HOSPITAL INFECTION

ESSAY

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BY

NAGY ZAKY AMIN
M.B.,B.Ch.

Supervised by:

Prof.Dr. Abd El-Meguid El-Shinnawy
Professor of General Surgery
Ain-Shams University

And

Dr. Amr Sherif
Lecturer of General Surgery
Ain-Shams University

Faculty of Medicine
Ain-Shams University

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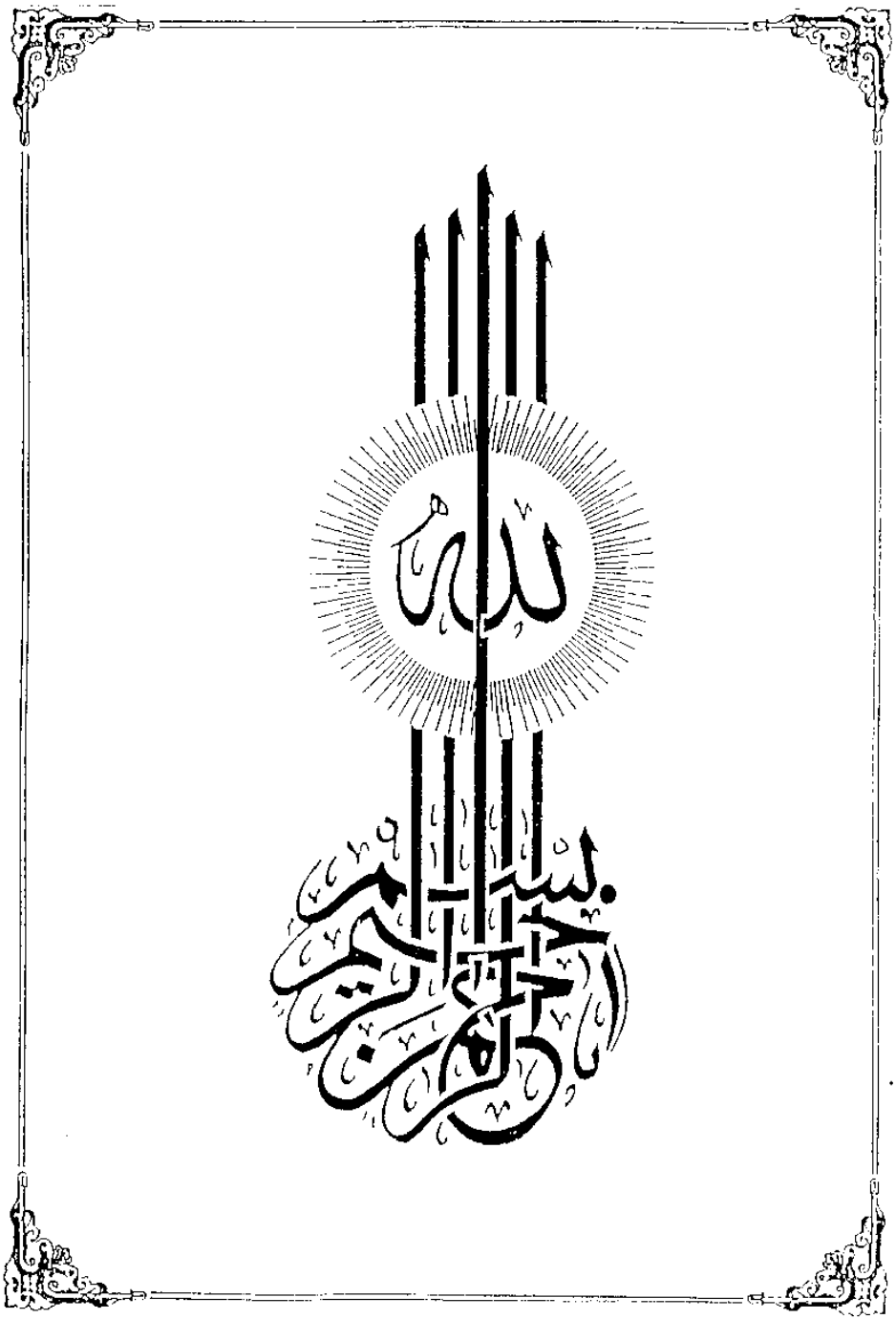

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INTRODUCTION

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Nosocomial infection has been a problem as long as there have been hospitals. The word nosocomial, derived from a Greek root, means "in the hospital", thus, nosocomial infections are those acquired in the hospital (Pelczar and Chan, 1981).

Nosocomial infections are those infections that develop within a hospital or are produced by microorganism acquired during hospitalization. Nosocomial infections may involve not only patients but also any one who has contact with a hospital, including members of the staff, volunteers, salesmen and delivery personnel. The majority of nosocomial infections in patients become clinically apparent while they are still hospitalized. However the onset of disease can occur after a patient has been discharged (Brachman, and Bennett, 1979).

