Malaria, Other Infections including airborne diseases

By

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What is malaria?

- **Malaria** is a life-threatening disease caused by **parasites (Plasmodium sp.)** that are transmitted to people by **mosquitoes**

- An estimated **409,000 people were killed by malaria in 2019** globally

- **Children (<5 years**) are the most vulnerable and account for **67%** of malaria deaths
- Approximately **half the world's population** are at **risk** of the **disease**.

- In 2019, 6 countries accounted for approximately half of all malaria deaths worldwide: Nigeria (23%)

- 9 out of 10 **malaria deaths** occur in **Africa**

- Malaria is **preventable** and **curable**

What causes malaria?

- Malaria is caused by a microscopic parasite called Plasmodium.
- Four species (P. falciparum, P. malariae, P. vivax and P. ovale) of this parasite infect humans to cause malaria.
- But Plasmodium falciparum is the most deadly.
- Plasmodium is transmitted between people by blood-eating mosquitoes.
- The mosquito is described as a malaria ‘vector’ because it spreads but doesn’t actually cause disease.

Cont.

- To beat malaria, the immune system needs to be able to find Plasmodium.
- But Plasmodium hides, first in liver cells and then in red blood cells.
- This prevents the immune system’s white blood cells from finding and destroying it.
- Plasmodium has a complex life cycle involving the infection and destruction of red blood cells

Symptoms of malaria

- Initial symptoms :
- Fever, headache, shivering, vomiting
- In severe cases of Plasmodium falciparum malaria, these symptoms can develop:
- Severe anaemia (lack of oxygen in blood), breathing difficulties, organ failure, problems with the nervous system

How is malaria diagnosed?

- To look at samples of a patient’s blood down to a laboratory for microscope or Rapid kit test.

How can malaria be prevented?

The main way of preventing malaria is to target mosquitoes by:

- Reducing areas of standing water where mosquitoes breed
- Using insecticide-treated bed nets that help prevent mosquitoe bites
- Spraying houses indoors with insecticides that kill mosquitoes when they land

How is malaria treated?

- Quick diagnosis and treatment of malaria with anti-malarial drugs prevents deaths and reduces transmission.

– artemether–lumefantrine

– atovaquone–proguanil

– dihydroartemisinin–piperaquine

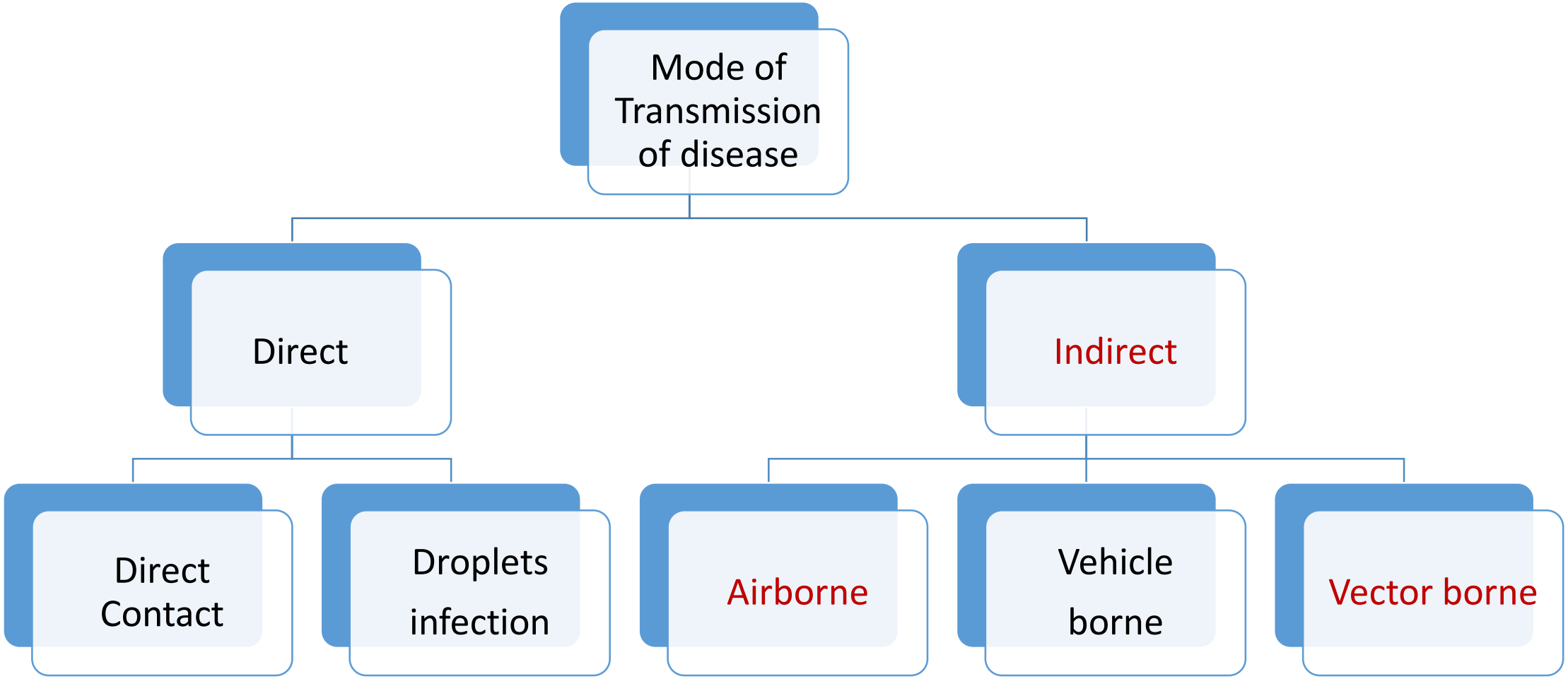
– quinine plus doxycycline or clindamycin.

