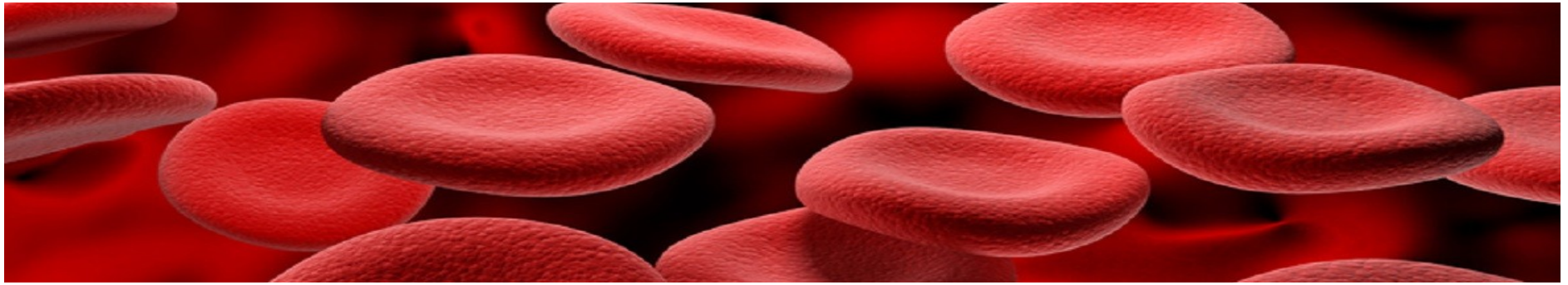

Blood Borne Diseases (part I)

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Learning objectives

1. List the important blood borne disease in Pakistan as prioritized by NIH
2. Discuss the global burden of blood borne disease & compare it with Pakistan
3. Describe important blood borne pathogens
4. Explain the evidence based public health practices to reduce transmission of blood borne infectious disease
5. Explain the evidence based best practices and procedures for safe blood transfusion and prevention of needle stick injury

Definition

- **Blood Borne Pathogens** are microorganisms such as **viruses** or bacteria that are carried in blood and can cause disease in people

- e.g. Syphilis, Brucellosis, and most notably **Hepatitis B** (HBV), **Hepatitis C** (HCV) and the **Human Immunodeficiency Virus (HIV**)

Definition;

- **Blood borne disease**, any of a group of diseases caused by pathogens such as viruses or bacteria that are carried in and spread through contact with blood and other body fluids such as semen, vaginal secretions, amniotic fluid and in some cases saliva

Source: www.britannica.com › science › bloodborne-disease

The infection may occur through:

- Transmission of blood or blood products,
- Sexual contact,
- Contaminated IV drug use,
- Occupational exposure especially in health care workers and
- From mother to the baby.

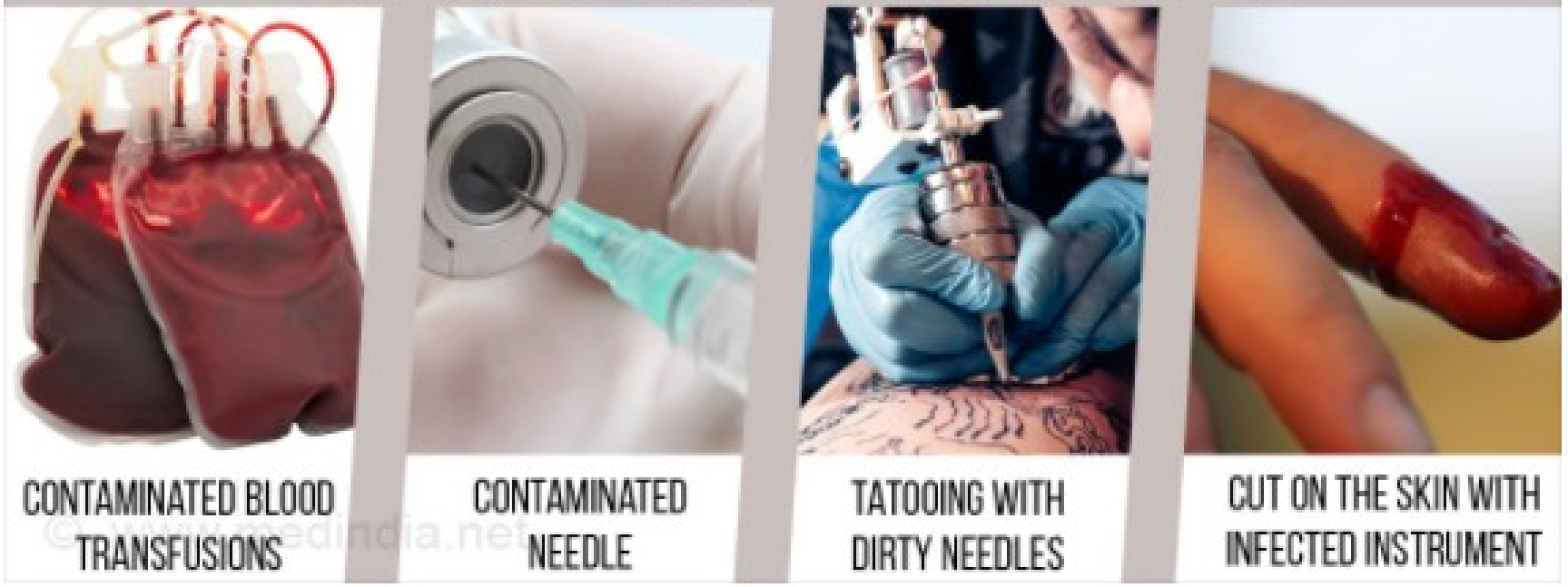
The main blood borne pathogens are the human immunodeficiency virus (HIV), Hepatitis B virus, (HBV) and Hepatitis C virus (HCV)

How are blood borne infections spread?

It has been reported spread occurs from patient to patient, patient to health worker and rarely from health worker to patient. Due to following reasons

- Contaminated blood transfusion
- Percutaneous exposures

TRANSMISSION ROUTES OF BLOOD-BORNE PATHOGENS



What are different blood borne diseases

They are divided into following categories:

1. Viral
2. Bacterial
3. Fungal

Viral blood borne disease are:

Viral diseases like **hepatitis A, B, C** and **HIV** are blood borne infections. **Cytomegalovirus** and **human T cell lymph tropic viruses (HTLVs)** are viral pathogens.

Other viral diseases that can potentially be spread through blood transfusion are:

- **Dengue fever (DF)**
- **Hepatitis A**
- **West Nile virus**
- **Zika virus**

Bacterial blood borne diseases are:

They are mostly common causing infections. Gram positive bacteria **Staphylococcus Aureus** and **Staphylococcus Epidermidis**, and gram negative bacteria like **Escheria coli** can contaminate blood used for transfusion.

Others can be brucellosis and syphilis.

