Infectio
A quarterly Magazine
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Current News

MDG 4: Reduce child mortality

Updated May 2015

Target 4.A: Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate

Globally, the number of deaths of children under 5 years of age fell from 12.7 million in 1990 to 6.3 million in 2013. The first 28 days of life – the "neonatal period" – represents the most vulnerable time for a child's survival. In 2013, around 44% of under-five deaths occurred during this period, up from 37% in 1990.

Reaching the MDG on reducing child mortality will require more rapid scale up of effective, affordable key interventions: care for newborns and their mothers; infant and young child feeding; vaccines; prevention and case management of pneumonia, diarrhea and sepsis; malaria control; and prevention and care of HIV/AIDS.

WHO strategies

To deliver these interventions, WHO promotes four main strategies:

- Appropriate home care and timely treatment of complications for newborns;
- Integrated management of childhood illness for all children under five years old;
- Expanded program on immunization;
- Infant and young child feeding.

These child health strategies are complemented by interventions for maternal health, in particular, skilled care during pregnancy and childbirth.

Infectio

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Introduction

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Infectio
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Head of Project (Special Pediatric Edition)

Managing Editor

Members Editorial Board

Advisor of Editorial Board

Message of the Chairman Infectio

Infectio

The response to our previous issues of the Infectio magazine has been tremendously encouraging. We look forward to continue to provide you with latest news & information about infectious diseases that may be of your interest. Now, we are providing special pediatric edition of Infectio in order to facilitate issues regarding pediatric segment

In every quarter 18,000 copies of magazine are distributed among physicians practicing in every nook and corner of Pakistan with aim to continue its circulation widely

The current issue provides updated knowledge on important topics on pediatric infectious diseases; we have focused important issues like Measles, TB, Typhoid, Pneumonia, Malaria & immunization programs. Issue also highlights the importance of the proper microbiology diagnosis in prevention and control of pediatric infectious diseases

We are much obliged to Prof. Abdul Gaffar Billoo and eminent members of the guest editorial board for this special issue. According to statistics, 45% of population of Pakistan is in pediatric age group; by providing good healthcare to our children we can safeguard our future generation

Prof. Billoo contributes special articles on Immunization progress & Pneumonia to achieve millennium development goals. The progress of Pakistan towards achieving millennium development goals in 2015 has been unsatisfactory. The goals were as follows:

- **Eradicate extreme poverty and hunger**
- **Achieve universal primary education**
- **Promote gender equality and empower women**
- **Reduce child mortality**
- **Improve maternal health**
- **Combat HIV/AIDS, malaria and other diseases**
- **To ensure environmental sustainability**
- **To develop a global partnership for development**

Each goal has a specific target to achieve by 2015. The record of Pakistan is uneven and unsatisfactory. Therefore we need to mobilize public opinion through social media and parliamentarians to ensure appropriate budget requirement to achieve these objectives

I would like to acknowledge SAMI pharmaceuticals, editorial board Infectio, Aga Khan University Hospital Pediatric Department, Dr. Syed Asad Ali with his team & editorial board advisor, Dr. Muhammad Salman for tremendous support in shaping this magazine

I would also like to congratulate winners of quiz and thank all doctors who participated in this quiz

I wish this magazine a great success in achieving its aim

Prof. Dr. Ejaz Ahmed Vohra
Chairman Department of Medicine
Dean Post Graduate (Clinical)
Dr. Ziauddin University Karachi

Message of the Head of Project

It gives me great pleasure to write this small note of appreciation for special issue of Infectio on common infection diseases in children.

Infectious Diseases are traditional enemies of mankind all over the world, especially children and continue to be major killers. Pneumonia and Diarrhea still take huge tall of life globally accounting for nearly 3 million deaths annually.

In this issue of Infectio various authors have tried to cover common infectious diseases of children for the knowledge and education of young practicing family physicians.

The issue has also covered recent guidelines for vaccines and immunization of children against vaccine preventable diseases.

Ever since it's quarterly publication, Infectio has been a great source of learning and continuing medical education for young doctors.

The whole credit for this goes to dynamic leadership of Professor Ejaz Vohra who is chairing the project and untiring efforts of managing editor, Dr Salman.

I sincerely hope practicing physicians will benefit a lot with knowledge provided by this issue of Infectio and will be able to provide care to children suffering from common infectious diseases and reduce the morbidity and mortality in children of Pakistan.

Prof. Abdul Gaffar Billoo (Sitara-e-Imtiaz)
The Aga Khan University Hospital
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Pneumonia: Major killer of children

By: Prof. A. Gaffar Billoo (Sitara-e-Imtiaz)

Introduction

Burden of disease

Pneumonia is a form of acute respiratory infection that affects the lungs. The lungs are made up of small sacs called alveoli, which fill with air when a healthy person breathes.

Pneumonia is the single largest cause of death in children worldwide, especially in developing countries like Pakistan. Every year, it kills an estimated 1.8 million children under the age of five years, (more than measles, malaria, tuberculosis and AIDS combined), accounting for 20% of all deaths of children under five years old. There are some 155 million cases of childhood pneumonia every year in the world. Pneumonia affects children and families everywhere, but is most prevalent in South Asia and Sub-Saharan Africa. **It can be prevented with simple interventions, and treated with low-cost, low-tech medication and care.**

Research has shown that prevention and proper treatment of pneumonia could avert one million deaths in children every year.

In Pakistan nearly half a million children die every year. Of these 100,000 die because of Pneumonia, this translates into more than 300 Pneumonia deaths every day.

Epidemiology and Etiology

Risk factors

While most healthy children can fight the infection with their natural defenses, children whose immune systems are compromised are at higher risk of developing Pneumonia. A child's immune system may be weakened by malnutrition or undernourishment, especially in infants who are not exclusively breastfed.

Pre-existing illnesses, respiratory allergy, measles, Pertussis and symptomatic HIV infections also increase a child's risk of contracting Pneumonia.

The following environmental factors also increase a child's susceptibility to Pneumonia:

- Indoor air pollution caused by cooking and heating with fuels such as wood, coal or dung
- Living in overcrowded and poorly ventilated homes
- Smoking by family members of young infants and children.

Etiology

Pneumonia is caused by a number of infectious agents, including bacteria, viruses and fungi. The most common are:

- ***Streptococcus pneumoniae*** – the most common cause of bacterial pneumonia in children;
- ***Haemophilus influenzae type b (Hib)*** – the second most common cause of bacterial pneumonia;
- Respiratory syncytial virus is the most common viral cause of Pneumonia;
- In infants infected with HIV, Pneumocystis jiroveci is one of the commonest causes of Pneumonia, responsible for at least one quarter of all Pneumonia deaths in HIV-infected infants.

Transmission

Pneumonia can be spread in a number of ways. The bacteria and viruses that are commonly found in a child's nose or throat can infect the lungs if they are inhaled. They may also spread via air-borne droplets from a cough or sneeze from other infected persons. In addition, Pneumonia may spread through blood, especially during and shortly after birth. More research needs to be done on the different pathogens causing Pneumonia and the ways they are transmitted, as this has critical importance for treatment and prevention.

Symptoms

The symptoms of viral and bacterial Pneumonia are similar.

The symptoms of Pneumonia are simple and can be easily picked up by parents and health workers.

- Cough
- Rapid or difficult breathing
- Fever
- Chills
- Loss of appetite
- Wheezing (more common in viral infections).

When pneumonia becomes severe, children may experience lower chest wall in drawing, where their chest moves in or retract during inhalation (in a healthy person, the chest expands during inhalation). Infants may be unable to feed or drink and may also experience unconsciousness, hypothermia and convulsions.

Investigation for diagnosis

In a simple case of pneumonia, investigations are not required. According to WHO criteria diagnosis of pneumonia is made on respiratory rate (see Table-1) and severe pneumonia is diagnosed when there is lower chest indrawing.

TABLE-1	
age	**Resp.rate**
Less than 2 months	More than 60
2 ms to 12 ms	More than 50
12 ms to 60 ms	More than 40

In more sever cases requiring hospitalization, simple work up, like CBC, CRP BL.C&S, O_2 saturation and chest X-ray may help in evaluating severity of the disease.

