The Expanded Programme on Immunization1 (EPI) is an organized programme of the World Health Organization Pan American Health Organization and The United Nations Children's Education Fund Implemented in St. Vincent and the Grenadines in 1977; it is managed by the Community Nursing Service, a division within the Ministry of Health and the Environment.

Initially the programme focused on administering vaccinations for six infectious diseases namely:

- Measles
- Paralytic poliomyelitis
- Diphtheria
- Pertussis or whooping cough
- Tetanus
- Tuberculosis

Hepatitis B and Haemophilus Influenzae were included into the National Infant Vaccination Programme in 2003, and those vaccines were administered as a Combination Pentavalent Vaccine – DPT/Hep B/Hib

HEPATITIS B

Hepatitis B is caused by the Hepatitis B virus, which affects the liver. After infection, patients usually recover, but some continue to carry the virus for many years, and become chronic carriers. They can spread the infection to others throughout their life. In 2000, there was an estimated 5.7 million cases of acute Hepatitis B infection worldwide.

Hepatitis B virus is one of several viruses that cause hepatitis. HbsAg has been found in virtually all body secretions and excretions, but only blood and serum-derived fluids: saliva, semen, and vaginal fluids have been found to be infectious. The presence of "e antigen or viral DNA" indicates high virus titer and higher infectivity of these fluids.

The virus is present in the blood of the persons suffering from the disease and in chronic carriers. Infection is usually associated with exposure to body fluids, blood, and blood products.

The disease occurs all over the world and can affect all age groups. Most chronic carriers are in China, South East Asia, and Africa.

Incubation Period

The incubation period averages 6 weeks, but may be as long as 6 months. The variation is related in part to the amount of virus in the Inoculum, the mode of transmission, and host factors.

Mode of Transmission

The Hepatitis B virus is carried in the blood, saliva, semen, vaginal fluids, and most other body fluids. However it is usually spread by contact with blood in the following ways:

- Through an un-sterilized injection needle or syringe containing Hepatitis B virus from an infected person.
- Transmission of the virus by mother to baby during the birth process.
- Transmission through cuts, scrapes, bites and scratches among children during social contact.

- Transmission during sexual intercourse through contact with blood or other body fluids.

The virus does not occur in the stool of an infected person, unless the stool contains blood. It occurs in the milk of infected mothers but in such small amounts hence breastfeeding can proceed.

Signs and Symptoms

The younger the person infected, the more likely it is that the person will not show signs or symptoms. A person with no symptoms may remain infected for many years and can spread the infection to others. The person showing no symptoms is more likely, in the long term, to suffer complications caused by liver damage than the person showing symptoms.

Infected persons may feel weak and may experience stomach upsets and other flu-like symptoms. They may have very dark urine or very pale stools. Jaundice may appear i.e. yellow skin or a yellow colour in the white of the eyes. These symptoms may last several weeks and may be accompanied by general weakness and fatigue over several months. A laboratory blood test is required for confirmation.

Most acute infections in adults are followed by complete recovery, and the affected person rarely becomes a chronic carrier. However, many children become chronic carriers and may develop severe complications even though they are not acutely ill.

Infected persons who recover from acute Hepatitis B, and who do not become chronic carriers, possess antibodies and are protected throughout their lives.

Complications

The consequences of acute infection can be severe. The most serious complications, including chronic hepatitis, cirrhosis, liver failure, and liver cancer, occur in persons with chronic infection. Death may occur in a small percentage of adults.

Treatment

There is no treatment for the acute condition, and supportive treatment is indicated. In chronic infection the disease can sometimes be stopped with medication.

Prevention

Immunization with Hepatitis B vaccine is recommended. Children should receive 3 doses during the first year of life - the first dose being administered as per national schedule. Most recently, some countries have been using combination vaccines that include vaccines for Diphtheria, Tetanus, Pertussis, Hepatitis B (Hep B) and Haemophilus Influenzae type b (Hib).

All pregnant women should be tested to determine whether they carry the Hepatitis B virus in their blood. Babies of mothers who are carriers should then receive an injection of Hepatitis B antibodies - Hepatitis B immune globulin - together with the first dose of vaccine at birth.

Person with Hepatitis B virus should not donate blood and should not allow other persons to have contact with their blood or other body fluids. They should use barrier methods during sexual intercourse and should not share eating utensils, toothbrushes, needles, or razors with other people.

