INTRODUCTION

Pseudomonas aeruginosa spp. belongs to Pseudomonas family which is Gram negative long rods bacterium. This microorganisms can be grown in both aerobic and anaerobic conditions, they favour moist environmental condition to grow rapidly or in another words we could explain that this Pseudomonas species could grow better in moist conditions. This pathogen commonly effects individuals who have less immunity and it is associated with the hospital-acquired infections, most probably in immune compromised patients. Pseudomonas aeruginosa contributes around more than 10% of all hospital-acquired infections and it is the next often found pathogen from intensive care unit.

The habitat of Pseudomonas aeruginosa are as follows:

They found in the environments like as soil, water, Lakes, streams, rivers, and other moist environment like fresh waters ponds, water sources like as sinks, showers.

Pseudomonas species is notorious thus they could contaminate hospital equipments like Respiratory therapy equipment Catheters, dialysis tubing, and respiratory devices. Hence It would colonize and infect sick patients, immunocompromised hospitalized patients, any kind of patient which has a weak immunity are at high risk of infectious by Psuedomonas species specially Pseudomonas aeruginosa care of in the hospital.

This organisms is readily found in fruits and vegetables. Some extreme conditions with high temperature like Hot tubs.

Pseudomonas aeruginosa is a gram-negative aerobic bacillus, it could be sampled from wide range of sources like soil, water, various plants, faeces of animals and from human beings. Pseudomonas is pathogenic for human population, plant kingdom and also wild animals populations. Pseudomonas has its minimal requirement for growth. That's the reason it could form its biofilms easily and transmit infection. The organisms are acquire pathogenicity in certain conditions like less immunity, inadequate maintenance of hygiene, such cases have been
seen in corneal infections where lenses are kept unclean. Pseudomonas shows continuity of their growth in various environmental conditions.

Pseudomonas has shown multiple drug resistant feature which helps or enhances pseudomonas to survive. This ability makes it known as an effective opportunistic pathogen. It causes very less or rare infections to healthy individuals. It is a common saprophytic organisms. The unique feature of the organism is due to its ability of permeability and its chromosomal mutations. The disease begins when there is a alteration in hosts defence which will alter metabolic functions due to bacterial infections.

Bacterial infections would lead to bacterial invasions, as in urinary catheters, intravenous lines or so called as Endotracheal tubes. In some instances, there would be an underlying dysfunction of specific host-defense mechanisms, such as neutropenic or iatrogenic immunosuppression patients.

The organism has multiple drug resistance pathogenic ability. Diseases are caused by P. aeruginosa must be could be cellular injury by endotracheal intubation. Its initial action is to attach epithelial cells in the respiratory tract. The virulence factors attach for the virulence of Pseudomonas is its resistance against antibiotics and antipseudomonal beta lactams. It has shown resistant to recent generations antibiotics like cephalosporins, neomycin, tetracyclin, carbapenems and monobactams have becoming challenging factors today in the medical field. Some of the challenging *Pseudomonas aeruginosa* infections has been discussed here.

Pneumonia The patients who are suffering from cystic fibrosis have their lungs colonized with *Pseudomonas aeruginosa*. In later stage these patients may develop a chronic pneumonia, which progressively destroys their lungs. Immunocompromised patients (cancer patients and intensive care unit patients) are highly susceptible to pneumonia caused by *Pseudomonas aeruginosa*.

Osteomyelitis

Diabetic patients have an increased risk of developing foot ulcers infected with *Pseudomonas aeruginosa*. The infection can penetrate into the bone resulting in osteomyelitis. Intravenous
(IV) drug abusers have an increased risk of osteomyelitis of the vertebrae or clavicle. Children develop osteomyelitis secondary to puncture wounds to the foot.

Wound infections caused by Burn: This organism sets up significant infections for burn wounds, which eventually lead to a fatal sepsis.

Sepsis: sepsis caused by *Pseudomonas* is of high mortality rate.

Urinary tract infections, pyelonephritis: This occurs in debilitated patients in nursing homes and in hospitals because of its often of urethral Foley catheters, which serve as a source of infection.

Endocarditis: The frequent organisms are *Staphylococcus aureus* and *Pseudomonas aeruginosa* which causes right heart valve endocarditis in IV drug users.

Malignant external otitis: *Pseudomonas* can cause external ear canal infection. Mainly to diabetic patients.

Corneal infections: This can occur in contact lens wearers.

