures, particularly Universal Precautions. The safety of the patients and employees lies in the understanding and conscientious application of these basic principles, especially for those patients with infections or diminished resistance to infection ***(CDC, 2006)***.

Epidemiology of Nosocomial Infections:

In endogenous infection, self-infection, or auto-infection, the causative agent of the infection is present in the patient at the time of admission to hospital but there are no signs of infection. The infection develops during the stay in hospital as a result of the patients altered resistance ***(Robert, 2002).***

In exogenous, it is followed by cross-infection, during the stay in hospital, the patient comes into contact with new

infective agents, becomes contaminated, and subsequently develops an infection ***(Normans .S. et. al., 2002).***

Healthy people are naturally contaminated. Feces contain bacteria, and the number of microorganisms on skin varies. Many species of microorganisms live on mucous membranes where they form a normal flora. None of these tissues, however, is infected. Microorganisms that penetrate the skin or the mucous membrane barrier reach subcutaneous tissue, muscles, bones, and body cavities (e.g. ,peritoneal cavity, pleural cavity, bladder), which are normally sterile (i.e. contain no detectable organisms). If a general or local reaction to this contamination develops, with clinical symptoms, there is an infection ***(Phipps et al., 2002)***.

Agents of Infection

The agents of infection, which are many, are classified in six general categories:

1. Bacteria the most common cause of infection. They are present in large numbers in the environment and in the body, and the vast majorities are non-pathogenic. When the normal distribution is disturbed or the host is wakened, bacteria can cause disease by invasion and destruction of tissue, and by the production of toxins ***(Rosenberg, 2003).***

2. Viruses: The intracellular parasites are wholly dependent upon the host call for reproduction. Diseases caused by viruses are generally not susceptible to antibiotic treatment ***(Gudjonsson .et al., 2003).***

3. Fungi these are vegetative organisms which are subdivided into yeasts and molds. Many of the pathogenic fungi are opportunistic and cause disease only in the immune compromised host ***(Caceres & Weiss., 2003).***

4. Rickettsiae diseases : there are a group of febrile infectious caused by micro-organisms, carried by an intermediate host, usually a rodent, and transmitted to humans by fleas, lice, ticks and mites ***(CDC, 2006)***

5. Protozoa: These are unicellular micro-organisms which invade certain target organ systems in humans. Some cause intestinal disease (amoebiasis); others cause malaria. ***(Akguns et al., 2001)***

6. Helminths: These are parasites usually infecting the intestinal system, but can cause disease in the lungs, eyes, and blood. They are classified as round worms, tape worms and flukes ***(Beare & Myers, 2002)***

Causes of Infection:

Hospital-acquired infections can be caused by bacteria, viruses, fungi, or parasites. These microorganisms may already be present in the patient's body or may come from the environment, contaminated hospital equipment, health care workers, or other patients. Depending on the causal agents involved, an infection may start in any part of the body. A localized infection is limited to a specific part of the body and has local symptoms ***(Rosenberg. 2003).***

All hospitalized patients are at risk of acquiring an infection from their treatment or surgery. Some patients are at greater risk than others, especially young children, the elderly, and persons with compromised immune systems ***(Falagas. et al., 2000).***

The risk factors for hospital-acquired infections include the use of antibiotics for more than 10 days, use of invasive devices, poor postoperative status and immune system dysfunction ***(Janice, 2001).***

Other risk factors that increase the opportunity for hospitalized adults and children to acquire infections are:

- A prolonged hospital stay.
- Severity of underlying illness.