Other organisms are

- That rarely be spread through blood transfusion are **Parasitic diseases**. Transmission of parasitic infections through blood donations is very rare but not impossible. Examples are:
- **Babesiosis**
- **Chagas disease**
- **Leishmaniasis**
- **Malaria**

Prion disease

- Also known as transmissible spongiform encephalopathy's (TSEs), prion diseases are rare, progressive neurodegenerative disorders that affect both humans and animals. Creutzfeldt-Jakob disease (CJD), a prion disease can spread through blood.

Important blood borne pathogens are:

1. Brucellosis
2. Hepatitis A
3. Hepatitis B
4. Hepatitis C
5. Hepatitis D
6. Hepatitis E
7. Hepatitis G
8. Human Immunodeficiency Virus (HIV)
9. Human T-Lymphotropic Virus 1 (HTLV)
10. Syphilis

Diseases that are not usually transmitted directly by blood contact,

But rather by insect or other vector, are more usefully classified as *vector-borne disease*, even though the causative agent can be found in blood.

Vector-borne diseases include;

1. West Nile virus,
2. Zika fever and
3. Malaria

Although they can be transmitted via blood

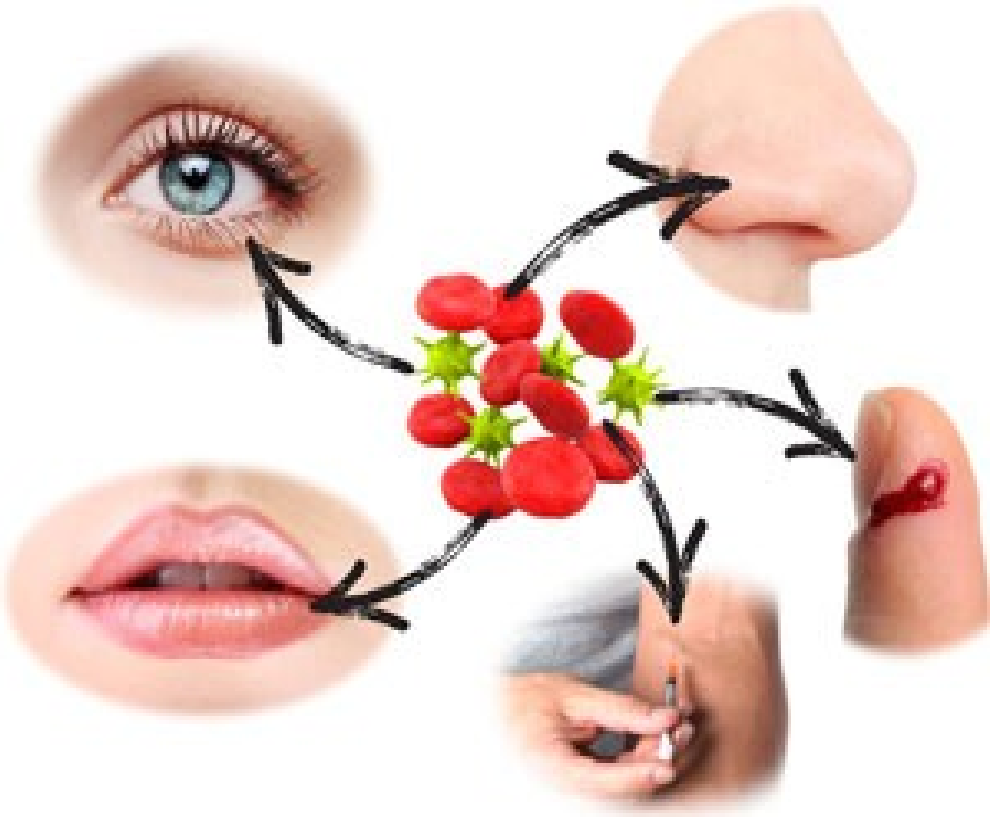
Route of spread

- Blood borne pathogens such as HBV and HIV can be transmitted through contact with infected human blood and other potentially infectious body fluids such as:

Routes of spread

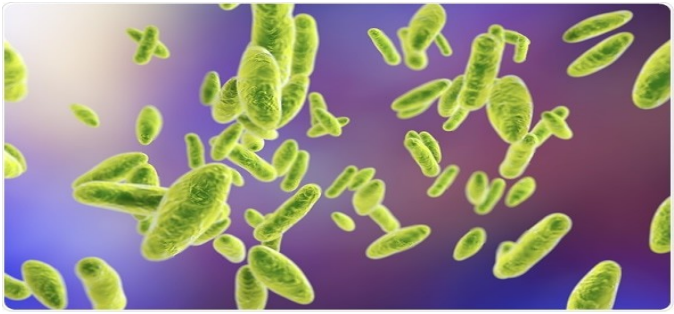
1. Saliva (in dental procedures),
2. Cerebrospinal fluid
3. Synovial fluid
4. Pleural fluid
5. Peritoneal fluid
6. Amniotic fluid
7. Semen
8. Vaginal secretions, and
9. Any body fluid that is visibly contaminated with blood.

Route of spread



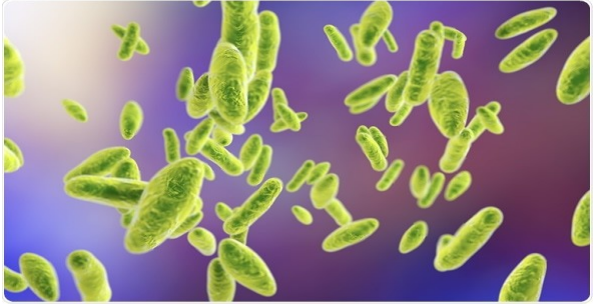
Transmission of any of these can be through open sores, cuts, abrasions, damaged skin, or mucous membranes of the eyes, nose, mouth, vagina or anus.

Brucellosis



Brucellosis is an infectious disease caused by gram negative bacteria called **Brucella**. The bacteria can spread from animals to humans. There are several different strains of **Brucella** bacteria. Some types are seen in cows. Others occur in dogs, pigs, sheep, goats, and camels.

- **Brucellosis** is a highly contagious zoonosis caused by ingestion of unpasteurized milk or undercooked meat from infected animals, or close contact with their secretions. It is also known as **undulant fever**, **Malta fever**, and **Mediterranean fever**.



Brucella species are small, Gram-negative, nonmotile, nonspore-forming, rod-shaped (coccobacilli) bacteria. They function as facultative intracellular parasites, causing chronic disease, which usually persists for life.

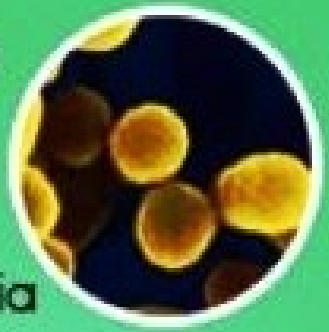
Four species infect humans: *B. abortus*, *B. canis*, *B. melitensis*, and *B. suis*.

1. *B. abortus* is less virulent than *B. melitensis* and is primarily a disease of cattle.
2. *B. canis* affects dogs.
3. *B. melitensis* is the most virulent and invasive species; it usually infects goats and occasionally sheep.
4. *B. suis* is of intermediate virulence and chiefly infects pigs. Symptoms include profuse sweating and joint and muscle pain. Brucellosis has been recognized in animals and humans since the early 20th century.