Health Care Workers (HCWs) should be vaccinated against the disease and use all necessary precautions with all patients, since carriers of the virus can easily spread the infection through blood contact.

HEPATITIS B

There are two types of Hepatitis B vaccine – a recombinant inactivated viral antigen vaccine and a plasma–derived Hepatitis B vaccine. Hepatitis B vaccine contains 20 micrograms per ml of Hepatitis B surface antigen (HbsAg) adsorbed on aluminum hydroxide adjuvant. It is currently prepared from yeast cells using recombinant DNA

technology. It is recommended for use by PAHO/TAG in areas with high endimicity i.e. HbsAg prevalence equal to or greater than 7%.

Hepatitis B vaccine is a cloudy liquid that is packaged in a vial or a pre-filled syringe. It does not have to be reconstituted. If Hepatitis B vaccine stands for a long time it separates from the liquid and looks like fine sand at the bottom of the vial. It must be mixed by shaking.

Routine vaccination is recommended for those at high risk of infection such as health workers and hospital staff. In adults and older children, the first two doses are given 1 month apart and the 3rd dose 6 months after the first dose.

Schedule for Administering HEP B Vaccine to children 0-6mts	
Dose	Age Given
1st	8 wks/2mths
2nd	16 wks/4mths
3rd	24wks/6mths

Dosage

Children from birth to 10 years of age are given three doses of 0.5ml each. Adults receive 1.0ml according to the manufacturer's instructions.

Administration

Hepatitis B vaccine should be given intramuscularly in the 5antero-lateral thigh for infants and in the deltoid region for older children and adults.

The buttock must not be used because vaccine efficacy may be reduced on account of erratic absorption into subcutaneous tissue and immunization/protection is compromised and cannot be guaranteed.

Contra-indication

Immunization should be postponed in individuals suffering from severe febrile infections.
Anaphylactic reaction to a previous dose.
Hypersensitivity to yeast, since Hepatitis B vaccine is developed in baker's yeast.

Adverse Reaction

- Mild fever for one or two days
- Soreness and redness at the injection site
- Rash and malaise
- An influenza-like syndrome
- Arthritis/Arthralgia
- Myalgia
- Abnormal liver function may occur

POST – EXPOSURE PROPHYLAXIS

Specific Hepatitis B Immunoglobulin *(HBIG)* is manufactured for passive protection and is normally used in combination with Hepatitis B vaccine to confer passive/active immunity after exposure. Whenever immediate protection is required, immunization with the vaccine should be given with simultaneous administration of *Hepatitis B Immunoglobulin (HBIG)* at a different site. **Passive immunization with *HBIG* does not suppress an active immune response.**
If infection has already occurred at the time of vaccination, virus multiplication may not be inhibited completely but severe illness and, most importantly, the development of the carrier state may be prevented.

Immunoglobulin should be administered as soon as possible after exposure. In babies born to Hepatitis B carrier mothers, it should be

given not later than 48 hours after birth and for other types of exposure; it should preferably be given within 48 hours and certainly no later than one week after exposure.

HAEMOPHILUS INFLUENZAE TYPE B (HIB)

Hib disease is a bacterial illness caused by Haemophilus Influenzae serotype B -a bacteria that has the potential to cause a fatal brain infection in young children.

Haemophilus Influenzae is a gram–negative Coccobaccillus, which is generally aerobic, but which grows as a facultative anaerobe. Although six capsular types (a - f) had been described before the introduction of Haemophilus Influenzae Type B (Hib) vaccine, almost all Haemophilus Influenzae isolate from sterile sites were usually of one capsular type – type b. Type b organisms account for almost all strains that cause invasive disease.

Risk factors for Hib disease include host factors that increase the likelihood of exposure to Hib organisms. Exposure factors include household crowding, large household size, daycare attendance, low socio-economic status, and low levels of education in parents and among school-aged siblings.

Some protective factors include breastfeeding and passively-acquired maternal antibodies. However the effect of these is limited to less than six months.

Mode of Transmission

The Hib bacterium is commonly present in the nose and throat. Bacteria are transmitted from person to person by droplets dispersed through sneezing and coughing. Infected children may carry Hib bacteria without showing any signs or symptoms of illness but they can still infect others. The risk of disease is highest for children between six months and two years of age.

Incubation Period

The incubation period may be as short as 27 - 72 hours.