- Compromised nutritional or immune status.
- Use of indwelling catheters.
- Failure of health care workers to wash their hands between patients or before procedures.
- Prevalence of antibiotic-resistant bacteria from the overuse of antibiotics ***(Pina, 2002).***

Routes of Infection Transmission:

How nosocomial infections occur, it occurs when an organism is able to colonize and multiply within a host. For microorganisms to cause infection, they must have disease causing potential (virulence), be transmitted from its reservoir, gain entry into susceptible host ***(Lemone & Burker, 2003*).**

Micro-organisms are transmitted by various routes; the same micro-organism may be transmitted by more than one route. The differences infectivity and in the mode of transmission form the basis for the categories of isolation and precautions that have been devised to prevent the spread of infection ***(CDC, 2006)***

There are several majors' routes of transmission:

1. Contact

Involves direct physical transfer from an infected person to a susceptible contact, such as occurs between patient and

hospital staff; giving baths, changing dressings, or performing other procedures requiring direct personal contact. Direct contact may also occur between patients ***(Barrett, 2003).***

Infectious agents may come in contact with the conjunctivae, nasal passages, oral and respiratory tracts, and the uro-genital tract as a result of coughing, sneezing, talking, laughing, singing, or kissing by a carrier. This is considered a contact infection because of the close association necessary for droplet passage ***(Bobb, 2001).***

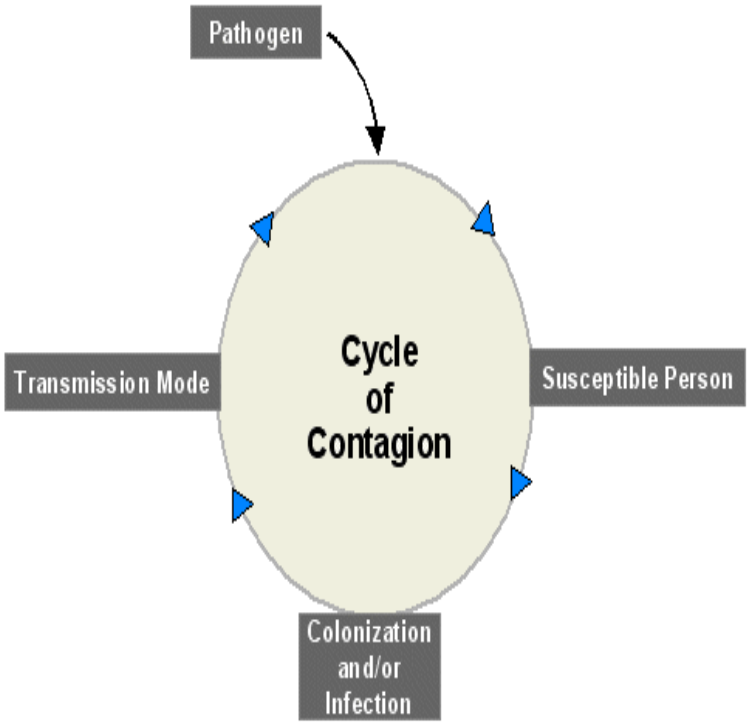
2. Fomites are inanimate objects which have been contaminated with micro-organisms, by handling or other physical contact with a carrier, or with the secretion, body fluids or droplets from a carrier. Fomites include linens, dressing, instruments, as well as pens, pencils, doorknobs, and tableware ***(Bennet & Gordone, 2003).***

3. Airborne certain organisms can be spread from one person to another without direct contact with body or droplet or object. These organisms can be spread through air-conditioning and ventilation ducts, for example, as in legionnaire's disease ***(Richard, 2005).***

4. Water, Food when contaminated water or food is ingested or in any other way comes in contact with the susceptible host, infection may be spread ***(Dorland, 2003).***

5. Vector-Borne some pathogens are transmitted from the host organism to susceptible persons via an intermediary, such as a mosquito, flea, tick or mite **(*Dennice, 2004).***

Figure (1)*:* Understanding How Infections Spread: The Cycle of Contagion.



The Cycle of Contagion model *(CDC, 2006)*

Sites of Infection

Urinary tract infection: Asymptomatic bacteria are applied to those persons having colony counts of > 100,000 organisms/ml. without previous or current manifestations of infections. Such asymptomatic urinary tract infection should be classified as nosocomial if an earlier urine culture was negative. If there is a subsequent culture of greater than 100,000 per ml, it should be regarded as a nosocomial infection. Onset of clinical signs or symptoms of urinary infection (fever, dysuria, hematuria, elevated white blood cells, positive urine culture ***(Baule, 2004*)**.