- But the cost of such drugs and the development of resistance by Plasmodium poses challenges.
- Ideally, we would prevent people from getting malaria in the first place.

Vaccines could help prevent malaria

- A malaria vaccine would train the immune system to find and destroy Plasmodium before it does any damage.
- The most promising vaccine being researched is called RTS,S and is currently being tested to see how safe and effective it is.

Link between Malaria and Airborne disease



Other Airborne diseases

What is Airborne disease?

- Airborne infection is defined as “A mechanism of transmission of an infectious agent by particles, dust, or droplet nuclei suspended in the air

Examples of Airborne diseases

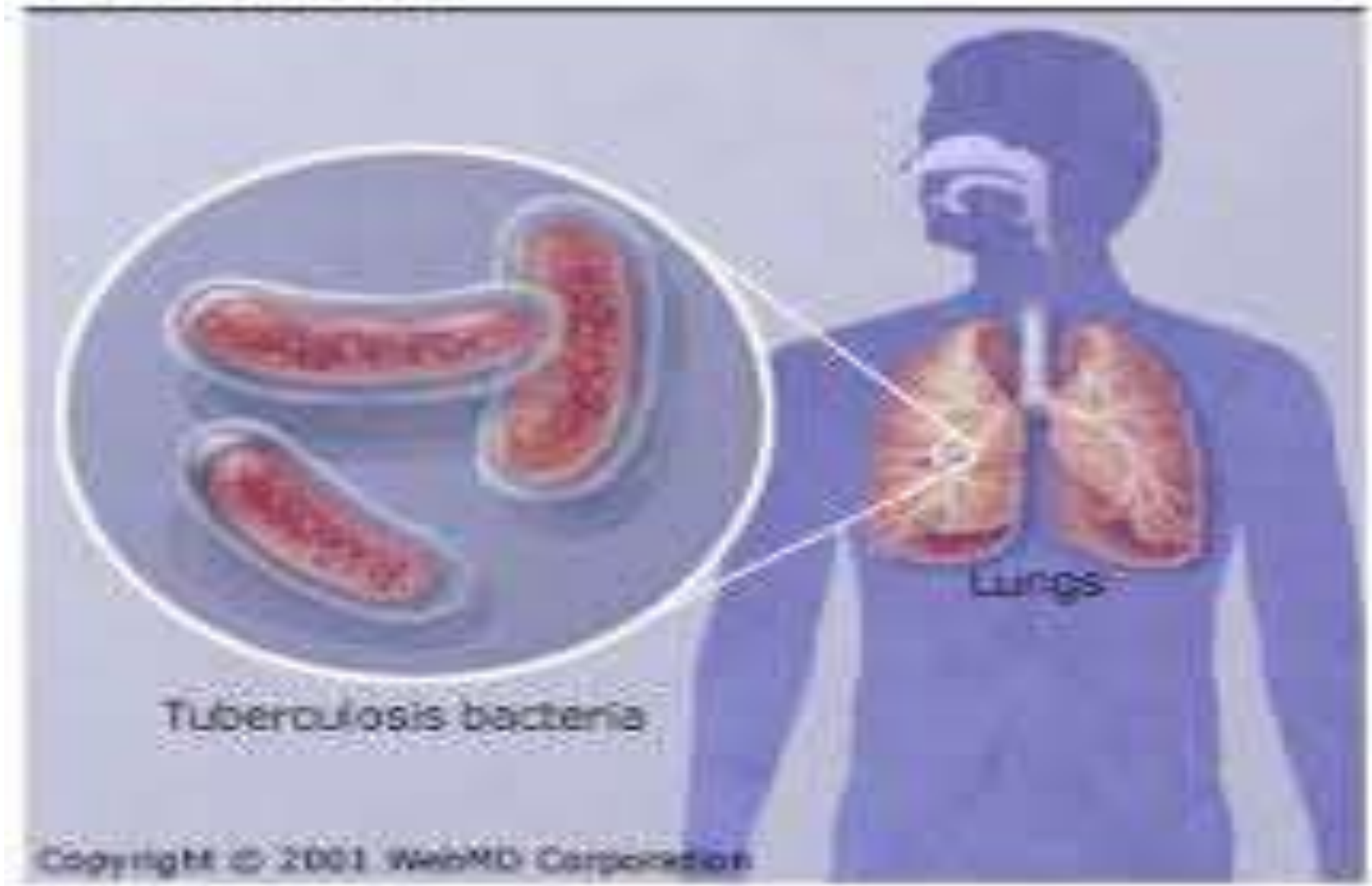
- Typical pulmonary infections acquired due to inhalation of infectious aerosols include: Tuberculosis, Influenza, Legionellosis, Histoplasmosis, Q fever , occupational lung diseases, COVID-19 etc

