

Nosocomial infections



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Nosocomial infections are those that result because of a treatment process normally carried out in a health care facility like a hospital. Typically these infections will appear two days after admission into the facility or hospital and up to one month after discharge from the hospital. Nosocomial infections are also known as health care associated infections or hospital acquired infections. These infections are not genetic in nature. They are typically caused by a pathogenic organism that may invade the body and cause that particular type of infection. The Centre for Disease Control and Prevention (CDC) in the US puts forth estimates on infections at about 2 million resulting into 100, 000 deaths annually. In Europe nosocomial infections account for two thirds of the 25, 000 deaths annually.

Typically nosocomial infections result in blood stream infections, urinary tract infections and severe pneumonia. Most of these resulting infections have been known to exhibit antibiotic treatment resistance. The bacteria strains behind these infections are quickly evolving into Gram negative bacteria which is typically infecting people outside the health care facility.

These health care associated infections being widely prevalent are now being considered as important contributors of mortality and morbidity. They are continuing to increasingly attract attention due to the fact that increasing populations resulting in crowding, increased bacterial resistance especially to antibiotics, new strains of microorganisms and impaired immunity due to age, treatments and illness. Nosocomial infections continue

to attract concerted focus. For developing countries these infections have become a major cause of preventable disease and death. The infections of concern and focus in this bracket include diarrhea, pneumonia and urinary tract infection, maternal and new born infections and those resulting from surgery and invasive medical procedures. Studies continue to indicate that the organisms that cause these hospital acquired infections usually come from a patient - endogenous flora. However they can also result from contaminated instruments and needles, environment - exogenous and contact with health care staff which are cases of cross contamination. Due to the fact that patients are mobile and admission periods have become shorter, a discharge is always initiated before the nosocomial infection becomes evident in the patient. This in turn has made it difficult to determine the causing organisms nature, whether it is exogenous or endogenous. When hospital attendants are complacent and ignore to practice correct hygiene regularly, nosocomial infections are likely to occur. As the hospital staff attends to one patient after another they themselves can be carriers of the pathogens. The use of the out-patient treatment procedure means crowding as more people are hospitalized due to illnesses and a generally weakened immunity. It has also been noted that certain medical procedures which override the body's natural immunity have resulted into a compromise of the defence system resulting into nosocomial infections. Health care facilities and hospitals continue to uphold sanitation protocols by the use of uniforms, washing and sterilization of equipment. It has been proven and has become acceptable standard procedure to wash hands using alcohol rubs before and after every patient contact. This is one of the ways available to combat nosocomial infection incidences. The

controlled administration and prescription of anti- microbial agents such as antibiotics is also of great importance as far as nosocomial infections are concerned. The general view is that patients should have antibiotic prescription to treat illness but this sometimes may increase selection pressure resulting into resistant strains of the microorganism. The MRSA, Gram positive bacteria and Acinetobacter which is considered Gram negative are the cause agents of nosocomial infections. Currently drugs to effectively handle Acinetobacter germs are in short supply. Studies continue to show that Acinetobacter germs are evolving are becoming resistant to existing antibiotics. One typical case is that one of *Klebsiella pneumoniae* a strain prevalent in Brooklyn , New York city which is showing signs of resistance to all modern antibiotics. These germs are also fast spreading around the world. The Gram negative bacteria so classified because of its reaction to the Gram test has been known to cause infections of the bloodstream, urinary tract and severe pneumonia. These Gram negative micro organism has a unique cell structure that makes it difficult to attack unlike the Gram positive type.

Statistical data is now available in terms of country figures showing the annual infection rates. The CDC in the US puts forth 1. 7 million infections annually with a mortality rate of 99, 000 during the same period. The cost incurred ranges between 4. 5 billion dollars to 11 billion dollars. The infections in France have been as indicated from 6. 7% in 1990 to 7. 4% Nationally the infection rate stood at 6. 7% for 1995, 5. 9% for 2001 and 5. 01% for 2006.

The United Kingdom has a 10% infection rate and an 8. 2% estimate in 2006. Finland has estimated infection rates at 8% in 2006.

Typically the Gram negative germs affect most often the hospitalized patients due to their weakened immune system. The Gram negative germ survives for long periods of time on surfaces entering the body through wounds, catheter and ventilators.