Intestinal (diarrheal) infection

Extraintestinal infection are as follows:

Urinary tract (primarily cystitis)

Respiratory (nosocomial pneumonia)

Wound (surgical wound infection)

Bloodstream (gram-negative bacteremia)
Central nervous system (neonatal meningitis)

These infection are caused by Enterobacteriacae family. All are Gram negative rod shaped bacteria. Among them all are glucose fermenting with acid formation and often produce gas. Cytochrome oxidase activity is negative except pseudomonas species which give oxidase positive tests. They are Nitrate reducers i.e it convert Nitrate is reduce to Nitrite.

Treatment of *Pseudomonas* is complicated as it is resistant to many antibiotics. Antibiotics used to treat various sp. Pseudomonas popularly known as antipseudomonal penicilllin is usually combined with an aminoglycoside for synergy (for example, piperacillin and gentamicin).

*Pseudomonas aeruginosa* is rapidly becoming an important pathogen, infecting hospitalized patients (burn and cystic fibrosis patients) in a similar manner.

**Importance**

**Urinary Tract Infections (UTI)**

Urinary tract infection is one of the major bacterial infection of the urinary bladder, the kidneys that is (pyelonephritis). The diagnosis has been made is based on an examination of the urine of both males and females.

Most of the urinary tract infection are caused by bacteria which enters the urethral opening and then it moves to the urinary bladder or sometimes in kidney which eventually causes cystic in women, it is common in women during adolescent years compare to men.

If it cyctitis is in recurring episodes it eventually frequent urine s called polyuria (uncontrollable loss of urine or urge to go for urinating) this situation generally seen in old age people or older people in later stage it would have a painful sensation during passing urine.

One of the Urinary tract infection which is so called is Complicated urinary tract infections (cUTI), this would occur in both the sexes men and women of regardless of their age, it is caused by bacteria, and it is considered to be more serious infections, which is more difficult to treat, it is recurrent. It is a result of some anatomical or structural abnormality that which would
impairs the ability of the urinary tract to clear out urine, the urethra has an anatomical
dysfunction e.g. in benign prostatic hyperplasia (BPH) in men or kidney stones, urine cannot be
passed properly. In the hospitals catheter are used for chronic indwelling catheter for Bladder
and kidney dysfunction and at that Conditions uncomplicated cystitis becomes more severe, for
patient with like diabetes mellitus, a weakened immune system suffering from (AIDS, cancer
treatment), sickle cell anemia and some certain neurological disorders like (multiple sclerosis,
stroke, and some spinal cord injury) which would affect the nervous control of the urinary
bladder. For About 50% of all nosocomial infections would develop in patients while they are
in the hospitals which would affect their urinary tract. Here the difference of pathogens causing
UTIs in the hospital are different from
those commonly causing UTI and this exclusively include *Pseudomonas aeruginosa*, compare
to other microorganisms. This species is more likely to be resistant to standard
antibiotic treatment and many other antibiotics. Patients who are in hospitalized or in the
nursing homes, they are at highest risk of infections with in-dwelling urinary catheters,
patients undergoing urinary procedures, cases also have been if patient are staying long specially
occurs in elderly men and patient with severe medical treatment. In most of the cases urinary
tract infection would cause discomfort in urination. If it is not treated it could lead to serious and
potentially life-threatening kidney infections so called (pyelonephritis) which would
permanently damage both the kidneys. Eventually it is reach to blood stream (sepsis) and could
infect different organs in the body.

There are two types of complications first one complicated and the other one is uncomplicated
one. Here both complicated and uncomplicated urinary tract infection could be treated with
one or more combination of the antibiotics. It has been seen that synergistic action of antibiotics
is more effective than single usage of antibiotics.

The usage of catheters in hospitals increases more risk of infections with a high degree urinary
tract of infections. Preventive measures under these conditions are extremely important for
further serious infections. The use of Catheters should be seen only when there is urgency and
there is none of the options are possible. In case if catheters are used then it is should removed
as soon as possible to avoid further infection from *Pseudomonas*. 
Patients who have developed urinary tract infection during usage of catheters should be treated with each episode of antibiotics and catheters should be also removed or changed if possible to reduces further complications of infections. This would reduce the risk of infections during long term use of catheters, but it would be a remain in challenge.

- *Pseudomonas aeruginosa* can be found in the following:
  - Moist environments such as soil and water
  - Lakes, streams, rivers, and other fresh waters
  - Potable water sources such as sinks and showers
  - Fresh fruits and vegetables
  - Hot tubs
  - Respiratory therapy equipment
  - Catheters, dialysis tubing, and respiratory devices