TUBERCULOSIS (TB)

WHAT IS TB

- Tuberculosis is caused by a germ (bacteria) known as *Mycobacterium tuberculosis*
- It mainly affects the lungs (Pulmonary TB) but can also affect other organs such as bone, kidney, brain tissue etc.
- TB outside the lungs is called ‘Extra Pulmonary TB’

Tuberculosis



HOW IS TB TRANSMITTED

- TB germs are released into the air when a person with TB of the lungs who is not on treatment coughs or sneezes.
- A healthy person can become infected with TB when s/he breathes in TB germs circulating in the air.
- Such an infected person with TB may later develop TB disease.

Transmission of TB

Family, friends, workmates, etc. exposed

Not infected

Infected, but no symptoms

"Latent TB infection (LTBI)"

Active TB Infections

If not identified & treated, ~10% develop TB during their lifetime

Quest Diagnostics

RISK OF TRANSMISSION

- Overcrowding
- Inadequate ventilation
- Contact with a TB patient who is not on treatment

KEY RISK FACTORS FOR PROGRESSION OF TB INFECTION TO TB DISEASE

- HIV/AIDS
- Malnutrition
- Chronic diseases like diabetes mellitus, various types of cancer, etc.
- Immunosuppressive drugs like prolonged use of steroids
- Extremes of age (very young children and the elderly)

WHO IS PRESUMPTIVE TB CASE

- Any anyone who presents with signs and symptoms of TB.
- The commonest symptom of TB is persistent cough lasting two or more weeks.
- Other symptoms of TB may include, chest pain, breathlessness/difficulty in breathing, coughing up blood, weightloss, tiredness, fever, night sweats and loss of appetite

HOW TO MAKE THE DIAGNOSIS OF TB

- TB can be diagnosed by a combination of symptoms, physical examination and investigations
- PTB is commonly diagnosed by testing sputum specimen in the laboratory (Sputum smear microscopy) or presently using,
- GeneXpert test which is a relatively new, faster, more sensitive test for diagnosis of TB. Results can be obtained within 2 hours.
- Other method of diagnosis is Culture which is the Gold standard but, takes longer time.

