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ANTIBIOTIC RESISTANCE IN CHILDREN

Introduction

Antibiotic is a medicinal preparation, that act against bacterial infections. The invention of antibiotics is a major revolution in modern medicine world. The mechanism of action of antibiotics is to kill bacteria, that prevent bacterial infection and further spread of the infection.

Antibiotics usage in children is different from the usage in adults. There are changes in dosage and frequency. Most of the infections cause in children tend resolve by its own without any treatment. Indication of antibiotics in child are to treat health conditions, that are unlike to resolve on its own such as acne, to speed up the recovery, such as kidney infections, to treat infections that are not serious but prompt to spread to other people, skin conditions such as impetigo and sexually transmitted disease such as chlamydia, to treat health problems that could develop serious or life threatening complications such as pneumonia and cellulitis.

Goal

To evaluate the development of antibiotic resistance of children over time due to different etiologies, to control the antibiotic resistance further development in children and the preventive measures that could taken to avoid the future health risks.

Material and Method of research

The analysis and generalization of modern medical scientific literature on antibiotic resistance in children.

The results of the research and their discussion

Antibiotic resistance is bacteria or fungi pathogens develop the ability to defeat the medicinal preparation that design to kill them and cause more severe infection that is difficult in treatment and prevention of spreading. Antibiotic resistance is an emerging threat in children worldwide. According to recent studies in WHO, infections caused by multidrug drug resistant (MDR) bacteria are 700 000 deaths in all ages, among them 200 000 deaths are newborns. In Europe, MDR infections in children are 30 % of total cases. Middle East, 90 % newborns with sepsis are drug resistant. In South East Asia 83 % of pediatric patients have E.coli resistant to first line antibiotic therapy were reported. In Sub Sharan Africa 66 % of neonatal sepsis and meningitis were found to be cause by bacteria resistant to antibiotics [1]. In USA study, 20 % of pediatric patients treated with colistin to infections that are caused by already MDR Gram negative bacteria developed resistance [2]. Up to 40 % of the bacterial infections in newborns are resistant to standard treatments, leading to an estimated 214 000 newborn deaths each year from drug resistant infections.

According to a study in Sri Lanka, 54 % of pediatric patients were administered with antibiotics prior to admission of hospital. Among them 53 % were infants. Amoxicillin 48 %, Erythromycin 20 %, Cephalexin 16 % were commonly used. 63 % of antibiotics were prescribed by doctor, while 16 % used antibiotics without a prescription. Hospital stay for children with prior antibiotic admission is longer than the patients without prior antibiotic use [5].

Methicillin resistant Staphylococcus aureus (MRSA) infections were uncommon until 1990s. Trimethoprim with Sulfamethoxazole and Clindamycin used to treat MRSA infections. Among them, Clindamycin resistance has increased in past decade. To eradicate MRSA carriage and prevent its spread, application of Mupirocin ointment in anterior nostrils and Chlorhexidine baths has been practiced. Since the practice started, resistant to Mupirocin and Chlorhexidine have emerged. Carbapenem resistance in children have increased in past decade. 50 % of mortality rate were reported in hospitalized patients with bloodstream Carbapenem resistant Enterobacterales (CRE) infection. Colistin is the last resort treatment for life threatening infections in pediatrics caused by CRE bacteria. According to a study of 150 patients with Enterobacteriae infection 62 (41 %) were Carbapenem resistant and 23 (15 %) were Colistin resistant. In hospital mortality of Carbapenem resistant were 45 % (28/62), Colistin resistant 39 % (9/23) [4].

The issue of antibiotic resistance is complex and multifactorial. Lack of knowledge in antibiotics usage in developing countries, is a major cause for antibiotic resistance. Misuse of dose and incorrect period of continuation of antibiotic course increase the risk of antibiotic resistance. Parents and guardians tend to share antibiotics with children without doctor's prescription and once the symptoms start disappearing in the child, parents discontinue the antimicrobial drug. This will cause incomplete destruction of the causative pathogen. Therefore the remaining pathogen will develop an advanced infection in the host, that is difficult to be treated and it will manifest more serious symptoms in the child. Over use of antibiotics too increase the risk of antibiotic resistance in children.