Upper and lower respiratory Infections this category includes manifestations of infection of the nose, throat, or ear. The majority of these infections will be viral in origin **(Anil *et al., 2004)***. The clinical picture and presence of multiple cases on a unit will indicate a nosocomial cluster. Clinical signs/symptoms of these infections developing after admission are considered as sufficient evidence to diagnosis respiratory infection such as sore throat, rhinitis, congestion, cough, sputum, chest pain, shortness of breathing, fever, increase pulse rate, elevated white blood cells& positive x- ray findings& culture **(Timbes, 2004).**

Skin and Subcutaneous Infections: any purulent material in skin or subcutaneous tissue developing after admission is

considered nosocomial. This category includes non-surgical wounds as well as various forms of dermatitis and decubitus ulcers. A change in pathogens cultured is regarded as a nosocomial infection. Cellulites caused by bacteria are usually not accompanied by purulent drainage. In such instances primary reliance must be on clinical judgment. The signs of these infections are pain, tenderness, redness, warmth, swelling, edema and itching **(*Gregory, 2003).***

Clinically symptomatic gastroenteritis having its onset after admission and associated with a culture which is positive for a known pathogen is classified as a nosocomial infection. ***(Watson & Beck, 2000).*** If the incubation period for the pathogen is known (i.e. Salmonella), the interval between admission and the onset of clinical symptoms (nausea, vomiting, diarrhea, anoxia, abdominal cramps, distension, fever, increase pulse rate & elevated white blood cells) must be greater than the incubation period to label the infection as nosocomial. Nosocomial gastroenteritis may also be diagnosed if a previous culture on admission was negative. Gastroenteritis of viral origin may also occur; bacterial cultures will be negative **(*Jane & Fried, 2004)***.

Other infections: any culture-documented bacteremia developing after hospitalization is a nosocomial infection, Indwelling urinary catheters and needles: Purulent drainage

from the site of a catheter or IV site is regarded as a nosocomial infection even if no culture is obtained. Inflammation of such sites without purulent drainage may indicate nosocomial cellulites; clinical judgment prevails, Endometritis: Purulent cervical discharge accompanied by either a positive culture for pathogen or systemic symptoms of infection is regarded as nosocomial endometritis ***(Panton & Tandal, 2004).***

Complications of Infection

As regard complications of infection the gram negative or positive organisms, E. Coli, klebsiella, proteus and pseudomonas are responsible for 60% to 70% of septic shock cases , staphylococci, pneumococci and streptococci are gram positive microorganisms also frequently implicated ***(Tierney, 2001).***

There are local complications such as cellulites and pneumonia may progress to abscess formation and systematic complications may develop as a result of inadequate therapy. Even small local infections, if untreated or treated inadequately, may spread locally or via blood stream to produce significant complications such as leukocytosis or leucopenia and disseminated intravascular coagulation ***(Ignativicius et al, 2003).***

Jane (2004) stated that, an infection is suspected any time a hospitalized patient develops a fever that cannot be

explained by the underlying illness. Some patients, especially the elderly, may not develop a fever. In these patients, the first signs of infection may be rapid breathing or mental confusion.

***Barbara (2004*) added that** diagnosis of a hospital-acquired infection is determined by:

- evaluation of symptoms and signs of infection
- examination of wounds and catheter entry sites for redness, swelling, or the presence of pus or an abscess
- a complete **physical examination** and review of underlying illness

Moreover, ***Robert (2004)*** added that hospital infection diagnosed by:

- laboratory tests, including complete blood count especially to look for an increase in infection fighting white cells; urinalysis, looking for white cells or evidence of blood in the urinary tract; cultures of the infected area, blood, sputum, urine, or other body fluids or tissue to find the causative organism
- chest x ray may be done when pneumonia is suspected to look for the presence of white blood cells and other inflammatory substances in lung tissue
- review of all procedures performed that might have led to infection