HOW CAN TB BE PREVENTED

Ensure any person with cough observes basic infection control practices such as:

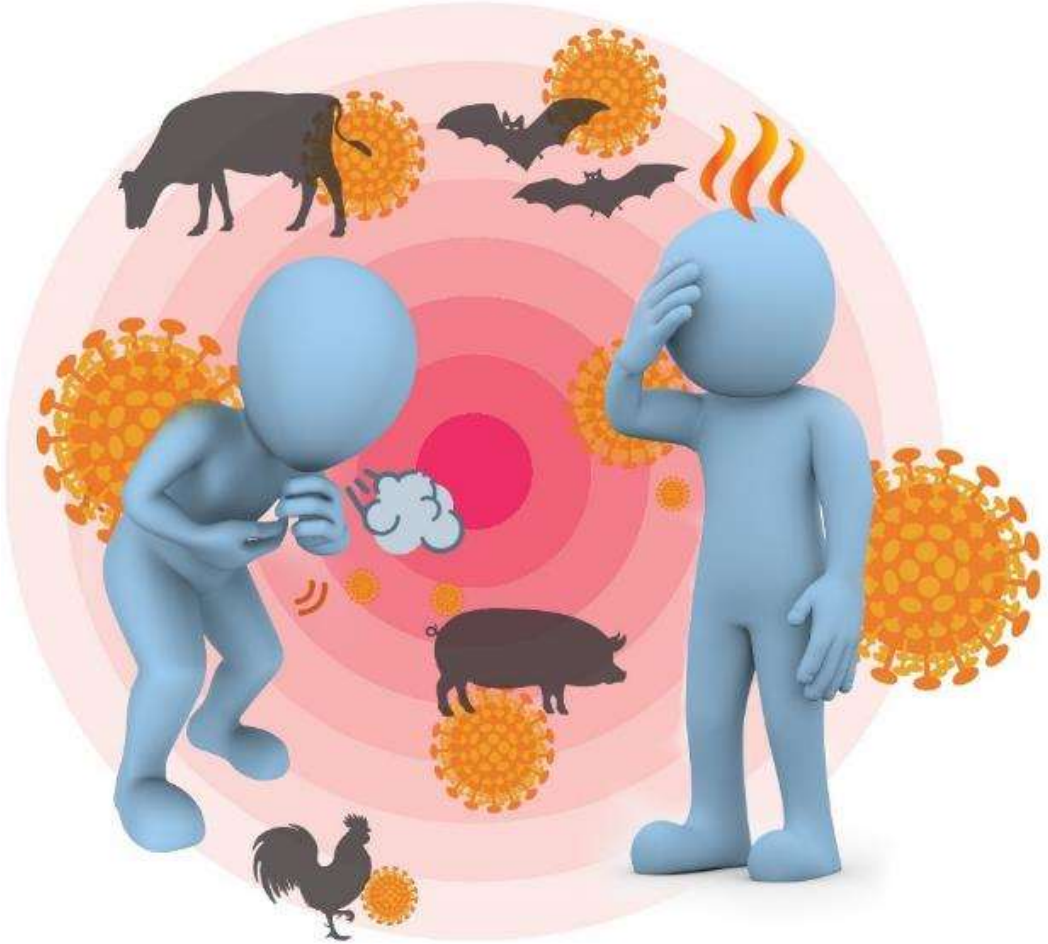
- covering of nose and mouth with handkerchiefs when coughing or sneezing
- avoid spitting indiscriminately and dispose sputa properly
- wash hands after coughing or sneezing

Ensure TB patients are promptly diagnosed and put on appropriate treatment for the right duration

BCG vaccination can prevent severe forms of TB especially in children

COVID-19 DISEASE

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causes COVID-19



- SARS-CoV-2 is a new virus.
- The first cases were identified in people with **pneumonia** in Wuhan, China, in late December 2019.
- It probably started in animals but is now spreading between people.
- As this virus is new, we are learning more all the time, and what we know now may change.