Signs and Symptoms

Children less than 5 years old are most often affected but the incidence decreases with age. Clinical categories of diseases caused by Hib include:

Meningitis

The classical sign of meningitis – neck stiffness, is often not detected in infants who present with drowsiness, poor feeding and high fever.

Epiglottitis (Inflammation of the epiglottis) present with: respiratory obstruction, associated with stridor, and often drooling in an anxious child who remains upright to maximize his or her airway.

- Septic Arthritis
- Cellulitis
- Pneumonia

Meningitis and Epiglottitis are almost invariably fatal without appropriate treatment.
Septic arthritis and cellulitis present with local signs related to the involved joints or skin.
Pneumonia due to Hib may present with respiratory distress and pleural effusion. There are no specific clinical features of any of these infections due to Hib, which enable them to be differentiated from those due to other organisms.

Complications

15% to 30% of children who survive Hib meningitis may develop permanent neurological disability, hearing loss, and mental retardation. 5% to 10% cases of Hib meningitis patients are at risk of dying.

Treatment

Hib disease can be treated with specific antibiotics according to the sensitivity pattern of the organisms.

Prevention

Several Hib Conjugate Vaccines are available. All are effective when given in early infancy, and have virtually no side effects except occasional temporary redness or swelling at the injection site. To reduce the number of injections, Hib vaccine is sometimes given in combination vaccine, DPT, Hepatitis B and Hi HAEMOPHILUS INFLUENZAE TYPE B (HIB)

Haemophilus Influenzae Type B (Hib) is a conjugated capsular polysaccharide vaccine. It is not live and contains non-replicating bacterial capsular antigens. Vaccine efficacy exceeds 95% in infants immunized from 2 - 3 months of age. Studies have shown that 90-99% of children developed protective levels of antibody following 3 doses.

Schedule

The first dose of Hib vaccine can be given as early as 6 weeks of age. The minimal interval between doses is 4 weeks/1month. The vaccine can be given at the same time with DPT. A common schedule is:

Schedule for Administering HIB Vaccine	
Dose	Age Given
1st	8 wks/2mths
2nd	16 wks/4mths
3rd	24wks/6mths

If the primary course is interrupted, it should be resumed, allowing one month between remaining doses. Children who start a course of Hib vaccine on one product can have the course completed with another product, should the need arise. Children between 15 - 48 months can be given a single injection of Hib vaccine either simultaneously with other vaccines or singly if other vaccines have already been given. Children in this age group are at a lower risk of disease and therefore the vaccine is effective after a single dose.

Because the incidence of invasive disease falls sharply after four years, routine immunization of older children and adults is not recommended. However, older children and adults who are at high risk of the disease, i.e. persons with asplenia or otherwise immuno-compromised should receive the vaccine.

Dosage

The primary course consists of 3 doses of Hib vaccine of 0.5ml each. No booster doses are necessary.

Administration

Hib vaccine is given by deep subcutaneous or intramuscular injection in the outer mid thigh for infants and outer upper arm for older children. This vaccine should be administered in a different limb from other simultaneously-administered vaccine. The site of the injection should be recorded. In older children or adults, the vaccine can be injected into the deltoid.

Contraindications and Precautions to Vaccination

Vaccination with Hib conjugate vaccine is contraindicated in persons known to have experienced anaphylaxis following a prior dose of that vaccine. Vaccination should be delayed in children with moderate or severe acute illnesses. Minor illnesses (e.g., mild upper-respiratory infection) are not contraindications to vaccination.

Adverse Reactions

Adverse events following Hib conjugate vaccines are uncommon.

- Swelling,
- Redness, and/or pain have been reported in 5%-30% of recipients and usually resolve within 12-24 hours.
- Systemic reactions such as fever and irritability are infrequent.

In St. Vincent and the Grenadines the law stipulates that EVERY child must be immunized prior to entry into primary school. The Head Teacher is mandated to request a child's immunization card at registration.

Since the immunization card contains the record of all the child's vaccinations the Health workers must ensure the card is complete i.e. that all vaccines administered and other relevant health information are recorded and dated. A child can only be admitted if immunization is complete.

The legislation governing the administration of vaccines to children is **the immunization of the children Act of 1982**. Since Hepatitis B and Haemophilus Influenza Type B were introduced in 2003 they were not included in the Act. A bill to amend the act to include Hepatitis B and Haemophilus Influenza Type B, was passed in parliament on the April 5, 2011