Treatment

Pneumonia can be easily treated by health care provider/ family physician, at home, with simple low cost oral antibiotics like, amoxycicillin in a dose of 40-50mg/kg body weight/day divided in two doses. Here it is important to bear in mind that expensive antibiotics like 2nd and 3rd generation cephalosporins and aminoglycosides are not recommended for treatment of pneumonia. Hospitalization is recommended only in very severe cases of pneumonia and also in infants aged younger than two months.

Economic costs

With proper treatment alone, 600 000 deaths could be avoided. The cost of treating all children with pneumonia in 42 of the world's poorest countries is estimated at around US$ 600 million per year. Treating pneumonia in South Asia and Sub-Saharan Africa – which accounts for 85% of deaths – would cost a third of this total, at around US$ 200 million. The price includes the antibiotics, as well as the cost of training health workers, which strengthens the health system as a whole.

Prevention: The best option

Given the challenges with pneumococcal disease, the risk of inappropriate therapy contributing to antibiotic resistance and the cost of illness - prevention is the best option

Prvention

Preventing pneumonia in children is an essential component of a strategy to reduce child mortality. Immunization against Hib, pneumococcal, measles and whooping cough (Pertussis) is the most effective way to prevent pneumonia.

Immunization against Pertussis (whooping cough), Hib (Haemophilus Influenzae b) and measles are already present in EPI Program of Pakistan. What we need now is to introduce Pneumococcal conjugate vaccine in our EPI Program as soon as possible. High cost of present Pneumococcal conjugate Vaccine is the major constrain. This can be overcome by international funding support, since Pakistan is ONE OF THE GAVI ELIGIBLE COUNTRIES. Fortunately pneumococcal Vaccine (PCV) has been introduced since 2013 in Pakistan's national immunization plan (NIP) and is now the part of routine EPI. Introduction of pneumococcal vaccine will have additional benefit of reducing the burden of pneumococcal disease in elderly and otitis media in children.

More than half of all children who die because of pneumonia are malnourished. Adequate nutrition is therefore essential to improving children's natural defenses, starting with exclusive breastfeeding for the first six months of life. This is also effective in preventing pneumonia and reducing the length of the illness.

Addressing environmental factors such as indoor air pollution (by providing affordable clean indoor stoves) and encouraging good hygiene in crowded homes also reduces the number of children who fall ill with pneumonia.

In children infected with HIV, the antibiotic cotrimoxazole is given daily to decrease the risk of contracting pneumonia.

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TYPHOID FEVER

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introduction

Typhoid fever is an acute systemic illness caused by Salmonella enterica serovar typhi. Recent data show the annual burden of disease to be 21 million cases globally with over 200 000 deaths due to typhoid fever. The morbidity of typhoid fever is highest in Asia with 93% of the global episodes occurring in this region. It also has the highest regional incidence of 274 cases / 100,000 population, over five times higher than the second highest, Latin America. Southeast Asia has an incidence of 110 cases/ 100 000 population, which is the third highest incidence rate for any region. Pakistan falls into this region. [1,2,3]

Etiology

Salmonella typhi is a gram negative, non-spore forming bacterium. It can survive long periods in water, sewerage, dried food stuffs and withstand freezing. Incubation period ranges from 4-14 days. Infective dose is about 105-109 organism. Humans are the only reservoir of the S. typhi. It can cause large epidemics when human excreta contaminate water supply. [4]

The classic three 3 stages of disease i.e. prodrome, toxic, defervescence stage are shorter in children. The onset is marked by fever and malaise. Patients typically present with fever, influenza like symptoms with chills, a dull frontal headache, anorexia, nausea. An Initial low grade fever rises progressively and by the second week it is often high (39.0-40.0°C) and sustained. Fever is accompanied by gastrointestinal symptoms of poorly localized pain abdomen, vomiting and loose motion. Less commonly patients may present with pneumonia and meningitis. Convulsions are more commonly observed in children under five years of age. Patients may be severely agitated, delirious or obtunded but complete stupor or coma is infrequent. [5]

Relative bradycardia, on physical examination, is not common in children but paradoxical relationship of high temperature and low pulse rate may be observed. A few rose spots are present in less than 50% cases and some reported in 5-30% cases. A coated tongue, abdominal distension, tender abdomen and hepatosplenomegaly are common. [5,6]

Complications

Complications occur in 10 – 15% of the patients, particularly who has been ill for more than two weeks. Major problem is the development of ileal perforation that occur in 1- 3% of the hospitalized patients. Gastrointestinal bleeding in the form of hematochezia is a common complication. Complications related to urinary tract are cystitis, pyelitis and pyelonephritis. Toxic myocarditis and endocarditis do occur in enteric fever. Rarely isolated cerebellar ataxia and nephritis are reported in patients with enteric fever. [6]

Diagnosis

In typhoid endemic areas, a fever without focus that lasts more than one week should be considered typhoid until proved otherwise. Blood cultures are the standard diagnostic method; they are positive in 60 to 80 percent of patients with typhoid. The sensitivity of blood culture, higher in the first week of the illness, is reduced by prior use of antibiotics. Culture of bone marrow is more sensitive. The result is positive in 80 to 95 percent of patients with typhoid, even in patients who have been taking antibiotics for several days, regardless of the duration of illness. Stool cultures are positive in 30 percent of patients with acute typhoid fever. The role of Widal test is controversial, because the sensitivity, specificity, and predictive values of this test vary considerably among geographic areas. Newer serologic tests are being developed but do not yet perform well enough to ensure their widespread adoption. DNA probes and polymerase-chain-reaction protocols have been developed to detect S. enterica serotype typhi directly in the blood. [7,8]

Differential Diagnosis

Typhoid must be distinguished from other endemic acute and subacute febrile illnesses. Malaria, deep abscesses, tuberculosis, amebic liver abscess, encephalitis, influenza, dengue, leptospirosis, infectious mononucleosis, endocarditis, brucellosis, typhus, visceral leishmaniasis, toxoplasmosis, lympho-proliferative disease, and connective-tissue diseases should be considered. [9]

Treatment

Supportive measures are important in the management of typhoid fever, such as oral or intravenous hydration, the use of antipyretics, and appropriate nutrition. Anti-microbial choice depends on the culture and sensitivity pattern. In uncomplicated fully sensitive typhoid fever third generation oral cephalosporin i.e. cefixime is the first line drug with chloramphenicol, ampicillin and co-trimoxazole as second line therapy. In MDR cases of uncomplicated typhoid fever oral 3rd generation remains treatment of choice with Azithromycin as an alternative drug. Duration of therapy should be 14 days. For severe typhoid fever either fully

sensitive or MDR intravenous 3rd generation cephalosporin i.e. ceftriaxone or cefotaxime remain the drug of choice. Chloramphenicol, ampicillin or co-trimoxazole are 2nd line parenteral drugs for fully sensitive cases in category of severe typhoid fever and aztreonam as 2nd line drug in MDR cases. [9, 10, 11]

Precaution

A combination of hand hygiene, improvement of water supplies, public awareness and mass vaccination has been suggested as methods to control epidemics in typhoid fever. A number of different vaccines are available for the prevention of typhoid fever. However recently developed Vi conjugate vaccine has shown to have a greater than 90% protective efficacy in children for a period of 3 years post immunization. [11, 12]

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MEASLES

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Measles will always show you if someone isn't doing a good job on vaccinations. Kids will start dying of measles.
Bill Gates

Measles, also known rubeola is an extremely contagious infection caused by the measles virus(1). Worldwide, it is a significant cause of morbidity and mortality.[2] In 2000, measles was estimated to cause approximately 31 to 39.9 million illnesses worldwide with an estimated 733,000 to 777,000 deaths, making it the fifth most common cause of death in children under five years of age, despite the availability of a safe and effective vaccine. [2] Approximately 145 700 people died from measles in 2013 – mostly children under the age of 5. Accelerated immunization activities have had a major impact on reducing measles deaths. During 2000-2013, measles vaccination prevented an estimated 15.6 million deaths.