- The symptoms are like those associated with many other febrile diseases, but with emphasis on muscular pain and night sweats. The duration of the disease can vary from a few weeks to many months or even years.

Brucellosis in Humans

Brucellosis is the name given to a bacterial infection which basically is contracted from animals usually due to consumption of unpasteurized dairy products.



Bacteria

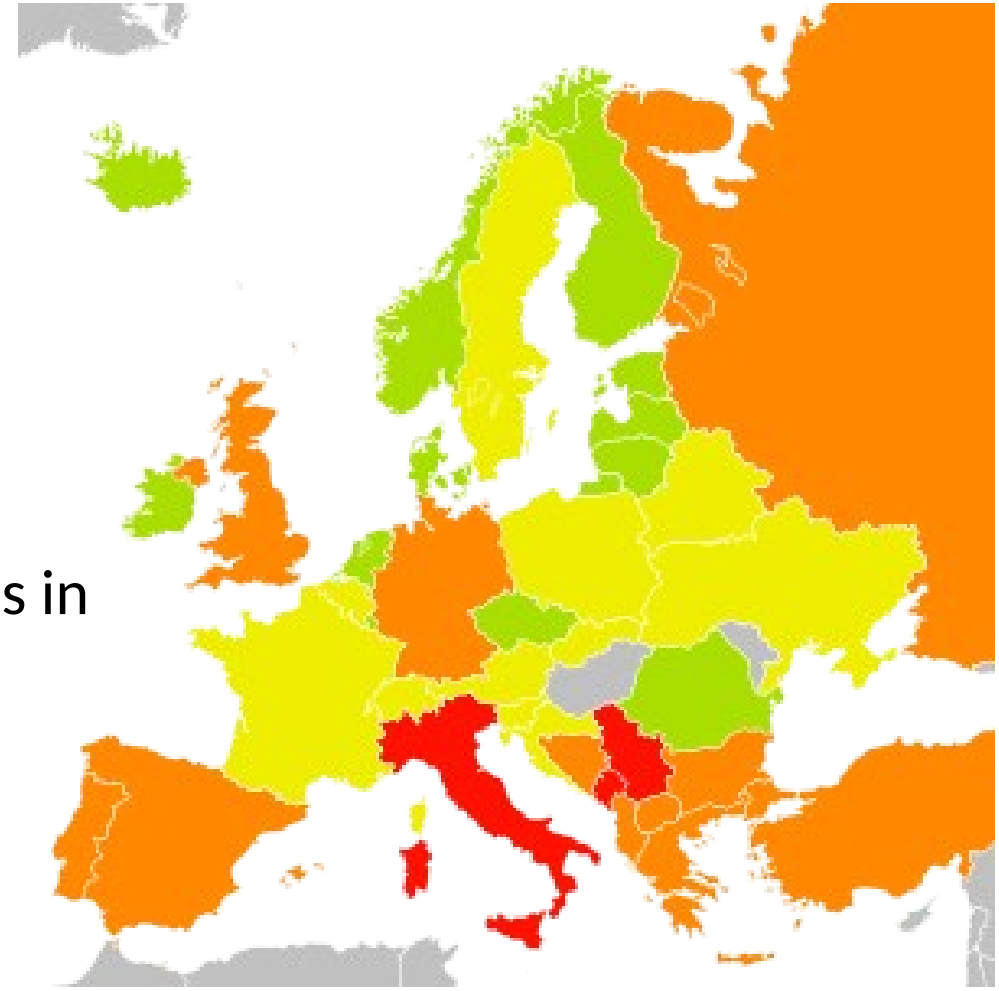
Some of the Symptoms of Brucellosis are

- Fevers
- Chills
- Weakness
- Lethargy
- Muscle and joint aches and pains
- Headaches.

Prevention

- Surveillance using serological tests, as well as tests on milk such as the milk ring test, can be used for screening
- Also, individual animal testing both for trade and for disease-control purposes
- In endemic areas, vaccination is often used to reduce the incidence of infection. An animal vaccine is available that uses modified live bacteria.

Disease incidence map of *B. melitensis* infections in animals in Europe during the first half of 2006



never reported
not reported in this period
confirmed clinical disease
confirmed infection
no information

Situation in Pakistan

- **Brucellosis** is a zoonotic disease; endemic but neglected in the South Asian countries including **Pakistan**. It causes economic loss to the livestock sector
- In Pakistan, brucellosis is still an important and neglected problem and seroprevalence of brucellosis has been rarely investigated in Pakistan.
- **Brucella** infection, particularly in rural areas of **Pakistan**, is an important public health concern

Hepatitis A

- **Hepatitis** A virus (HAV) is classified as a member of the Hepatovirus genus within the family Picornaviridae. It is responsible for a self-limiting viral **hepatitis** in human beings and may be transmitted by the fecal–oral route during acute infection or by the ingestion of uncooked contaminated shellfish.

- It is most **contagious soon** after a person is infected.
- Adults who are otherwise healthy are no longer **contagious** two weeks after the illness begins.
- Children and people with weak immune systems may be **contagious** for up to six months.

- Unlike hepatitis B and C, hepatitis A does not cause chronic liver disease and is rarely fatal, but it can cause debilitating symptoms and fulminant hepatitis (acute liver failure), which is often fatal.

- WHO estimates that hepatitis A caused approximately 7134 deaths in 2016 (accounting for 0.5% of the mortality due to viral hepatitis)

- The risk of hepatitis A infection is associated with a lack of safe water, and poor sanitation and hygiene (such as dirty hands)

- In countries where the risk of infection from food or water is low, there are outbreaks among men who have sex with men (MSM) and persons who inject drugs (PWIDs)

Epidemiology of hepatitis A

- Hepatitis A occurs sporadically and in epidemics worldwide, with a tendency for cyclic recurrences.
- The hepatitis A virus is one of the most frequent causes of foodborne infection.
- Epidemics related to contaminated food or water can erupt explosively, such as the epidemic in Shanghai in 1988 that affected about 300 000 people.
- They can be also prolonged, affecting communities for months through person-to-person transmission.
- Hepatitis A viruses persist in the environment and can withstand food-production processes routinely used to inactivate and/or control bacterial pathogens.

Spread

- **Hepatitis** A can be spread from close, personal contact with an infected person, such as through certain types of sexual contact (like oral-anal sex), caring for someone who is ill, or using drugs with others. **Hepatitis** A is very contagious, and people can even spread the virus before they feel sick.

Geological distribution

- **Areas with high levels of infection**
- **Areas with low levels of infection**
- **Areas with intermediate levels of infection**

Geological distribution

Areas with high levels of infection

- In low- and middle-income countries with poor sanitary conditions and hygienic practices, infection is common and most children (90%) have been infected with the hepatitis A virus before the age of 10 years, most often without symptoms[2]. Epidemics are uncommon because older children and adults are generally immune. Symptomatic disease rates in these areas are low and outbreaks are rare.