Shortage or lack of access to quality antibiotics too lead to MDR in pediatrics. Depending on the type of infection, the status of the immune system of the child, the mechanism of action of the drug and the possible side effects, the antibiotic drug choice differ. Therefore the drug selection, according to its specificity of action on the pathogen is important. In developing countries, the financial situation is a major problem in drug selection due to its unavailability.

3 million newborns suffer from sepsis every year. It's a leading cause of morbidity and mortality. It has a significant impact on both neonatal and under 5 years children mortality numbers worldwide. Lack of routine checkups such as screening test for mothers for Streptococcal infections and not giving intrapartum antimicrobial agents leads to early onset of neonatal sepsis. To treat neonatal sepsis, wide range of antibiotics were given, that lead to cause increase antimicrobial resistance. Malpractice and poor diagnostics are reasons to prescribe the pediatric patients with antibiotics blindly.

Not all the groups of antibiotics are qualified for children. There are specific contraindications of drugs with pediatric age. For example, fluoroquinolones are not commonly used in pediatrics, since it disrupt the cartilage development. Similarly, lack of options of antibiotics could lead to cause of antibiotic resistance. Long term treatment for chronic infections with antimicrobial drugs too increase antimicrobial resistance in children

Children are more susceptible to infections. The immune system of a child completely developed in 3 years of age. Therefore usage of antimicrobial drugs in newborns and toddlers tend to develop microbiota dysbiosis, which alter the natural and adaptive immune reactions to bacterial and viral pathogens. Vaccinations in young age could prevent causing wide range of infection. Hence, this reduces the requirement of antibiotic treatment for infections in childhood. Enforcement of legislations related to antibiotic usage to prevent overuse and malpractice.

Promote public awareness about antibiotics. Rapid diagnosis will be able to treat the infection on early stages and prevent further complications. In 2017, only 2 out of 37 new antibiotics being developed in adults were being studied in children. Therefore new antibiotics should be developed for children.

According to WHO, if misuse of antibiotics is not change, drug-resistant diseases could cause 10 million deaths each year by 2050 [1].

Conclusion

Antibiotic resistance is a serious problem in worldwide. Preventive measures for antimicrobial resistance has to be improved, if not children mortality rate will be increased due to simple infections, that were previously treatable. To treat already multiple drug resistant infections, new antibiotics study on children should be enhanced.

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EPIDEMIOLOGICAL REVIEW OF CHIKUNGUNYA FEVER IN INDIA

Introduction

Chikungunya is a mosquito-borne viral disease caused by the chikungunya virus (CHIKV), an RNA virus in the alphavirus genus of the family Togaviridae. The name chikungunya derives from a word in the Kimakonde language, meaning «to become contorted». CHIKV was first identified in the United Republic of Tanzania in 1952 and subsequently in other countries Africa and Asia. Urban outbreaks were first recorded in Thailand in 1967 and in India in the 1970s. Since 2004, outbreaks of CHIKV have become more frequent and widespread, caused partly due to viral adaptations allowing the virus to be spread more easily by Aedes albopictus mosquitoes. CHIKV has now been identified in over 110 countries in Asia, Africa, Europe and the Americas. All regions with established populations of Aedes aegypti or Aedes albopictus mosquitoes have now experienced local mosquito-borne transmission. CHIKF was reported in India in 1963 for the first time. After a period of quiescence lasting up to 32 years, CHIKV re-emerged in India in 2005. Currently, every part of the country has become endemic for the disease with outbreaks resulting in huge economic and productivity losses. Several mutations have been identified in circulating strains of the virus resulting in better adaptations or increased fitness in the vector(s), effective transmission, and disease severity [1]. CHIKV evolution has