Transmission:

Measles is an airborne disease which spreads easily through the coughs and sneezes of those infected. It may also be spread through contact with saliva or nasal secretions. Nine out of ten people who are not immune who share living space with an infected person will catch it. People are infectious to others from four days before to four days after the start of the rash.

Sign & Symptoms:

Symptoms usually develop 10–12 days after exposure to an infected person and lasts 7–10 days, typically include fever, often greater than 40 °C (104.0 °F), cough, runny nose, and red eyes and Koplick's spot on the inner of buccal mucosa followed by a red, flat rash(exanthem) which usually starts on the face and then spreads to the rest of the body typically begins three to five days after the start of symptoms.

Investigation:

Although diagnosis is based on clinical grounds but laboratory confirmation may be achieved by means of serologic testing for immunoglobulin G (IgG) and M (IgM) antibodies, isolation of the virus, and reverse-transcriptase polymerase chain reaction (RT-PCR) evaluation.

Treatment:

No specific treatment is available. Supportive care, however, may improve outcomes.[3] This may include giving oral rehydration solution (slightly sweet and salty fluids), healthy food, and medications to help with the fever.[3][4] Antibiotics may be used if a bacterial infection such as pneumonia occurs. The World Health Organization recommends vitamin A supplementation for all children diagnosed with measles, regardless of their country of residence, based on their age.

Prevention:

Measles incidence has decreased substantially in regions where vaccination has been instituted; measles in the developing world has been attributed to low vaccination rates [1-uptodate]. The measles vaccine is effective at preventing the disease. Immunization is also important for preventing severe sequelae of measles infection, including subacute sclerosing panencephalitis[4].Vaccination has resulted in a 75% decrease in deaths from the disease since the year 2000 with about 85% of children globally being vaccinated.

In developed countries, children are immunized against measles at 12 months, generally as part of a three-part MMR vaccine (measles, mumps, and rubella). The vaccination is generally not given earlier than this because sufficient antimeasles immunoglobulins (antibodies) are acquired via the placenta from the mother during pregnancy may persist to prevent the vaccine viruses from being effective. A second dose is usually given to children between the ages of four and five, to increase rates of immunity.[2] Vaccination rates have been high enough to make measles relatively uncommon. Adverse reactions to vaccination are rare, with fever and pain at the injection site being the most common. In developing countries where measles is highly endemic, WHO doctors recommend two doses of vaccine be given at six and nine months of age. The vaccine should be given whether the child is HIV-infected or not.

Complications and Prognosis:

Most measles-related deaths are caused by complications associated with the disease. Complications are more common in children under the age of 5, or adults over the age of 20. The most serious complications include blindness, encephalitis, severe diarrhoea and related dehydration, ear infections, or severe respiratory infections such as pneumonia. Severe measles is more likely among poorly nourished young children, especially those with insufficient vitamin A, or whose immune systems have been weakened by HIV/AIDS or other diseases. In populations with high levels of malnutrition and a lack of adequate health care, up to 10% of measles cases result in death.

Measles in Pregnancy:

Women infected while pregnant are also at risk of severe complications and the pregnancy may end in miscarriage or preterm delivery. Natural human Immunoglobulin (NHIG) should be administered to all pregnant women and isolation measures should be taken. (4) If the baby is born to a non-immune mother or if it's a preterm birth, NHIG should be administered within 7 days.(4) Babies born to immune mothers do not need post-exposure prophylaxis. (5).

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Malaria

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The word malaria comes from 18th century Italian mala meaning "bad" and aria meaning "air", the term was first used by Dr. Francisco Torti, Italy, when people thought the disease was caused by foul air in marshy areas. It was not until 1880 that scientists discovered that Malaria is a mosquito-borne infectious disease of humans and other animals caused by parasitic protozoans (a group of single-celled microorganism) belonging to the genus Plasmodium.[1]

The disease is transmitted most commonly by an infected female Anopheles mosquito. Five species of Plasmodium can infect and be spread by humans.[2] Most deaths are caused by P. falciparum because P. vivax, P. ovale, and P. malariae generally cause a milder form of malaria.[1][2] The species P. knowlesi rarely causes disease in humans.[1]

The bite of an infected mosquito introduces asexual forms of the parasite, called sporozoites, into the bloodstream. Sporozoites enter the hepatocytes and form schizonts, which are also asexual forms. Schizonts undergo a process of maturation and multiplication known as pre-erythrocytic or hepatic schizogony. In P. vivax and P. ovale infection, some sporozoites convert to dormant forms, called hypnozoites, which can cause disease after months or years.

Pre-erythrocytes' schizogony takes 6-16 days and results in the host cell bursting and releasing thousands of merozoites into the blood. Merozoites enter the erythrocytes and initiate another asexual reproductive cycle, known as erythrocytes' schizogony. Upon maturation of these merozoites, the erythrocyte ruptures, releasing the merozoites and multiple antigenic and pyrogenic substances into the bloodstream, some merozoites differentiate into the sexual forms: the male and female gametocytes. A mosquito that takes a blood meal from a patient with gametocytemia acquires these sexual forms and plays host to the sexual stage of the plasmodial life cycle. Rupture of a large number of erythrocytes at the same time releases a large amount of pyrogens, causing the paroxysms of malarial fever. The periodicity of malarial fever depends on the time required for the erythrocytic cycle and is definite for each species. P. malariae needs 72 hours for each cycle, leading to the name quartan malaria. The other 3 species each take 48 hours for 1 cycle and cause fever on alternate days (tertian malaria). However, this periodicity requires all the parasites to be developing and releasing simultaneously; if this synchronization is absent, periodicity is not observed.[3]

Most patients with malaria have no specific physical findings, but splenomegaly may be present. Headache (noted in virtually all patients with malaria), cough, fatigue, malaise, shaking chills,arthralgia,myalgia, paroxysm of fever, shaking chills, and sweats (every 48 or 72 hours, depending on species). Sometimeas anorexia and lethargy, nausea and vomiting,diarrhea, Jaundice.

Severe malaria manifests as cerebral malaria (sometimes with coma), severe anemia, and metabolic acidosis, associated respiratory distress, and pulmonary edema, Impaired consciousness,bleeding, fits, hypovolaemia, hypoglycaemia, Renal failure, Nephrotic syndrome.

Prompt and accurate diagnosis of malaria is vital for effective case management and if implemented well should reduce mortality from this disease.[4] Light microscopy and rapid diagnostic tests are the two most commonly used methods of confirming a diagnosis of malaria. Microscopy, the gold standard, has several advantages including low cost and high sensitivity and specificity when used by well trained staff. Microscopic examination of thick and thin blood smears,thick blood smears are more sensitive in detecting malaria parasites because the blood is more concentrated allowing for a greater volume of blood to be examined; however, thick smears are more difficult to read. Thin smears aid in parasite species identification and quantification. Blood films need to be read immediately; off-hours, qualified personnel who can perform this function. Another test is Rapid diagnostic tests (which detect parasite antigens) are easier to perform by staff with basic training, have less waiting time and indirect costs, but are relatively more expensive.[5]

It is preferable that treatment for malaria should not be initiated until the diagnosis has been established by laboratory investigations. "Presumptive treatment" without the benefit of laboratory confirmation should be reserved for extreme circumstances (strong clinical suspicion, severe disease, impossibility of obtaining prompt laboratory diagnosis).

Chloroquine In case of P. falciparum, ovale and vivax or species not identified in areas without chloroquine resistance or alternatively, hydroxychloroquine may be used per oral stat then at 6, 24, and 48 hours after the initial dose. In case of P. vivax or P. ovale, additional treatment with primaquine should be administered for 14 days to eradicate the hypnozoites,because primaquine can cause hemolytic anemia in persons with glucose - 6 - phosphate - dehydrogenase (G6PD) deficiency, persons must be screened for G6PD deficiency prior to starting primaquine treatment.

For P.falciparum infections acquired in areas with chloroquine resistance, four treatment options are available. The first two treatment options are atovaquone proguanil (Malarone) or artemether-lumefantrine (Coartem). These are fixed dose combinations that can be used in pediatric patients.