COVID-19 pandemic

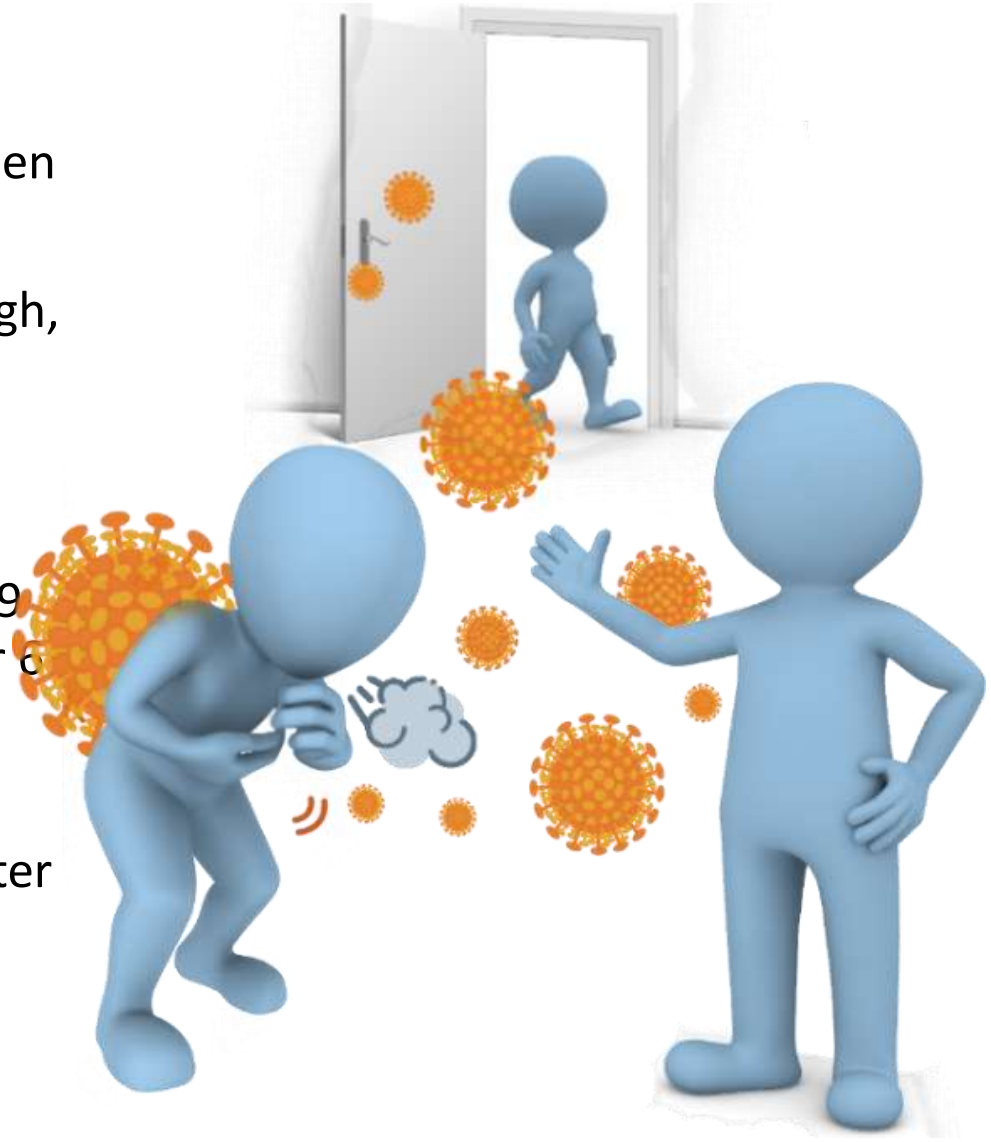
•The World Health Organization (WHO) declared the situation a pandemic on 11 March 2020 signifying

- Widespread human-to-human transmission
- Large number of affected countries

•Although there is a lot we don’t know yet about this new virus, we can still prevent the disease.

How is COVID-19 spread?

- Most people are being infected from other people, when in close contact (within 2 metres or 6 feet).
- It spreads through droplets created when we talk, cough, sing, sneeze or breathe heavily.
- These droplets enter the nose, eyes or mouth or when the infected droplets are inhaled.
- In indoor spaces with inadequate ventilation, COVID-19 has spread to people who were more than 2 metres or 6 feet away.
- Touching contaminated objects puts the droplets onto your hands. If you touch your face the droplets can enter your nose / eyes / mouth.
- Infected people with minimal or no symptoms can spread COVID-19.