Geological distribution

Areas with low levels of infection

- In high-income countries with good sanitary and hygienic conditions, infection rates are low. Disease may occur among adolescents and adults in high-risk groups, such as PWIDs, MSMs, people travelling to areas of high endemicity, and in isolated populations, such as closed religious groups. In the United States of America, large outbreaks have been reported among homeless persons.

Geological distribution

Areas with intermediate levels of infection

- In middle-income countries, and regions where sanitary conditions are variable, children often escape infection in early childhood and reach adulthood without immunity. These improved economic and sanitary conditions may lead to accumulation of adults who have never been infected and who have no immunity. This higher susceptibility in older age groups may lead to higher disease rates and large outbreaks can occur in these communities.

Symptoms

- The incubation period of hepatitis A is usually 14–28 days.
- Symptoms of hepatitis A range from mild to severe, and can include fever, malaise, loss of appetite, diarrhea, nausea, abdominal discomfort, dark-colored urine and jaundice (a yellowing of the skin and whites of the eyes). Not everyone who is infected will have all of the symptoms.
- Adults have signs and symptoms of illness more often than children. The severity of disease and fatal outcomes are higher in older age groups.
- Infected children under 6 years of age do not usually experience noticeable symptoms, and only 10% develop jaundice. Among older children and adults, infection usually causes more severe symptoms, with jaundice occurring in more than 70% of cases.
- Hepatitis A sometimes relapses; the person who just recovered falls sick again with another acute episode. This is, however, normally followed by recovery.

Who is at risk?

- Anyone who has not been vaccinated or previously infected can get infected with hepatitis A virus. In areas where the virus is widespread (high endemicity), most hepatitis A infections occur during early childhood. Risk factors include:
- Poor sanitation
- Lack of safe water
- Living in a household with an infected person
- Being a sexual partner of someone with acute hepatitis A infection
- Use of recreational drugs
- Sex between men
- Travelling to areas of high endemicity without being immunized.

Prevention

Improved sanitation, food safety and immunization are the most effective ways to combat hepatitis A.

The spread of hepatitis A can be reduced by:

- Adequate supplies of safe drinking water
- Proper disposal of sewage within communities; and
- Personal hygiene practices such as regular hand-washing before meals and after going to the bathroom.

Several injectable inactivated hepatitis A vaccines are available internationally. All are similar in terms of how well they protect people from the virus and their side effects. No vaccine is licensed for children younger than 1 year of age. In China, a live attenuated vaccine is also available.

Nearly 100% of people develop protective levels of antibodies to the virus within 1 month after injection of a single dose of vaccine.

Even after exposure to the virus, a single dose of the vaccine within 2 weeks of contact with the virus has protective effects. Still, manufacturers recommend 2 vaccine doses to ensure a longer-term protection of about 5 to 8 years after vaccination.

Immunization efforts

- Vaccination against hepatitis A should be part of a comprehensive plan for the prevention and control of viral hepatitis.
- Planning for large-scale immunization programs should involve careful economic evaluations and consider alternative or additional prevention methods, such as improved sanitation, and health education for improved hygiene practices.
- Whether or not to include the vaccine in routine childhood immunization depends on the local context. The proportion of susceptible people in the population and the level of exposure to the virus should be considered.

Generally speaking,

- countries with intermediate endemicity will benefit the most from universal immunization of children.
- Countries with low endemicity may consider vaccinating high-risk adults.
- In countries with high endemicity, the use of vaccine is limited as most adults are naturally immune.

- As of May 2019, 34 countries used or were planning to introduce hepatitis A vaccine in routine immunization of children in specific risk groups.
- While the 2-dose regimen of inactivated hepatitis A vaccine is used in many countries, other countries may consider inclusion of a single-dose inactivated hepatitis A vaccine in their immunization schedules.
- Some countries also recommend the vaccine for people at increased risk of hepatitis A, including:
- Users of recreational drugs;
- Travellers to countries where the virus is endemic;
- Men who have sex with men; and
- People with chronic liver disease (because of their increased risk of serious complications if they acquire hepatitis A infection).

Prevention

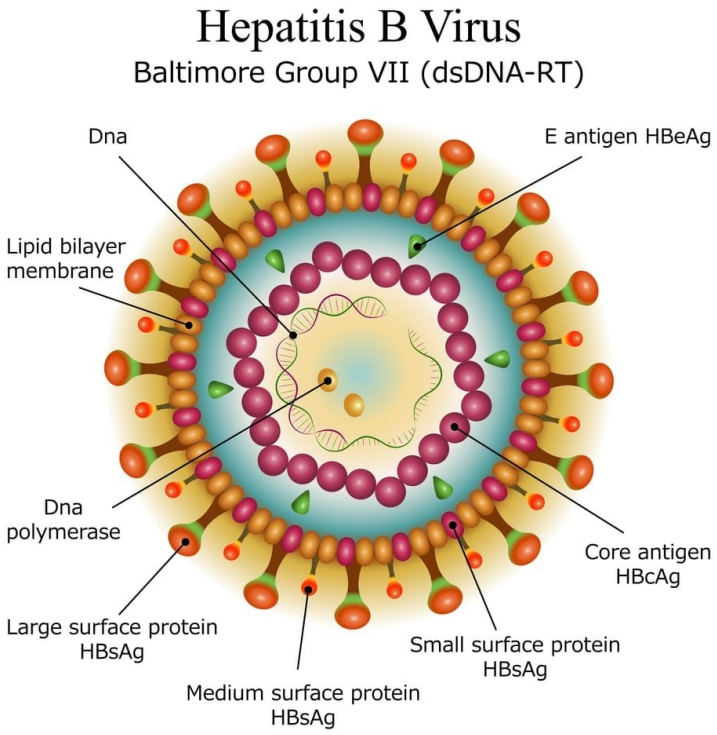
- **Hepatitis** A infection can be prevented by getting vaccine or immune globulin soon after coming into contact with the virus. Persons who have recently been exposed to HAV should get immune globulin or vaccine as soon as possible, but not more than 2 weeks after the last exposure.

- **A safe and effective vaccine is available to prevent hepatitis A.**

- **Safe water supply, food safety, improved sanitation, hand washing and the hepatitis A vaccine are the most effective ways to combat the disease. Persons at high risk, such as travelers to countries with high levels of infection**

Hepatitis B

- **Hepatitis B virus** (**HBV**), is a partially double-stranded DNA **virus**, a species of the genus Ortho hepadna virus and a member of the Hepadnaviridae family of **viruses**.
  This **virus** causes the disease **hepatitis B**.



- Hepatitis B is a potentially life-threatening liver infection caused by the hepatitis B virus (HBV).
- It is a major global health problem.
- It can cause chronic infection and puts people at high risk of death from cirrhosis and liver cancer.

Geographical distribution

- Hepatitis B prevalence is highest in the WHO Western Pacific Region and the WHO African Region, where 6.2% and 6.1% of the adult population is infected respectively.
- In the WHO Eastern Mediterranean Region, the WHO South-East Asia Region and the WHO European Region, an estimated 3.3%, 2.0% and 1.6% of the general population is infected, respectively.
- And in the WHO Region of the Americas, 0.7% of the population is infected.