Both of these options are very efficacious. Quinine sulfate plus doxycycline, tetracycline, or clindamycin is the next treatment option. If using a quinine-based regimen for children less than eight years old, doxycycline and tetracycline are generally not indicated; therefore, quinine can be given alone for a full 7 days regardless of where the infection was acquired or given in combination with clindamycin.[6]

Patients who are considered to have manifestations of more severe disease or severe malaria should be treated aggressively with parenteral antimalarial therapy regardless of the species of malaria seen on the blood smear. Oral antimalarial drugs are not recommended for the initial treatment of severe malaria. If severe malaria is strongly suspected but a laboratory diagnosis cannot be made at that time, blood should be collected for diagnostic testing as soon as it is available and parenteral antimalarial drugs may be started. This is a medical emergency,start effective anti-malarial drug therapy immediately – either with quinine or artesunate. Continue IV antimalarials until patient is improving and can reliably swallow, then switch to an oral antimalarial to complete the course of 7 days.[7] For children, artesunate 2.4 mg/kg BW IV or IM given on admission (time = 0), then at 12 h and 24 h, then once a day is the recommended treatment. Artemether, or quinine, is an acceptable alternative if parenteral artesunate is not available: artemether 3.2 mg/kg BW IM given on admission then 1.6 mg/kg BW per day ; or quinine 20 mg salt/kg BW on admission (IV infusion or divided IM injection), then 10 mg/kg BW every 8 h; infusion rate should not exceed 5 mg salt/kg BW per hour. Give parenteral antimalarials in the treatment of severe malaria for a minimum of 24 h, once started thereafter, complete treatment by giving a complete course of: – artemether plus lumefantrine, – artesunate plus amodiaquine, – dihydroartemisinin plus piperaquine, – artesunate plus sulfadoxine-pyrimethamine, – artesunate plus clindamycin or doxycycline, – quinine plus clindamycin or doxycycline.

Complications are almost always associated with P. falciparum infection and include impaired consciousness or seizures (cerebral malaria), Renal impairment, acidosis, hypoglycaemia, pulmonary oedema or acute respiratory distress syndrome,anaemia,splenic ruptured disseminated intravascular coagulopathy, shock secondary to complicating bacteremia/septicemia (algid malaria), haemoglobinuria ('black water fever'), multiple organ failure and death.

Use of effective chemoprophylaxis and insecticide-treated nets (ITNs) prevents about 90% of malaria. Travellers should be encouraged to use a prophylactic regime appropriate to their travel itinerary but they should be aware that this is not a guarantee against infection.[8]

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Tuberculosis

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World Health Organization (WHO) stated tuberculosis as a universal emergency in 1993 in respect of its upward importance as a public health problem globally and a foremost cause of morbidity and mortality in several countries. Tuberculosis (TB) is prevalent in Pakistan which ranks fifth among the twenty two countries nominated to be highly burdened. Regardless of aggressive preventive and control measures taken in the past few eras, it remains a key health problem. Globally an estimated 8.8 million cases and 1.4 million deaths accountable because of TB . 85% of these TB cases are concentrated in Asia and Africa where there is a lack of education, health care infrastructure, poverty and overcrowding.[1] Even though the title role of general practitioners in TB control may vary from country to country and at different levels of the health care system, there are quite a few shared elements, including their link with the National TB Programme (NTP) and direct contact with patients and communities. Utmost associations between physicians and the TB program exist at the district level. Preferably there should be close collaboration between general practitioners and the NTP.[2]

Tuberculosis (TB) is a chronic granulomatous disease caused by mycobacterium species. Out of five closely accountable species (M. tuberculosis, M. bovis, M. africanum, M. microti and M. canetti) M. tuberculosis undoubtedly the commonest one. There are no known animal reservoirs of M. tuberculosis and is transmitted among humans through the airborne route. Three factors limit the likelihood of transmission of M. tuberculosis: the number of organisms expelled into the air, concentration of organisms in the air, determined by the volume of the space and its ventilation and the length of time an exposed person breathes the contaminated air. Close contact and prolonged exposure increases the risk of transmission. Mycobacterium is fastidious bacteria and can survive in the environment for long periods of time. When M. tuberculosis is first encountered (primary infection), host macrophages in the lung engulf the organisms and carry them to hilar lymph nodes in an attempt to control infection.[3] Some organisms may disseminate via the lymphatics or bloodstream to distant sites. Small granulomas (tubercles) are formed around the body to contain the mycobacteria. These may heal spontaneously and the bacteria are eliminated (in 80% of cases) or bacteria are encapsulated in a defensive barrier but persist in an otherwise healthy individual where the disease is considered dormant. Only a small proportion of patients progress to active TB. TB can affect all organs and body systems. Extrapulmonary TB is more common in children or in the immunosuppressed especially those in HIV[4]. The risk is highest in the first two years after infection, those most at risk include children <5 years of age and the elderly. Key risk factors for TB in children are: household or other close contact with a case of pulmonary TB (especially smear-positive or culture-positive pulmonary TB), age less than 5 years, HIV infection and severe malnutrition. Primary infection occurs on first exposure to organism and usually occurs in childhood . Though, it can occur at any age in a previously unexposed. Primary infection is usually asymptomatic and a positive montoux test 4-6 weeks after infection is the only proof of infection. Post-primary TB is the pattern of disease that occurs in a previously sensitised host and occurs after a latent period of months or years after primary infection either by reactivation of latent bacilli or by re-infection.[5]

The common clinical manifestations of TB are persistent cough that lasts 2 weeks or longer, fever, drenching night sweats, unexplained weight loss (more than 1.5 Kg in a month), poor appetite, weakness, fatigue, hemoptysis is normally common in older childrens/adults. Extra-pulmonary TB symptoms depend on the site or organ affected. The most common types of extra-pulmonary tuberculosis are TB lymphadenitis, tuberculous pleural effusion (usually single-sided), TB of the bones and joints, tuberculous pericardial effusion, TB meningitis, disseminated / miliary tuberculosis, tuberculous empyema, TB peritoneal effusion.

For screening patients with TB two tests are available in Pakistan, tuberculin skin test and IGRA (interferon-gamma release assay). IGRA assays offer certain advantages over tuberculin skin testing but IGRA should not replace the tuberculin skin test (TST) in low- and middle-income countries for the diagnosis of latent TB infection in children or for the diagnostic work-up of children (irrespective of HIV status) suspected of TB disease in these settings. The diagnosis of TB in children relies on thorough assessment of all the evidence derived from a careful history of exposure, clinical examination and relevant investigations. The prime diagnostic test for TB is historically dependent on the identification of acid fast bacilli on sputum smears through microscope. It has good specificity but very low sensitivity for identifying TB patients who has paucibacillary and non cavitary disease.[5]

The development that has received most attention recently is that of the Xpert MTB/RIF assay and Line Probe assay: Xpert MTB/RIF is fully automated real-time DNA based test and is useful for diagnosing TB promptly by pointing specific mutations in the rpoB gene and allows rapid screening to exclude rifampicin resistance in less than 2 hours. For pulmonary TB it can be performed on sputum, gastric aspirates and BAL specimen and in extra pulmonary TB on CSF, pleural fluid and tissue(lymph node , pleural, peritoneal) but it cannot be performed in stool, urine , blood and bone

marrow specimens . It is specific for MTB complex that is it can differentiate MTB from other mycobacterium species. The test might be ineffective due to laboratory test errors, test failure or invalid results. Therefore definitive diagnostic test still relies on culture and histopathological examination.[6]

Another PCR –based test , The Line Probe assay is useful for detecting resistance to both Rifampicin and Isoniazid. Culture is more sensitive than smear microscopy and PCR for detection of mycobacterium and for drug susceptibility testing. However, it is an expensive and slow diagnostic method. Culture positivity depends on bacillary load. Smear microscopy requires ~10 000 TB bacilli per ml of sputum to be detected/positive. Culture can be positive with only ~10 - 100 TB bacilli per ml of sputum and GeneXpert requires ~ 130 TB bacilli per ml of sputum for a positive result.[7]

The key to stopping the spread of TB in a community is to start treating patients who are coughing up live TB bacilli as soon as possible. The aims of TB treatment are to: cure the patient of TB, decrease transmission of TB to others, prevent the development of acquired drug resistance, prevent relapse and prevent death from TB or its complications. The standard treatment regimen for all patients is made up of an intensive phase lasting 2 months and a continuation phase lasting 4 months. During the intensive phase 4 drugs (isoniazid 10 mg/kg (range 7–15 mg/kg); maximum dose 300 mg/day, rifampicin 15 mg/kg (range 10–20 mg/kg); maximum dose 600 mg/day, pyrazinamide 35 mg/kg (range 30–40 mg/kg), and ethambutol 20 mg/kg (range 15–25 mg/kg)) are used to rapidly kill the tubercle bacilli.(7) Approximately 10-14 days after starting patient become less infectious and symptoms abate.