The contact transmission route remains the most frequent and important mode of transmission for this type of infections. Contact transmission may either be direct in which case involving direct body surface to body surface contact and subsequent transference of the bacteria from the host. This will normally result from circumstances such as a person (medical staff) physically turning patient, giving the patient a bath or any other activity requiring direct personal contact. This can also transpire between two patients. The indirect contact transmission involves a host and a contaminated object. This object maybe needles or dressing, instruments or gloves. The improper use of bags, vials and saline flush syringes also fall under this category of transmission. Microorganisms can also be passed onto the host by contaminated food, water, contaminated equipment and medication all of which fall under common vehicles of transmission.

Droplet transmission also a mode of transmission for the Gram negative germs. Droplets generated from source through coughing , sneezing and talking or during bronchoscopy convey the germs from the person and deposited on the host. Airborne transmission mode would fall the droplet transmission. In this case residue particles present in evaporated droplets which is a medium for the microorganism are suspended in the air for long periods of time. The germs in this case are widely dispersed and often enter the host through inhalation.

Gram negative germs can also be transmitted through vectors such as flies, rats and mosquitoes.

Nosocomial infections have various impacts. They generally reduce the quality of life when they result in disabling conditions. They cause emotional stress and functional impairment. The impact is much greater even among the countries poor in resource. Due to the little progress made to address the prevalence of nosocomial infections, their condition is deteriorating. The overall effect of this has been that the cost of health care has increased. This is as a result of increased periods in the duration of hospitalization, use of auxiliary medical care services such as lab tests, X- rays and transfusions. The treatment with expensive drugs may also be considered under this heading.

Nosocomial infections point to certain risk factors. This factors will pre-dispose a patient to infection. Treatments such as immunosuppression and ant acid which form part of the patient's treatment tend to undermine the body's defence. Recurrent blood transfusions and anti microbial therapy are also considered as contributory risk factors.

The use of invasive devices such as catheters, surgical drains, tracheostomy tube, and intubations overrides the body's natural lines of defence promoting pathogen invasion leading to an infection. Premature birth, immunodeficiency due to illness , irradiation and drugs which are some of the states of hospitalization impair their body's defence against bacteria.

The prevention of nosocomial infections is directed towards isolation precautions. These precautions are aimed at preventing transmission. The

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interruption process is normally directed at transmission. Common practices such as washing hands and gloving helps to reduce the risk of skin microorganism transference between persons. Washing of hands promptly and repeatedly after every patient contact procedure has become an important part of controlling infection and also serves as an isolation precaution. Although a simple process, hand washing is nonetheless ineffective because it is often performed incorrectly. Gloves must be changed between patients and hands must be washed after the gloves have been removed. Sanitizing surfaces is also another way of effectively breaking the cycle of infection. However this also has been overlooked. The use of sanitization methods such as NAV-CO₂ has proven effective against MRSA gastroententis and influenza. Sometimes hydrogen peroxide has also been in use. Using disposable aprons is also a method that can be employed to combat the transmission of nosocomial infections.

One of the areas of concern among the general medical fraternity is the antimicrobial resistance phenomenon. The Gram negative bacteria that is a cause of the nosocomial infections is a drug resistant agent. Malaria, TB, gonorrhoea and ear infections are difficult to treat because of the drug resisting pathogens. A school of thought has indicated that in the near future we are likely to witness increased incidences of untreatable bacterial infections. A study by National Academy of Science puts the annual treatment cost for antibiotic resistant infections at approximately 30 billion dollars. While looking at the advent and development of antimicrobial resistance, we must consider the ability of the organism to speedily adapt to altered or new environment. These organisms being unicellular will rapidly

evolve via a single gene mutation. A general view of the scope of the antimicrobial resistance takes into account a number of factors. The emergence of resistant strains such as *Staphylococcus aureus* in hospitals and non hospital settings. Similarly *Streptococcus pneumoniae* leads to many cases of pneumonia and meningitis, and this strain is resistant to penicillin.

The appearance of multi drug resistant TB has also elicited a lot of concern over the recent times especially so for the treatment of people with HIV. *Shigella dysenteriae*, *Vibrio cholerae*, *Salmonella* and *Eschenchia* remain some of today's highly drug resistant pathogenic bacteria that are currently responsible for diarrhea (1676 words) //934 words left