It should be noted that we use the word sepsis for an acute inflammatory disease - usually with pus formation - whether or not septicaemia. Definitions now generally used include all microbial diseases that develop in hospital patients after the expiry of the supposed incubation period of the disease (Parker, 1984).

On other words, hospital infection includes both :

Infections acquired while in hospital and

Infections acquired in the community which are then brought into hospital.

Recent surveys in Britain indicate that about half of all the infections occuring in hospital in-patients are hospital acquired. These studies also show that between 8 and 16% of hospital patients acquire infections while in hospital. Serious hospital infections due to Gram-negative bacilli have increased greatly in incidence during the last 30 years and the ultimate consequence of these may be fatal Gram-negative septic shock. New or previously unrecognized serious problems have occasionally occured in recent years.

such as hospital - acquired Legionnaires' disease. Members of the hospital staff are also sometimes at risk from diseases such as tuberculosis or hepatitis (Shanson, 1982).

Nosocomial infections occur in approximately 5% of all patients admitted to hospital in the United States. Over 80 percent of these infections involve the urinary and respiratory tracts and surgical wounds (Joklick and Willet, 1976).

Nosocomial infections are a major public health problem today not only for patients, but also for each patients family, community and state. There are some hospitals with a lower rate, but others have a more serious problem. Some areas of a hospital have more serious problems than other areas, and some patients are at greater risk than others (Brachman and Bennett, 1979).

Some more light is thrown over this problem, so that its different aspects may be well considered by the personnel in surgical departments, in an attempt to minimize its impact both medically and economically.

HISTORY OF HOSPITAL INFECTION

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Interest in infection acquired in hospitals began long before micro-organisms have been implicated as their cause.

The first stage in this history may be said to have begun with the investigations of Semmelweis (1861) into the prevention of puerperal fever. He was the first to show that this was an infectious disease and the first to show how it could be prevented.

The introduction of "antiseptic" surgical methods by Joseph Lister (1867), and their use, resulted in such a dramatic reduction in sepsis rates that the scientific study of wound infection waned for over a quarter of a century.

In the last years of the nineteenth century interest was transferred to children's hospitals, in which mortality rates from hospital-acquired scarlet fever, diphtheria and measles were very high.

Between 1880 and the end of the century, haemolytic

streptococci, staphylococcus aureus and pseudomonas aeruginosa were shown to cause septic diseases, but their role in hospital acquired infection was seldom recognized except in epidemics among babies . Serious interest in the bacteriology of wound sepsis did not begin until the first world ware (1914-1918) when the failure of aseptic surgical methods to prevent infection in gun shot wounds became obvious.

Cruickshank (1935) showed that the spread of haemolytic streptococci in burn units was similar to that observed earlier in gunshot wounds. There were important studies of the spread of haemolytic streptococci in scarlet-fever wards (Allison and Brown, 1937) and ear, nose and throat departments (Okell and Elliott, 1936).

During the second world war (1939-1945), bacteriological studies revealed that a considerable proportion of normal persons were carries of staph. aureus, that colonized but uninflamed wounds were a rich source of organisms, and that Gram-positive pathogens tended to accumulate on surfaces and indust in rooms occupied by patients.

Antibiotics active against pyogenic organisms began to be widely used towards the end of the second world war and raised hopes that wound sepsis would no longer cause serious difficulties.

Soon after the introduction of antibiotics, various Gram-negative aerobic bacilli appeared as increasingly common causes of serious septic infection. Before 1945 Escherichia coli had been a moderately important but little studied cause of sepsis. By the early 1950, it has been joined by proteus and Klebsiella strains and by Ps. aeruginosa, which were more of ten resistent to antibiotics available at the time.

Recent advances in medical and surgical techniques revealed that gross impairment of the body's defence mechanisms may be an inevitable consequence of or even an essential element in the treatment of the patient's underlying disease. The prevention of infection in immunodeficient patients has thus now become a matter of considerable importance (Parker, 1984).

Although with the use of antibiotics the number

of deaths due to nosocomial infections declined rapidly, the number of cases had no corresponding decline (Pelczar and Chan, 1981).

The majority of hospital acquired infections are of minor or moderate clinical importance but nevertheless may cause distressing morbidity, lengthen hospital stay and increase cost (Shanson, 1982).

MORPHOLOGY AND STRUCTURE OF BACTERIAL CELL

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Bacteria are distinguished from all other forms of life by their procaryotic structure, i.e. their nuclear material is not enclosed in a nuclear membrane. The bacterial cell consists of :

The cell wall : This is extremely important. In Gram-positive bacteria it is thick and monolayer and formed of peptidoglycan. Gram-negative bacteria have a thin and multilayer cell wall. It is composed of an outer membrane that contains the O antigen and a relatively thin layer of peptidoglycan that is in contact with the plasma membrane (Pelczar and Chan, 1981).

When the cell wall is deprived as by penicillin, Gram-positive species become completely naked and osmotically fragile. Gram-negative species are partly protected by the lipopolysaccharide of their cell walls, which is not affected by penicillin. On the other hand, Gram-positive bacteria are more resistant to physical disruption than Gram-negative species.