Transmission

- In highly endemic areas, hepatitis B is most commonly spread from mother to child at birth (perinatal transmission), or through horizontal transmission (exposure to infected blood), especially from an infected child to an uninfected child during the first 5 years of life. The development of chronic infection is very common in infants infected from their mothers or before the age of 5 years.
- Hepatitis B is also spread by needle stick injury, tattooing, piercing and exposure to infected blood and body fluids, such as saliva and, menstrual, vaginal, and seminal fluids. Sexual transmission of hepatitis B may occur, particularly in unvaccinated men who have sex with men and heterosexual persons with multiple sex partners or contact with sex workers.

- Infection in adulthood leads to chronic hepatitis in less than 5% of cases, whereas infection in infancy and early childhood leads to chronic hepatitis in about 95% of cases.
- Transmission of the virus may also occur through the reuse of needles and syringes either in health-care settings or among persons who inject drugs.
- In addition, infection can occur during medical, surgical and dental procedures, through tattooing, or through the use of razors and similar objects that are contaminated with infected blood.
- The hepatitis B virus can survive outside the body for at least 7 days. During this time, the virus can still cause infection if it enters the body of a person who is not protected by the vaccine.
- The incubation period of the hepatitis B virus is 75 days on average, but can vary from 30 to 180 days.
- The virus may be detected within 30 to 60 days after infection and can persist and develop into chronic hepatitis B.

Who is at risk of chronic disease?

The likelihood that infection becomes chronic depends on the age at which a person becomes infected. Children less than 6 years of age who become infected with the hepatitis B virus are the most likely to develop chronic infections.

In infants and children:

- 80–90% of infants infected during the first year of life develop chronic infections; and
- 30–50% of children infected before the age of 6 years develop chronic infections.

In adults:

- less than 5% of otherwise healthy persons who are infected as adults will develop chronic infections; and
- 20–30% of adults who are chronically infected will develop cirrhosis and/or liver cancer.

HBV-HIV co-infection

- About 1% of persons living with HBV infection (2.7 million people) are also infected with HIV. Conversely, the global prevalence of HBV infection in HIV-infected persons is 7.4%.
- Since 2015, WHO has recommended treatment for everyone diagnosed with HIV infection, regardless of the stage of disease. Tenofovir, which is included in the treatment combinations recommended as first-line therapy for HIV infection, is also active against HBV.

Diagnosis

- It is not possible, on clinical grounds, to differentiate hepatitis B from hepatitis caused by other viral agents, hence, laboratory confirmation of the diagnosis is essential.
- Laboratory diagnosis of hepatitis B infection focuses on the detection of the hepatitis B surface antigen HBsAg. WHO recommends that all blood donations be tested for hepatitis B to ensure blood safety and avoid accidental transmission to people who receive blood products.
- Acute HBV infection is characterized by the presence of HBsAg and immunoglobulin M (IgM) antibody to the core antigen, HBcAg.
- During the initial phase of infection, patients are also seropositive for hepatitis B e antigen (HBeAg). HBeAg is usually a marker of high levels of replication of the virus. The presence of HBeAg indicates that the blood and body fluids of the infected individual are highly infectious.
- Chronic infection is characterized by the persistence of HBsAg for at least 6 months (with or without concurrent HBeAg). Persistence of HBsAg is the principal marker of risk for developing chronic liver disease and liver cancer (hepatocellular carcinoma) later in life.

Treatment

- ***Acute* hepatitis B,** There is no specific treatment. Therefore, care is aimed at maintaining comfort and adequate nutritional balance, including replacement of fluids lost from vomiting and diarrhoea. Most important is the avoidance of unnecessary medications. Acetaminophen/Paracetamol and medication against vomiting should not be given.
- ***Chronic* hepatitis B** infection can be treated with medicines, including oral antiviral agents. Treatment can slow the progression of cirrhosis, reduce incidence of liver cancer and improve long term survival. Only a proportion (estimates vary from 10% to 40% depending on setting and eligibility criteria) of people with chronic hepatitis B infection will require treatment.
- WHO recommends the use of oral treatments - tenofovir or entecavir- as the most potent drugs to suppress hepatitis B virus. They rarely lead to drug resistance compared with other drugs, are simple to take (1 pill a day), and have few side effects, so require only limited monitoring.

Challenges

- There is still limited access to diagnosis and treatment of hepatitis B in many resource-constrained settings. In 2016, of the more than 250 million people living with HBV infection, 10.5% (27 million) were aware of their infection. Of those diagnosed, the global treatment coverage is 16.7% (4.5 million). Many people are diagnosed only when they already have advanced liver disease.

- Among the long-term complications of HBV infections, cirrhosis and hepatocellular carcinoma cause a large disease burden. Liver cancer progresses rapidly, and since treatment options are limited, the outcome is generally poor. In low-income settings, most people with liver cancer die within months of diagnosis. In high-income countries, surgery and chemotherapy can prolong life for up to a few years. Liver transplantation is sometimes used in people with cirrhosis in high income countries, with varying success.

Prevention

- The **hepatitis B vaccine** is the mainstay of hepatitis B prevention.

- WHO recommends that all infants receive the hepatitis B vaccine as soon as possible after birth, preferably within 24 hours – followed by two or three doses of hepatitis B vaccine at least four weeks apart to complete the series. Timely birth dose is an effective measure to reduce transmission from mother-to-child.
- According to latest WHO estimates, the proportion of children under five years of age chronically infected with HBV dropped to just under 1% in 2019 down from around 5% in the pre-vaccine era ranging from the 1980s to the early 2000s.
- This marks the achievement of one of the milestone targets to eliminate viral hepatitis in the Sustainable Development Goals – to reach under 1% prevalence of HBV infections in children under five years of age by 2020.

The scale-up of hepatitis B vaccine worldwide over the last two decades has been a great public health success story and contributed to the decrease in HBV infections among children

- In 2019, coverage of 3 doses of the vaccine reached 85% worldwide compared to around 30% in 2000. However, coverage of the hepatitis B vaccine birth dose remains uneven. Global coverage of the HBV birth dose, for example, is 43%, while coverage in the WHO African Region is only 6%

- The complete vaccine series induces protective antibody levels in more than 95% of infants, children and young adults. Protection lasts at least 20 years and is probably lifelong. Thus, WHO does not recommend booster vaccinations for persons who have completed the 3-dose vaccination schedule.

All children and adolescents younger than 18 years and not previously vaccinated should receive the vaccine if they live in countries where there is low or intermediate endemicity.