Though, the mainstream of patients with sputum smear-positive TB will become smear-negative within 2 months. In the continuation phase, 2 drugs (isoniazid, rifampicin) are used, over a period of 4 months which further eliminates the remaining bacilli and prevents subsequent relapse. Six months treatment is as effective in extra-pulmonary as in pulmonary disease. In some instances of severe or complicated disease (meningitis, TB bones/joints, miliary TB) treatment may need to be prolonged to nine to twelve months. Pyridoxine and steroids used as an adjunctive therapy. Steroids (1-2 mg /Kg) is recommended particularly for TB meningitis, pericarditis and endobronchial TB. (7) Effective treatment of TB requires adherence to the TB treatment ,adequate dosing and duration of treatment is important for cure. Thus dosages must be adjusted at the end of intensive phase where the weight has changed.

As antituberculous drugs have some adverse reactions, hence all TB patients intend to be monitored clinically for these side effects. Key to this is educating the patients and their families on how to identify common side effects and to report them immediately when they develop. At each follow up visit, the patients essentially be asked about the following symptoms; anorexia, nausea, abdominal pains ,joint pains ,burning sensation in feet, orange/ red coloured urine(minor side effects) and skin itching/ rash ,deafness ,dizziness (vertigo, nystagmus), jaundice, vomiting, confusion, visual impairment/ loss, generalized purpura and shock(major side effects),about adherence and clinical examination especially weight gain /loss . When the patient has minor side effects they can be reassured and treated symptomatically at the clinic. When they present with major side effects they must be referred to next appropriate level of care –hospital immediately.[8]

In conclusion the initial diagnosis of TB frequently relies upon the physician having a high index of suspicion. When a patient presents with signs or symptoms consistent with TB, the physician should examine the patient, take a medical history with contact tracing , and order a chest radiograph and sputum smears with culture if indicated (or refer to a provider who can carry out these steps) . The physician may consult or refer to a TB specialist if the diagnosis is unsure. Specific actions depend on the country specific TB guidelines. It not only includes 6–8 months of treatment with anti-tuberculosis drugs but also involves counseling regarding the disease process and adherence to treatment. Failure to do so by care providers, either due to lack of knowledge or motivation, may lead to maltreatment with relapse and spread of drug resistant organisms.

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Infectious Hepatitis (Viral Hepatitis)

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Infectio

Definition:

An acute inflammation of the liver due to an unknown virus or viruses.

Etiology:

The disease is caused by a virus. However it has not been isolated. Some of the associated viruses have been identified from suspected cases. The disease is transmitted by the oral faecal route. It is common in young people. It is common within the family group and particularly where conditions of hygiene are poor. Epidemics occur where there is faecal pollution of water though it causes systemic upset; it has low mortality. The disease seems to be widespread in Pakistan currently. Recent developments in the study of acute viral hepatitis reveal five major agents; hepatitis virus A and B, and C,D,E as well as other serotypes at present named non A, and non B.

Hepatitis A previously called infectious hepatitis, is generally spread by the oral - faecal route and occasionally by parenteral route. There are three general sources of orally trans¬mitted disease:

- Water supply contaminated by human sewage.
- Seafood such as oysters and shellfish, if exposed to untreated sewage.
- Food which is prepared or handled by persons who are infectious and practice poor hygiene.

Blood sucking insects including bed bugs have been suspected of spreading hepatitis, but studies show this to be unlikely until definite evidence is forthcoming.

Clinical Syndrome:

Incubation period is 15–50 days. As many as 50–80% of infected persons have no symptoms. Subclinical infection may be associated with mild to moderate elevation of liver enzymes. Clinical illness can range from mild malaise, low grade fever to nausea, vomiting, diarrhoea and varying degrees of jaundice. In the majority (96%) of persons with clinically apparent hepatitis A, the infection resolves in 2—6 weeks. Chronic complications such as cirrhosis are rare with hepatitis A.

Hepatitis B:

(Previously known as serum hepatitis). The virus particle consists of an inner core which is associated with hepatitis B core antigen (HB.Ag) and "e" antigen. Surrounding the core is the outer protein surface, the antigen to which is Hep. B surface Antigen (HBs Ag), also known as Australia Antigen. (Au Ag) HBs Ag may be found in blood several weeks before the onset of clinically apparent hepatitis B and disappears before clinical symptoms resolve. It has been found in blood, urine, stool, semen, tears and saliva. About 10% of persons with acute hepatitis B become chronic carriers who are contagious to others. Hepatitis B strain is passed through sexual contact much more easily than AIDS virus. The virus infects an estimated 300,000 every year; and five to ten percent of them will develop cirrhosis, liver cancer or chronic liver disease according to centre of communicable disease centre Atlanta. The viruses are linked in similar patterns of spread both by blood and by sexual contact. B virus can be prevented by a vaccine.

Clinical Syndrome

Incubation period is 30–l 80 days, spread is mostly by inoculation of blood whether by transfusion or by use of contaminated needles, medical, dental or tattooing instruments. Hepatitis B is clinically indistinguishable from Hepatitis A but does tend to be slightly more with severe chronic complications such as cirrhosis which occurs more frequently.

Extra hepatic manifestations of rash or arthritis are seen in one third of cases. Serologically it can be differentiated from hepatitis A by detection of Au Antigen. This is important from both epidemiological and prognostic points of view.

Treatment

Treatment is entirely supportive. Anti viral agents are not indicated. Conclusive studies have shown that restriction of diet and physical activity are unnecessary in the uncomplicated case. A balanced diet and reasonable amount of physical activity should, in fact, be encouraged without being enforced; Cartico-steroids have no role in uncomplicated acute viral hepatitis. Giving I.V., drips is unnecessary, except in the patient who is persistently vomiting.

Prevention:

Prevention is by careful hand washing after using the toilet, both by patients and carriers. They should never donate blood.

Prophylaxis:

Until a vaccine is widely available, prophylaxis against hepatitis A can be achieved by passive immunization with standard pooled immune serum globulin (ISG). Exposed persons should receive ISG 2 c.c. I.M. as soon as possible after exposure.

Protection:

Protection is by Engerix-B which is DNA Hepatitis B vaccine (Recombinant). It contains antigen of the virus obtained by culturing genetically engineered saccharomyces cervisiae cells which carry the surface antigen of B. Virus. It is stored at 2°C—8°C. Do not freeze. Do not dilute. It is given by intra muscular route. The first dose may be given at birth. This is now included in the EPI schedule.

Schedule:

1st dose	0.5 ml
2nd dose	1 month later
3rd dose	6 months after 1st dose

Infants and children 0.5 ml Adults: 1 ml.

It is now a component of EPI.

Hepatitis C and D viruses have the same mode of spread as B virus. The E virus spreads by the Faeco-oral Route and epidemics have occurred in Cities with bad sanitation.

Key:

This 3 month old baby is having recurrent infections. His absolute lymphocyte count , which is calculated as the proportion of Lymphocyte of the total WBC, is 225, 84 and 78 at 3, 5 and 10 weeks of age.

Absolute Lymphocyte count of less than 3000 in the newborn period should raise the suspicion of severe combined immune deficiency. Child should therefore be immediately referred to tertiary care center, where flow cytometry should be done to make the diagnosis of Severe Combined Immune Deficiency.

It is important to make the diagnosis of severe combined immune deficiency early, since if stem cell transplant is done early, chances of complete recovery are very high. Untreated disease is universally fatal by around year of life.

