**Health Science**

**Drug sensitivity and resistance as it relates to anti-microbial usage**

Antimicrobials are chemicals that are used to kill or inhibit the growth of microorganisms as well as treating a microbial infection (Niederman, 2005). Antimicrobial may be produced naturally by microbe while others are made synthetically.

**Antimicrobial resistance**

Antimicrobial resistance occurs when microorganisms change when they are exposed to antimicrobial drugs (John & Rice, 2000).  Micro-organisms are considered as drug resistant when they are no longer inhibited by an antimicrobial to which they were previously sensitive. Such resistance is encoded by resistance genes in microbial DNA. The resistance genes occur as a result of a spontaneous gene in the DNA of microbe and can change from being drug-resistant microbes to drug sensitive ones. All uses of antimicrobials apply selective pressure on microbial populations; however the more antimicrobial used, the greater the pressure.  For example, if a person develops an acute infection such as pneumonia and is treated the bacteria are killed before any resistance emerges. However, in the case of chronic infections, drug resistant mutants have time to emerge and replace the drug-susceptible population of microbes. As a result, the drug becomes ineffective, and infection persists in the body increasing the risk of spread to others.

**Antimicrobial sensitivity**

Antimicrobial sensitivity or susceptibility is the susceptibility of bacteria to antibiotics. Since sensitivity varies within species antimicrobial sensitivity test to determine the most effective drug in treating bacteria infection (Masterton, 2008).  A bacterial strain is considered to be susceptible to a particular antibiotic if it is inhibited in vitro by antibiotic concentration that has a high probability of therapeutic success.

**Prophylactic, empiric, and therapeutic drug usage**

**Empiric drug use**

Empiric treatment is based on experience and should be started by a clinical educated in the absence of clear information before laboratory microbiological reports are unavailable and treatment should not be delayed in serious illnesses (Eliopoulos, Paterson & Rice, 2003). For instance, the empirical antibiotics are chosen using clinical consideration such as physical examination and history. For instance, when a patient has an infection caused *hemophillus* influenza strain that is susceptible to sulpha- and penicillin. The physician can prescribe amoxicillin rather than waiting 2-3 days to find out what it is and what it responds to since they know the drug is effective in such clinical setting.

*Prophylactic drug use*

Antibiotic prophylaxis is the administration of antimicrobials in cases where there is no infection, but the risk for an infection is substantial (Ren & Malmstrom, 2007).  The need for prophylaxis is assessed based on susceptibility to infection as well as the degree of infection at the operating site. For example, surgical procedures can introduce bacteria and other microbes in the blood infecting other parts of the body. The use of antibiotics in such case can be effective in minimising the occurrence of such infections. The antibiotic prophylaxis is used to prevent the development of either systemic or local infection complications. Many antibiotics require a single dose.

**Therapeutic antibiotics**

Therapeutic antibiotics are used to kill or inhibit the growth of microorganisms. The therapeutic antibiotics that only inhibit growth are called microbioststic while those that kill microorganisms are called microbiocidal. However, before starting to give, it is crucial to obtain samples that will be used for culture since it is difficult to obtain when therapy is administered.

**Choose an organism and state the test used, specimen source and transport procedure used**

The aim of this study is to estimate chronic the toxicity of waters in their environment

**Test organism**

*Ceriodaphnia dubia (daphnid)* will be used in testing for acute toxicity. *C. dubia* is a small crustacean found in fresh water bodies. A female *C. dubia* can produce offspring without fertilization when water is good and when water quality deteriorates they give birth to males and is thus considered appropriate for studying toxicity  (Blaise &  Férard, 2005). Thus the quality of water for culturing and dilution test is important.

**Source**

The samples are collected from fresh water and maintained under laboratory condition with sterilized lake water medium. The temperatures were maintained at 200C.

**Test**

*Ceriodaphnia dubia (daphnid)* is exposed to a stagnant renewal system with different effluent concentration until about 60 percent of the original female sample gave three broods of offspring.  A control sample was used, and the results of the test are based on their reproduction and survival.

**Transportation**

Transportation used should minimize the damage of the specimen. In this case, they will be transported from supply laboratory using plastic bags of plastic bottles in coolers (Styrofoam) to a test site in culture water. The dissolved oxygen concentration is maintained by replacing air above with oxygen from a compressed gas cylinder and sealing the bags to maintain it at   6.0 mg/L the species.

**References**

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