In those settings it is possible that more **people in high-risk groups** may acquire the infection and they should also be vaccinated. This includes:

1. People who frequently require blood or blood products, dialysis patients and recipients of solid organ transplantations
2. People in prisons
3. People who inject drugs
4. Household and sexual contacts of people with chronic HBV infection;
5. People with multiple sexual partners
6. Healthcare workers and others who may be exposed to blood and blood products through their work and
7. Travellers who have not completed their HBV series, who should be offered the vaccine before leaving for endemic areas

hepatitis B transmission from mother-to-child

In addition to infant vaccination, including a timely birth dose, WHO recommends the use of antiviral prophylaxis for the prevention of hepatitis B transmission from mother-to-child.

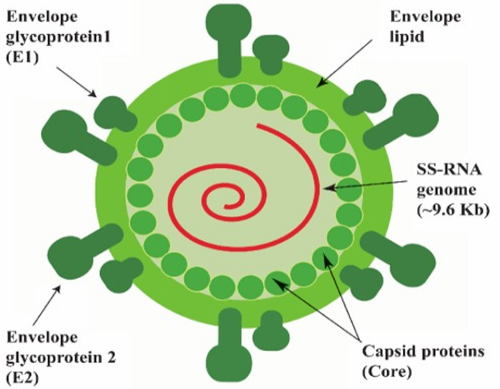
Pregnant women with high levels of HBV DNA (viral load) and/or the presence of HBeAG have an elevated risk of transmitting the virus to their child, even among infants who receive the timely birth dose and the complete hepatitis B vaccine series.

As such, pregnant women with high HBV DNA levels may be eligible for antiviral prophylaxis during pregnancy to prevent perinatal HBV infection and protect their infants from contracting the disease.

Implementation of blood safety strategies

- Including **quality-assured screening** of all donated blood and blood components used for transfusion, can prevent transmission of HBV.
- Worldwide, in 2013, 97% of blood donations were screened and quality assured, but gaps persist.
- **Safe injection practices**, eliminating unnecessary and unsafe injections, can be effective strategies to protect against HBV transmission. Unsafe injections decreased from 39% in 2000 to 5% in 2010 worldwide.
- Furthermore, **safer sex practices,** including minimizing the number of partners and using barrier protective measures (condoms), also protect against transmission.

Hepatitis C



- Hepatitis C is a liver disease caused by the hepatitis C virus (HCV). The virus can cause both acute and chronic hepatitis, ranging in severity from a mild illness lasting a few weeks to a serious, lifelong illness.
- Hepatitis C is a major cause of liver cancer.
- The hepatitis C virus is a bloodborne virus. The most common modes of infection are through exposure to small quantities of blood. This may happen through injection drug use, unsafe injection practices, unsafe health care, transfusion of unscreened blood and blood products, and sexual practices that lead to exposure to blood.

Epidemiology

- Globally, an estimated 71 million people have chronic hepatitis C virus infection
- A significant number of those who are chronically infected will develop cirrhosis or liver cancer
- WHO estimated that in 2016, approximately 399 000 people died from hepatitis C, mostly from cirrhosis and hepatocellular carcinoma (primary liver cancer)
- Antiviral medicines can cure more than 95% of persons with hepatitis C infection, thereby reducing the risk of death from cirrhosis and liver cancer, but access to diagnosis and treatment is low
- There is currently no effective vaccine against hepatitis C, however, research in this area is ongoing

Geographical distribution

- Hepatitis C is found worldwide. The most affected regions are the WHO Eastern Mediterranean Region and the WHO European Region, with an estimated prevalence in 2015 of 2.3% and 1.5% respectively. Prevalence of HCV infection in other WHO regions varies from 0.5% to 1.0%

- Depending on the country, hepatitis C virus infection can be concentrated in certain populations

- For example, 23% of new HCV infections and 33% of HCV mortality is attributable to injecting drug use. Yet, people who inject drugs and people in prisons are not often included in national responses

- In countries where infection control practices are or were historically insufficient, HCV infection is often widely distributed in the general population. There are multiple strains (or genotypes) of the HCV virus and their distribution varies by region. However, in many countries, the genotype distribution remains unknown.

Transmission

The hepatitis C virus is a bloodborne virus. It is most commonly transmitted through:

- Injecting drug use through the sharing of injection equipment;
- The reuse or inadequate sterilization of medical equipment, especially syringes and needles in healthcare settings;
- The transfusion of unscreened blood and blood products;
- Sexual practices that lead to exposure to blood (for example, among men who have sex with men, particularly those with HIV infection or those taking pre-exposure prophylaxis against HIV infection).
- HCV can also be transmitted sexually and can be passed from an infected mother to her baby; however, these modes of transmission are less common.
- Hepatitis C is not spread through breast milk, food, water or casual contact such as hugging, kissing and sharing food or drinks with an infected person.

WHO estimates that in 2015, there were 1.75 million new HCV infections in the world (23.7 new HCV infections per 100 000 people).

Testing and diagnosis

- Because new HCV infections are usually asymptomatic, few people are diagnosed when the infection is recent. In those people who go on to develop chronic HCV infection, the infection is also often undiagnosed because it remains asymptomatic until decades after infection when symptoms develop secondary to serious liver damage.
- HCV infection is diagnosed in 2 steps:
- Testing for anti-HCV antibodies with a serological test identifies people who have been infected with the virus.
- If the test is positive for anti-HCV antibodies, a nucleic acid test for HCV ribonucleic acid (RNA) is needed to confirm chronic infection because about 30% of people infected with HCV spontaneously clear the infection by a strong immune response without the need for treatment. Although no longer infected, they will still test positive for anti-HCV antibodies.
- After a person has been diagnosed with chronic HCV infection, he or she should have an assessment of the degree of liver damage (fibrosis and cirrhosis). This can be done by liver biopsy or through a variety of non-invasive tests.
- The degree of liver damage is used to guide treatment decisions and management of the disease.

- In settings with high HCV antibody seroprevalence in the general population (defined as ≥2% or ≥5% HCV antibody seroprevalence), WHO recommends that all adults have access to and be offered HCV testing with linkage to prevention, care and treatment services.
- About 2.3 million people (6.2%) of the estimated 3.7 million living with HIV globally have serological evidence of past or present HCV infection. Chronic liver disease represents a major cause of morbidity and mortality among persons living with HIV globally.

Getting tested

Early diagnosis can prevent health problems that may result from infection and prevent transmission of the virus. WHO recommends testing people who may be at increased risk of infection.

Populations at increased risk of HCV infection include:

- People who inject drugs
- People in prisons and other closed settings
- People who use drugs through other routes of administration (non-injecting)
- Men who have sex with men (MsM)
- Recipients of infected blood products or invasive procedures in health-care facilities with inadequate infection control practices
- Children born to mothers infected with HCV
- People with HIV infection
- Prisoners or previously incarcerated persons and
- People who have had tattoos or piercings

Treatment

- A new infection with HCV does not always require treatment, as the immune response in some people will clear the infection. However, when HCV infection becomes chronic, treatment is necessary. The goal of hepatitis C treatment is cure
- WHO's updated 2018 guidelines recommend therapy with pan-genotypic direct-acting antivirals (DAAs). DAAs can cure most persons with HCV infection, and treatment duration is short (usually 12 to 24 weeks), depending on the absence or presence of cirrhosis
- WHO recommends treating all persons with chronic HCV infection over the age of 12 with pan-genotypic DAAs. Pan-genotypic DAAs remain expensive in many high- and upper-middle-income countries

Prevention

Primary Prevention

There is no effective vaccine against hepatitis C; prevention of HCV infection depends upon reducing the risk of exposure to the virus in health-care settings and in higher risk populations for example, people who inject drugs and men who have sex with men, particularly those infected with HIV or those who are taking pre-exposure prophylaxis against HIV.