DISEASES CONVEYED BY INGESTION

Cholera

Prof. A.G.Billoo. (Sitara-e-Imtiaz)

Key facts

- Cholera is an acute diarrhoeal disease that can kill within hours if left untreated.
- There are an estimated 3–5 million cholera cases and 100 000–120 000 deaths due to cholera every year.
- Up to 80% of cases can be successfully treated with oral rehydration salts.
- Effective control measures rely on prevention, preparedness and response.
- Provision of safe water and sanitation is critical in reducing the impact of cholera and other waterborne diseases.
- Oral cholera vaccines are considered an additional means to control cholera, but should not replace conventional control measures.

Introduction

Cholera is an acute diarrhoeal infection caused by ingestion of food or water contaminated with the bacterium Vibrio cholerae. Every year, there are an estimated 3–5 million cholera cases and 100 000–120 000 deaths due to cholera. The short incubation period of two hours to five days, enhances the potentially explosive pattern of outbreaks.

History

During the 19th century, cholera spread across the world from its original reservoir in the Ganges delta in India. Six subsequent pandemics killed millions of people across all continents. The current (seventh) pandemic started in South Asia in 1961, and reached Africa in 1971 and the Americas in 1991. Cholera is now endemic in many countries.

Vibrio cholerae strains

Two serogroups of V. cholerae – O1 and O139 – cause outbreaks. V. cholerae O1 causes the majority of outbreaks, while O139 – first identified in Bangladesh in 1992 – is confined to South-East Asia.

Non-O1 and non-O139 V. cholerae can cause mild diarrhoea but do not generate epidemics.

Recently, new variant strains have been detected in several parts of Asia and Africa. Observations suggest that these strains cause more severe cholera with higher case fatality rates. Careful epidemiological monitoring of circulating strains is recommended.

The main reservoirs of V. cholerae are people and aquatic sources such as brackish water and estuaries, often associated with algal blooms. Recent studies indicate that global warming creates a favorable environment for the bacteria.

Risk factors and disease burden

Cholera transmission is closely linked to inadequate environmental management. Typical at-risk areas include peri-urban slums, where basic infrastructure is not available, as well as camps for internally displaced people or refugees, where minimum requirements of clean water and sanitation are not met.

The consequences of a disaster – such as disruption of water and sanitation systems, or the displacement of populations to inadequate and overcrowded camps – can increase the risk of cholera transmission should the bacteria be present or introduced. Epidemics have never arisen from dead bodies.
Cholera remains a global threat to public health and a key indicator of lack of social development. Recently, the re-emergence of cholera has been noted in parallel with the ever-increasing size of vulnerable populations living in unsanitary conditions.

The number of cholera cases reported to WHO continues to rise. For 2011 alone, a total of 589,854 cases were notified from 58 countries, including 7,816 deaths. Many more cases were unaccounted for due to limitations in surveillance systems and fear of trade and travel sanctions. The true burden of the disease is estimated to be 3–5 million cases and 100 000–120 000 deaths annually.

Clinical Features

Cholera is an extremely virulent disease. It affects both children and adults and can kill within hours.

About 75% of people infected with V. cholerae do not develop any symptoms, although the bacteria are present in their faeces for 7–14 days after infection and are shed back into the environment, potentially infecting other people.

Among people who develop symptoms, 80% have mild or moderate symptoms, while around 20% develop acute watery diarrhoea with severe dehydration. This can lead to death if untreated.

People with low immunity – such as malnourished children or people living with HIV – are at a greater risk of death if infected.

Treatment

Cholera is an easily treatable disease. Up to 80% of people can be treated successfully through prompt administration of oral rehydration salts (WHO/UNICEF ORS standard sachet). Very severely dehydrated patients require administration of intravenous fluids. Such patients also require appropriate antibiotics to diminish the duration of diarrhoea, reduce the volume of rehydration fluids needed, and shorten the duration of V. cholerae excretion. Mass administration of antibiotics is not recommended, as it has no effect on the spread of cholera and contributes to increasing antimicrobial resistance.

In order to ensure timely access to treatment, cholera treatment centres (CTCs) should be set up among the affected populations. With proper treatment, the case fatality rate should remain below 1%.

Prevention and control

A multidisciplinary approach based on prevention, preparedness and response, along with an efficient surveillance system, is key for mitigating cholera outbreaks, controlling cholera in endemic areas and reducing deaths.

Outbreak response

Once an outbreak is detected, the usual intervention strategy is to reduce deaths by ensuring prompt access to treatment, and to control the spread of the disease by providing safe water, proper sanitation and health education for improved hygiene and safe food handling practices by the community. The provision of safe water and sanitation is a formidable challenge but remains the critical factor in reducing the impact of cholera.

Oral cholera vaccines

There are two types of safe and effective oral cholera vaccines currently available on the market. Both are whole-cell killed vaccines, one with a recombinant B-sub unit, the other without. Both have sustained protection of over 50% lasting for two years in endemic settings.

Both vaccines are WHO-prequalified and licensed in over 60 countries. Dukoral has been shown to provide short-term protection of 85–90% against V. cholerae O1 among all age groups at 4–6 months following immunization.

The other vaccine (Shanchol) provides longer-term protection against V. cholerae O1 and O139 in children under five years of age.

Both vaccines are administered in two doses given between seven days and six weeks apart. The vaccine with the B-subunit (Dukoral) is given in 150 ml of safe water.

WHO recommends that immunization with currently available cholera vaccines be used in conjunction with the usually recommended control measures in areas where cholera is endemic as well as in areas at risk of outbreaks. Vaccines provide a short term effect while longer term activities like improving water and sanitation are put in place. When used, vaccination should target vulnerable populations living in high risk areas and should not disrupt the provision of other interventions to control or prevent cholera epidemics. The WHO 3-step decision making tool aims at guiding health authorities in deciding whether to use cholera vaccines in complex emergency settings.

The use of the parenteral cholera vaccine has never been recommended by WHO due to its low protective efficacy and the high occurrence of severe adverse reactions.

Travel and trade

Today, no country requires proof of cholera vaccination as a condition for entry. Past experience shows that quarantine measures and embargoes on the movement of people and goods are unnecessary. Isolated cases of cholera related to imported food have been associated with food in the possession of individual travelers. Consequently, import restrictions on food produced under good manufacturing practices, based on the sole fact that cholera is epidemic or endemic in a country, are not justified.

Countries neighboring cholera-affected areas are encouraged to strengthen disease surveillance and national preparedness to rapidly detect and respond to outbreaks should cholera spread across borders. Further, information should be provided to travelers and the community on the potential risks and symptoms of cholera, together with precautions to avoid cholera, and when and where to report cases.

Role of Clinical Microbiologist in the Management and Control of Pediatric Infectious Disease

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Infectio

The discipline of Pediatric Infectious Diseases has a great many remaining challenges. These include the conquest of illnesses that affect children in the developing world, most notably Human Immunodeficiency Virus (HIV) infection, tuberculosis and falciparum malaria, but also a wide array of other infections. Opportunistic infectious diseases that affect immunocompromised children will also continue to demand attention, and this host population will likely increase.

Pathogenesis of infections, new insights into the host-parasite relationship, mechanisms of host susceptibility and resistance, and development of new anti-infective therapies, new vaccines, and the identification of new drug targets are some of the areas that will be impacted directly.

Clinical Microbiologist and Pediatrician are partners in determining the etiology of pediatric infection. The role of Clinical Microbiologist is imperative for the effective management of pediatric infectious diseases. The Clinical Microbiology laboratory provides specific guidelines for collection and transport of specimens, as well as guidelines for common laboratory policies. Reporting of urgent and significant results to aid the Pediatrician in patient management is the vital role of Clinical Microbiologists.

There are four major roles of Clinical Microbiology laboratory:

1. Microbiological examination of specimens
2. Consultations on the investigation and management of patients with infection problems
3. Control of hospital infection
4. Teaching and research

Clinical Microbiologist ensures that its operation meets all current regulatory requirements, including initial verification and ongoing validation of procedures. Clinical Microbiology laboratory have a responsible program of quality control, as well as quality assurance benchmarks by which it can gauge its performance.