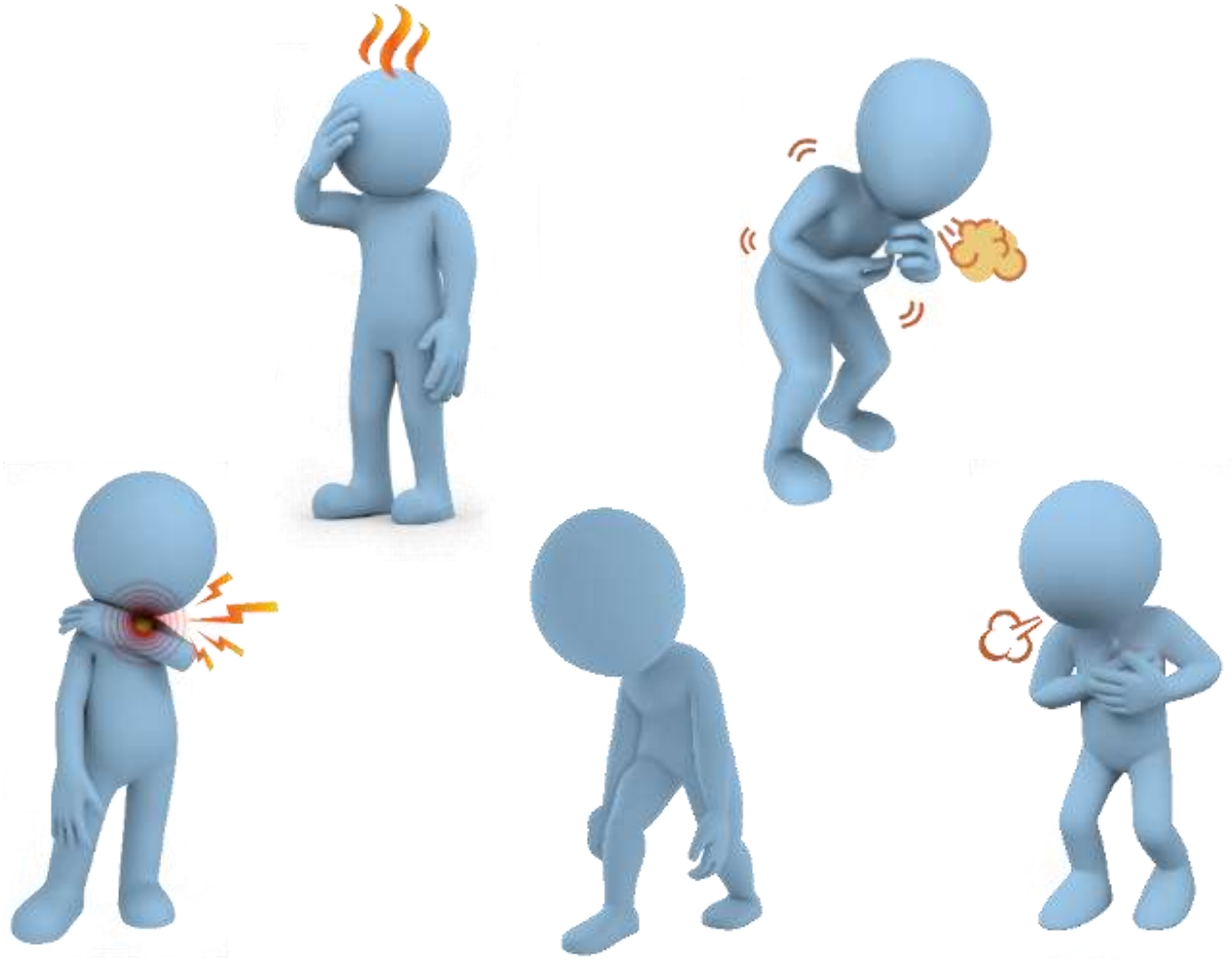


Symptoms start like many other illnesses

Common symptoms include:

- Fever
- Cough
- Sore throat
- Fatigue
- Shortness of breath

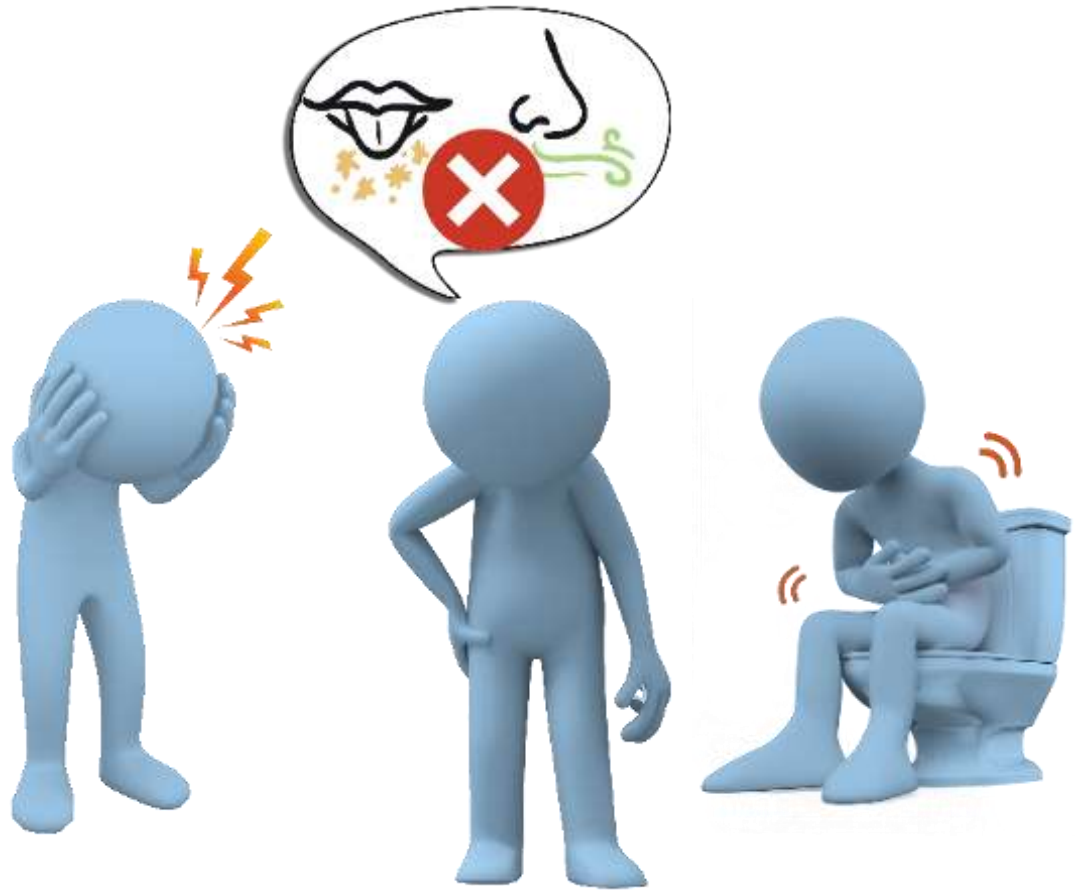
•Symptoms start about one day after exposure, but can be as long as 14 days. Most people develop symptoms within 5-6 days.



It can also cause many other symptoms, including

- Headache / muscle aches
- Sudden loss of sense of smell and taste
- Runny/stuffy nose
- Nausea, vomiting, diarrhoea
- Rash

•Some people have no symptoms, **most** have a mild illness. It can be severe and sometimes fatal.



Many patients recover fully in about 2 weeks. In others, some symptoms like breathlessness, fatigue may continue for weeks and months.

Diagnosis and treatment

Because symptoms are similar to many other illnesses, tests are needed to make the diagnosis (nose/ throat swab, blood test).

- **There is no specific treatment. Several trials are underway.**
- Mild symptoms can be treated at home with medicines to lower the fever, or relieve pain.
- If symptoms are more severe, treatment in hospital is required.

Prevention

•Reduce the spread of infection

- Wear a face mask (or cloth covering nose and mouth) in when in public, especially when it is not possible to keep 1-2 metres (3-6 feet) away from others.
- If you have any symptoms even if only mild, stay home. Seek medical advice following local guidelines.
- Wash your hands frequently with soap and water.
- Use alcohol-based hand sanitiser when soap and water are not readily available.
- Cover your coughs and sneezes. Do not use your hands, instead use a tissue or your upper sleeve. Immediately throw the tissue in a bin and wash your hands.

Some countries have started vaccination among priority groups.

Prevention

•Reduce the spread of infection

- Avoid touching shared objects (light switches, handrails, door handles etc) as much as possible. If you must touch such objects, wash your hands or use sanitiser promptly afterwards. Ensure you do not touch your face.
- Clean and disinfect frequently touched surfaces each day, more often if you think they've been contaminated. Use normal cleaning supplies.
- Do not share food, drinks and personal items including mobile phones.
- Do not travel if you are sick.