The following list provides a limited example of primary prevention interventions recommended by WHO:

- Safe and appropriate use of health care injections
- Safe handling and disposal of sharps and waste
- Provision of comprehensive harm-reduction services to people who inject drugs including sterile injecting equipment and effective and evidence-based treatment of dependence
- Testing of donated blood for HBV and HCV (as well as HIV and syphilis)
- Training of health personnel
- Prevention of exposure to blood during sex

Prevention

Secondary prevention

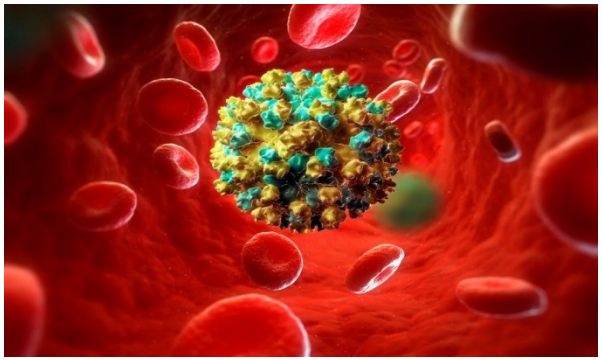
For people infected with the hepatitis C virus, WHO recommends:

- Education and counseling on options for care and treatment
- Immunization with the hepatitis A and B vaccines to prevent co-infection from these hepatitis viruses and to protect their liver
- Early and appropriate medical management including antiviral therapy and
- Regular monitoring for early diagnosis of chronic liver disease.

Screening, care and treatment of persons with hepatitis C infection

- In July 2018, WHO updated its "*Guidelines for the care and treatment of persons diagnosed with chronic hepatitis C virus infection*".
- These guidelines are intended for government officials to use as the basis for developing national hepatitis policies, plans and treatment guidelines. These include country program managers and health-care providers responsible for planning and implementing hepatitis care and treatment program, particularly in low- and middle-income countries.

Hepatitis E



- **Hepatitis E virus** (HEV) is a member of the Hepeviridae family, genus Hepevirus, which causes acute **hepatitis** in the normal host and chronic **hepatitis** in immunosuppressed patients.
- HEV may be the most common form of acute **viral hepatitis** and occurs in both sporadic and epidemic forms.

Hepatitis E

- The global burden of infections from the two major genotypes is estimated at 20 million per year, leading to 70,000 deaths and 3,000 stillbirths.

Epidemiology

- HEV may be the most common form of acute viral hepatitis and occurs in both sporadic and epidemic forms.
- HEV is transmitted by waterborne spread of fecally contaminated water or by fecally transmitted zoonotic infection. Person-to-person transmission is uncommon.
- HEV is unique among the hepatitis viruses because of its disproportionately high mortality rate in pregnant women (25% in the third trimester).
- HEV infection is uncommon, but likely underdiagnosed in developed countries, and zoonotic infections may be responsible for many of the cases that are locally acquired in developed countries.
- Chronic hepatitis E infection has recently been described in immunosuppressed patients.

Diagnosis

- Diagnosis of HEV had previously been made serologically, but molecular diagnosis via polymerase chain reaction has better sensitivity and specificity and is the diagnostic technique of choice, if available.

Therapy

- Acute HEV infection is generally self-limited and requires only supportive care. Severe acute cases have been treated successfully with ribavirin.
- Ribavirin monotherapy appears to be highly effective in treatment of chronic hepatitis E in solid-organ transplant recipients.

Prevention

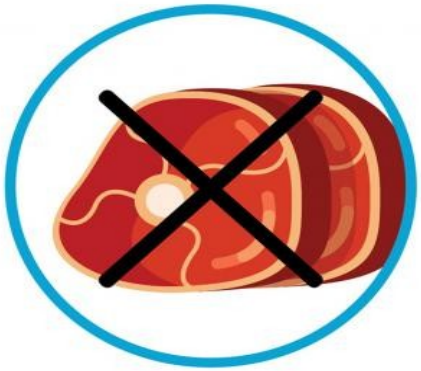
- Protecting water supplies from contamination with human feces is the most important means to prevent HEV infection.
- A vaccine using the ORF2 capsid protein that assembles into virus-like particles has been shown to be safe and effective and is licensed in China.

MEDICALNEWSTODAY

Hepatitis E Prevention

Use bottled water for brushing your teeth in high-risk areas

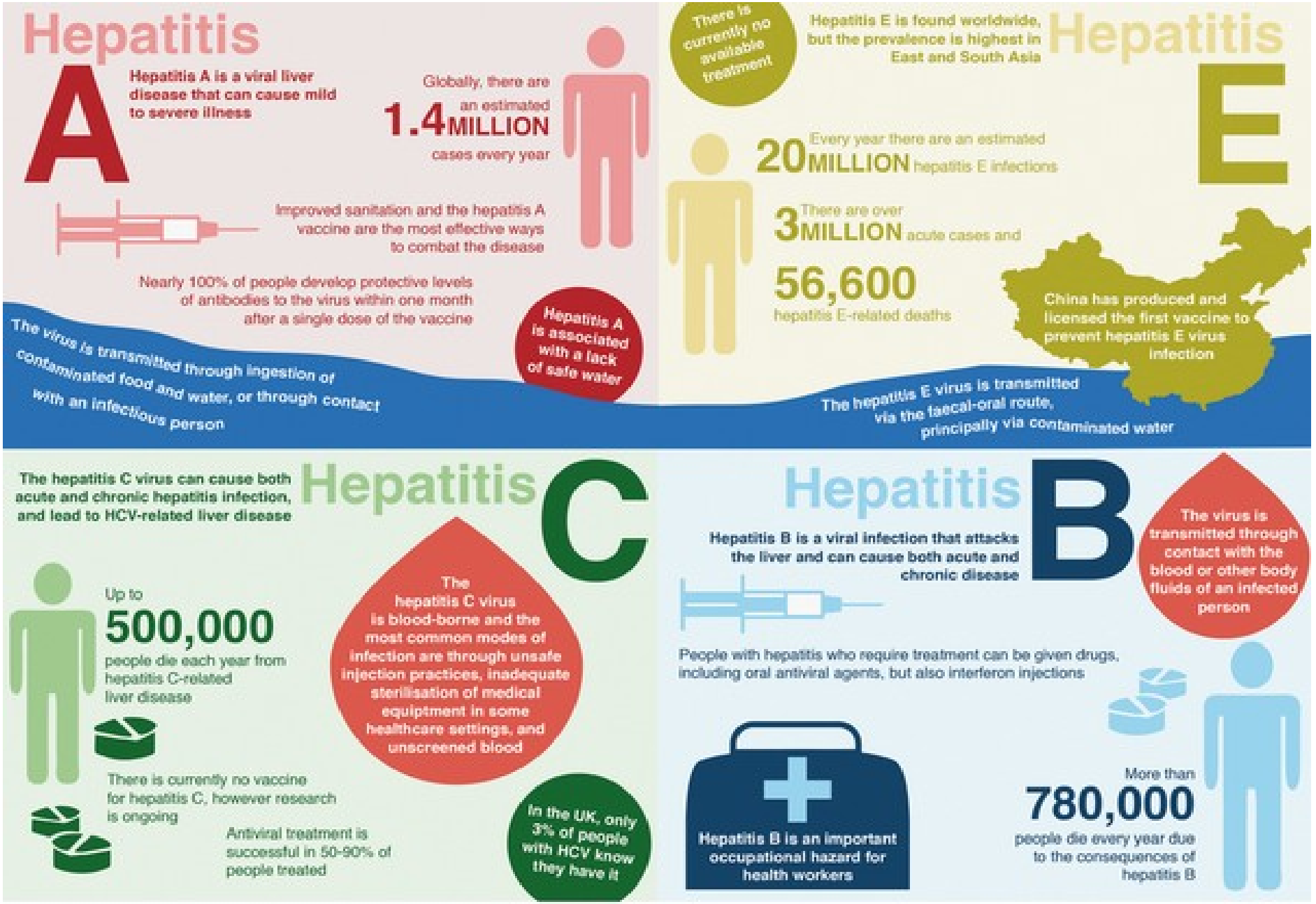
Use purified water for washing vegetables or when cooking