Effective communication with physician is one of the most important characteristic of a microbiologist. To be effective, the opportunity for dialogue between Clinical Microbiologist and Pediatrician must be readily accessible. Provision must be adequate for bidirectional interaction, because the information provided is nearly always qualitative and interpretive.

Accurate assessment of results of antibiotic susceptibility testing at times requires face-to-face discussion of the treatment implications. Development of rational therapeutic guidelines needed for prudent use of antimicrobial agents in the battle against emerging drug resistance cannot be accomplished without ongoing review of results of antimicrobial susceptibility testing by the professionals in the microbiology laboratory and the practicing physician. Distrust of results of testing in microbiology laboratories makes formulary control of antibiotics difficult to enforce and invariably leads to increasing therapeutic empiricism, which is something that should be abandoned as part of the historical practice of medicine. Trends identified by a survey of infectious diseases physicians indicated that overall quality ratings for microbiology laboratories were based on long-term experiences and ongoing communication. In such a setting, even a rarely occurring serious testing problem did not significantly detract from overall high-quality perception and trust of the laboratory's reported results.

On the basis of current knowledge, it appears that the management of pediatric infectious diseases will be best accomplished by the presence of Clinical Microbiologist on the same campus as the health care institution. They serve, to provide the patients and the physician who care for them with the necessary diagnostic testing, means of epidemiological detection, and future innovation required in an era of emerging and reemerging pediatric infectious diseases. The Clinical Microbiologists are the first line of detection and defense in the event of new emerging microbial resistance. They directly serve the patient through accurate and timely detection of infectious microbes, and this information is critical to the quality treatment of pediatric infectious diseases. Successful detection and interpretation of results clearly require adequate staffing with specially trained medical technologists and supervision by laboratory directors who have received training in a clinical and/or medical microbiology. The Clinical Microbiologist also is a crucial component of the infection control team responsible for preventing infections in pediatric patients, thus promoting good patient care outcomes that save money.

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Will provided on request.

Immunization – Pakistan Historical Back ground and Situation Analysis

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EPI –PAKISTAN

- Historical background
- Introduction
- Situation analysis
- Challenges
- Way forward

Historical Background

A nationwide survey conducted in 1976 revealed that the EPI target six diseases. Diphtheria, Whooping cough, Neonatal Tetanus, Poliomyelitis, Measles and Tuberculosis posed a major health problem.

Since these diseases are preventable by immunization, the Expanded Program on Immunization (EPI) was initiated in 1979. The ultimate objectives of the program were 90% reduction in morbidity and mortality resulting from the six targeted diseases in children less than 5 years of age, immunization of all pregnant mothers and married child bearing age women with tetanus toxoid with a view to eliminating tetanus neonatorum.

Historical background of EPI

- After successful small pox eradication(1994), EPI started as a pilot project in 1976
  - Established nationwide 1978
  - Intensified activities started in 1981 in the form of Accelerated Health Program(AHP)
- National polio immunization days started in 1994
- National Measles Catch-up Campaign done in 2007- 08

Historical Achievements

Since the 1980s, considerable progress has been made. Thanks to Expanded Program on Immunization (EPI), launched by the World Health Assembly in 1974 (when the immunization coverage was 5%), almost 3 million lives have been saved each year, and 750 000 children are saved from disability.

Introduction

The Expanded Program on Immunization (EPI) in Pakistan annually targets around 5.4 million children aged below 1 year to protect against 8 vaccine-preventable diseases and 5.9 million pregnant women to protect them and their newborns from tetanus through routine immunization services.

- EPI is almost the exclusive provider of immunization services in Pakistan
- The private sector provides ONLY 3% of Immunization.

It delivers immunization services through:

- More than 6000 fixed centers
- Over a million outreach and sessions annually, involving
- More than 10 000 vaccinators including paramedics trained in EPI, 6000 lady health visitors (LHVs) and other health workers.
- Approximately 100 000 lady health workers (LHWs) also assist in routine and supplementary immunization activities by social mobilization, defaulter tracing and occasionally providing vaccination

EPI Target population

- Children Surviving (<1 year) : approx. 5.4 million
- Polio SIA <5 years: approx. 32 million
- Pregnant women: approx. 5.9 million
- CBA women: approx. 36.8 million

Progress of PAKISTAN EPI Schedule (1980 -2009)

BCG	Birth
DTwP (pentavalent)	6, 10, 14 weeks.
OPV	Birth,6, 10, 14 weeks.
HepB (2002) Hib(2009)	6,10,14 weeks.
Measles	9 months
Vitamin A (2002)	On national Polio Days or at measles immunization

The routine immunization schedule for infants (2010-2013)

Age	Vaccines
At Birth	BCG & OPV zero
6 Weeks	Pentavalent - 1 & OPV - 1+PCV
10 Weeks	Pentavalent - 2 & OPV - 2+PCV
14 Weeks	Pentavalent - 3 & OPV - 3+PCV
9 Months	Measles - 1
15 Months	Measles - 2

Tetanus toxold (TT) vaccination schedule for pregnant women

Vaccination	Schedule
TT-1	During the first pregnancy
TT-2	1 month after the first dose
TT-3	6 month after the second dose
TT-4	1 year after the third dose
TT-5	1 year after the fourth dose

The immunization schedule for women of child bearing age (15 – 45 years)

Dose	Age	Protection
TT 1	at first contact	None
TT 2	at least 4 weeks after TT 1	1 – 3 years
TT 3	at least 6 months after TT 2	5 years
TT 4	at least 1 year after TT 3	10 years
TT 5	at least 1 year after TT 4	All child bearing years

Goals and Objectives-World Summit for Children(1990)

- 90% routine immunization coverage of all antigens by 2000
- Stop indigenous poliovirus transmission (eradication) by 2000
- Achieve measles elimination by 2000
- Neonatal tetanus elimination by 2000

(Revised -2000)Goals and Objectives

- 90% routine immunization coverage of all antigens by 2010
- Stop indigenous poliovirus transmission by 2011
- Achieve measles elimination by 2015
- Neonatal tetanus elimination by 2015

WHO-UNICEF Joint estimate of Pakistan national coverage of (DPT3) and 1 dose of measles (measles 1) 1980-2008

Challenges :Operational

- Improper management of vaccines and other logistics at district and health facility levels
- Very low immunization coverage
- High dropout
- Inadequate EPI fixed sites
- Irregular EPI outreach sessions
- Poor supervision and monitoring

Challenges : Managerial

- Frequent transfers and postings of provincial and district management
- Inexperienced management
  - Officers given charge of district management without basic orientation of the program
  - Injudicious distribution of vaccinators at district level
- Lack of accountability for poor performance and absenteeism (15-30 %)
- Lack of technical persons for program monitoring and evaluation
- No qualified engineers for regular maintenance and monitoring of cold chain system
- Delayed(2-4months) release of funds and disbursement of salaries
- Injudicious use of operational funds and EPI resources (Transport, Cold chain) by non EPI personnel.

Challenges & Solution-way foward

Challenges	Recommendations
Inadequate service delivery	■ Visible oversight by district management ■ Strict accountability at the level of district & provincial EPI leadership- EDO/DCO.
Weak public acceptance & demand	■ Visible support from the highest political levels ■ Liaise with media & involve religious & community leaders, all the year.

Challenges	Recommendations
Insecurity & inaccessibility in areas of conflict	■ Sustained high level political commitment ■ Opportunistic vaccination in peace times ■ Cross border collaboration ■ Locally appropriate social mobilization activities

Way forward

- Fully functioning of integrated VPD surveillance including measles case based surveillance in the country

- Plan for Rotavirus vaccine will depend on utilization and coverage of pneumococcal vaccine (PCV)

AMC/GAVI Support

This innovative financing mechanism will ensure that children in the world's poorest countries receive life-saving vaccines 15-20 years before they might otherwise have been available and at prices their governments can afford.

STATUS of PCV in NIP-PAKISTAN and AMC/GAVI Support

- Inclusion of PCV in NIP possible only with AMC/GAVI support
- Pakistan qualifies for GAVI eligible countries
- GAVI has approved Pakistan's application for PCV inclusion in NIP
- MoH Pakistan has NO preference, Between (PCV13/PCV10)
- Now the CHALLEGE is the availability of large quantity of PCV
- Pakistan has birth COHORT of over 4 million babies requiring more than 10 million doses for implementation of PCV in NIP
- Since PCV10 was available in such large quantity pakistan's EPI has introduced this vaccine from 2013 in national immunization plan (NIP)

Why Vaccinate?

Immunization has led to:

- Eradication of smallpox
- Near eradication of polio
- Control of many major diseases like Diphtheria, Pertussis, Tetanus, Measles etc

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Face to Face with Prof. Dr. Sajid Maqbool

DABP (USA), FRCP (CANADA)
Professor Emeritus of Pediatrics
The Children Hospital & the Institute of Child Health Lahore
Interviewed by: Dr. Muhammad Salman

Doctors dedicate their life to the service of the patients. They relieve the sufferings and pain of mankind. They cure them from disease and illness & strive to make the life of others better and healthier. A doctor's life is hard. Often they have to visit the patient at off hours foregoing their rest, sleep and even food. Sometimes they have to work throughout the day and night attending to serious patients. They always have to treat their patients with smile and cheer. They motivate and encourage sick person. They are source of hope and strength. Even in distress, their duty is first towards their patients.

Prof. Sajid Maqbool is one of the well-known personalities in the field of Pediatrics. He is considered the pioneer of Neonatology in Lahore and retains a special interest in Infectious Diseases. He is an enthusiastic supporter of the importance of prevention in general and childhood immunizations.

He graduated from the K.E. Medical College and trained in USA in the field of Pediatrics. He worked as a faculty member in K.E. Medical College/ Mayo Hospital, Lahore. He had also established the department of Pediatrics as Head of Department in Shaikh Zayed Hospital, Lahore. He also provided his services as Dean for Institute of Child Health/Children's Hospital in Lahore and currently after retirement, he is associated with same hospital as Professor Emeritus of Pediatrics. Professor Sajid Maqbool's primary focus is teaching and training. Majority of key players, active in the field of Pediatrics and Neonatology represent themselves as his trainees.

Q# 1. Please share details about your education & professional experience

Prof Sb: I took my basic school education up to matriculation from Saint Mary School Rawalpindi & intermediate from Government Gordon College Rawalpindi. I graduated from King Edward Medical College Lahore .After M.B.B.S; I went to USA to obtain post graduate education in pediatrics and acquired a fellowship from USA & of Royal College of Physicians that is F.R.C.P from Canada. I am a general pediatrician with a special interest in neonatology and infectious diseases

Q# 2. Why did you choose this career/ field of medicine and your major initiative in this field?

Prof Sb: I really don't know why I chose this career but I always wanted to be in the medical profession. After completion of my post-graduation I started my career from King Edward Medical College/ Mayo Hospital Lahore and established department of Neonatology which did not exist before it. After 3 years I moved to Shaikh Zayed Hospital and established department of Pediatrics. We also started a structured residency training program in Pediatrics at this hospital, and started review courses in Pediatrics for FCPS

students. During my tenure , the first ICU in Neonatology and Pediatrics was started.

Q# 3. Why did you think of taking pediatric as a profession?

Prof Sb: Because I like children and if you help in healing and improving the condition of ill child I think it is the most gratifying experience.

Q# 4. How did you feel when you received your doctoral degree?

Prof Sb: It was the most thrilling and exciting moment of my life, and great honor for me & my family members too.

Q# 5. What are the main challenges of this field of medicine?

Prof Sb: In the field of medicine many challenges still exist in Pakistan. The morbidity and mortality is very high in the neonates and children. There is a need to improve child health and reduce mortality. The prevailing conditions in Pakistan are not very helpful for optimum health of children. The problems are extensive but the resources are limited and this is the main challenge

Q# 6. What are the most common pediatric diseases in Pakistan?

Prof Sb: In Pakistan common pediatric diseases are Respiratory Tract Infections especially Pneumonia followed by Diarrhea and other infectious diseases. The most significant period in a child's life are the first 4 weeks because of their vulnerability to diseases; subsequently leading to death. We could reduce the probability of disease and death, by ensuring appropriate new born care along with mother's health and nutrition. Also we need to supervise and ensure appropriate protocols are being followed during delivery and proper schedule immunization is followed for the new born. Nutrition and proper immunization is the key to success for children health. This is the only way we can make a significant difference in the health and welfare of children.

Q# 7. Polio is still a main challenge for Pakistan. Do children who have already been polio vaccinated have chance of getting polio again?

Prof Sb: Yes they can, the reason is that there have been problems with cold storage, inappropriate uptake and the missing of doses.

Q# 8. What is the happiest moment being a doctor in your life?

Prof Sb: Happy moments come every day, whenever I see a child becoming comfortable with a smile on his face and their parent's satisfaction, it makes me happy.

Q# 9. If you were not a doctor then what would you have been?

Prof Sb: I never imagined myself to be anything other than a doctor because I was so focused on becoming one. But If I had to choose another option, I would have been a teacher or a social worker.

Q# 10. How do you keep balance in organizing time for your professional & personal commitments?

Prof Sb: Most of us sacrifice our personal life in order to stay involved in medical practice. I have tried to maintain a balance between work and family obligations and I think I have been fairly successful in this.

Q# 11. Who is your inspiration/role model?

Prof Sb: I was fortunate to have many distinguished teachers & I am impressed by teachers like Prof. Ameeruddin Shaikh (Surgery), Prof. Khwaja Sadiq Hussain (Medicine) and Prof. S.M.K.Wasti (Pediatrics). I have taken a lot of inspiration from late Prof. Shoukat Raza Khan and Prof.SM Haneef and from the current serving teachers I am also very impressed by the contribution of Prof. Abdul Gaffar Billloo.

Q# 12. How would you like to advise or guide newcomers in this profession?

Prof Sb.: My advise to younger generation and new comers who wish to join the field of Medicine in general or pediatrics particularly is that they should only pursue this profession if they like it and are motivated and committed. In other words, join this profession only if your heart is in it

Q# 13. Any message for betterment of magazine or this initiative?

Prof Sb: I am very pleased to see the academic initiative from SAMI. I found it informative and worthwhile. I am quite confident that this magazine will not only maintain its standards but will continuously update its content

Winners of lucky draw

Reported by. Dr. Muhammad Salman

The editorial board of Infectio magazine is pleased to announce the names of winners for quiz from the third issue. The lucky draw was held in a clinical meeting at Dr. Zia Uddin University Karachi on **May 5th 2015**. Following are the names of lucky draw winners drawn at random by Prof. Ejaz Ahmed Vohra and his team.

We congratulate the winners and once again thank all contestants for their participation in quiz

1. **Dr. Muhammad Waqar Ward No. 20 Nishtar Hospital Multan**
2. **Dr. Qudsia Aamir THQ Mianwali**
3. **Dr. Anees Ahmed Mughal Pura Lahore**
4. **Dr. Saima Saleem SIMS Hospital Shahdadpur**
5. **Dr. Ashiq Hussain Gojramore Jhang**

Quiz

Dr. Syed Asad Ali
Associate Professor
Department of Pediatrics & Child Health
The Aga Khan University

Infectio

Case Scenario

Three months old baby presents to your clinic with pneumonia. Mother tells you that he has been having multiple episodes of pneumonia and diarrhea since birth. He has been admitted twice for pneumonia so far. He also has oral thrush since birth.

Following labs are available, which were obtained during different illnesses.

Age	3 Weeks of age	5 Weeks of age	10 Weeks of age
Hg	9.4 g/dl	8.9 g/dl	8.4 g/dl
WBC	4.5 x 103	4.2 x 103	3.9 x 103
% neutrophils	88	90	92
% lymphocytes	5	2	2
Platelets	224 x 103	192 x 103	199 x 103

What is the most concerning finding after review of all his labs?

a) Persistent anemia

b) Low WBC count

c) High neutrophil count

d) Low absolute lymphocyte count

e) Low platelets

What is the suspected diagnosis?

a) Anemia of chronic disease

b) Persistent sepsis

c) Antibody deficiency

d) Severe combined immune deficiency

e) Glanzman's thrombasthenia