Avoid raw meat, particularly pork and game meat

Boil water to purify it

Wash your hands frequently



https://twitter.com/Hep_Alliance/status/497289822013095936

HEPATITIS PREVENTION AND PROTECTION GUIDE

WORLD HEPATITIS DAY

Know how it spreads

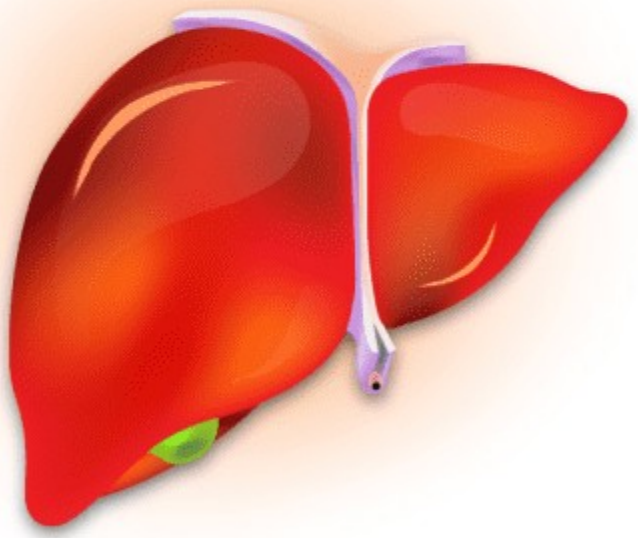
Get Vaccinations

Avoid Sharing Personal Items

Avoid Sharing Grooming Items

Alcohol and Drugs

When Travelling



"*Global Health Sector Strategy on Viral Hepatitis, 2016-2021*".

- In May 2016, The World Health Assembly adopted the first strategy to highlights the critical role of Universal Health Coverage and the targets of the strategy are aligned with those of the Sustainable Development Goals
- The strategy has a vision of eliminating viral hepatitis as a public health problem and this is encapsulated in the global targets of reducing new viral hepatitis infections by 90% and reducing deaths due to viral hepatitis by 65% by 2030
- Actions to be taken by countries and WHO Secretariat to reach these targets are outlined in the strategy

To support countries in moving towards achieving the *Global Hepatitis Goals under the Sustainable Development Agenda 2030,* WHO is working in the following areas:

- Raising awareness, promoting partnerships and mobilizing resources
- Formulating evidence-based policy and data for action
- Increasing health equities within the hepatitis response
- Preventing transmission and
- Scaling up screening, care and treatment services

- Since 2011, together with national governments, civil society and partners, WHO has organized annual World Hepatitis Day campaigns (as 1 of its 9 flagship annual health campaigns) to increase awareness and understanding of viral hepatitis. The date of 28 July was chosen because it is the birthday of Nobel-prize winning scientist Dr Baruch Bloomberg, who discovered the hepatitis B virus and developed a diagnostic test and vaccine for the virus

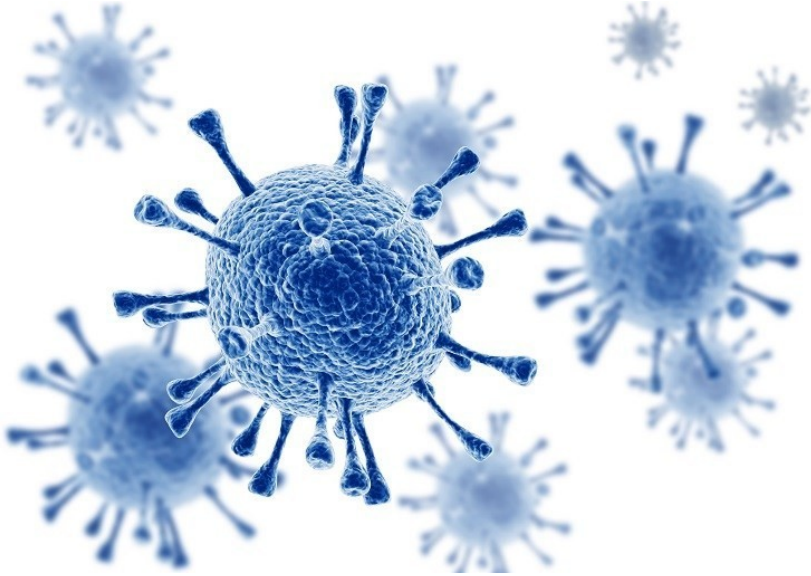
- The **theme** for World Hepatitis Day 2020 is **"Hepatitis-free future",** with a strong focus on preventing hepatitis B among mothers and newborns. On 28 July, WHO will publish new guidance on the prevention of mother-to-child transmission of the virus

28 July is World Hepatitis Day

28 July is World Hepatitis Day

- The **theme** for World Hepatitis Day 2020 is **"Hepatitis-free future",** with a strong focus on preventing hepatitis B among mothers and newborns.
- On 28 July, WHO will publish new guidance on the prevention of mother-to-child transmission of the virus
- Low coverage of testing and treatment is the most important gap to be addressed in order to achieve the global elimination goals by 2030.

HIV



- **HIV** stands for human immunodeficiency virus. It weakens a person's immune system by destroying important cells that fight disease and infection. There is currently no effective cure for **HIV**. But with proper medical care, **HIV** can be controlled

In next lecture

- HIV
- Syphilis
- Safe blood transfusion methods
- Needle stick injury prevention