



Micro-organisms: Harmful Microbes

In this lesson students will learn about some infectious diseases that cause problems in the world today.

Curriculum Links

Science

- Working scientifically
- Scientific attitudes
- Experimental skills and investigations

Biology

- Structure and function of living organisms
- Cells and organisation
- Nutrition and digestion

PSHE/RSHE

- Health and prevention

English

- Reading
- Writing

Key Words

Bacteria, Dermatophytes, Fungi, Infection, Pathogens, Toxin, Virus

Learning Outcomes

All students will:

- Understand that sometimes microbes can make us ill and cause infection.
- Understand that harmful microbes can pass from person to person.
- Understand that different infections cause different symptoms.
- Understand how global travel has influenced the spread of disease.

Most students will:

- Understand how individuals, groups, and organisations work together when responding to infectious diseases outbreaks.

Resources Required

Main activity: Infectious Disease Group Discussion

Per Class/Group

- Copy of SH1, SH2, SH3
- Copy of SW1
- Differentiated versions for students of different abilities SH4, SH5, SW2

Advance Preparation

1. Cut out the disease cards in SH1 - SH3, one set per group. Laminate or stick on to stiff card for future use.
(Differentiated version: SH4 – SH5).
2. Copy SW1 for each group.
(Differentiated version: SW2).
3. Copy TS1 - TS2 teacher answers.

@ Weblink

e-bug.eu/eng/KS3/lesson/
Harmful-Microbes

Supporting Materials

TS1 - Disease Match Answer sheet

Answer Sheet		3-Transmission	
1. Infectious Microbes		Transmission	Disease
Bacteria	Bacterial meningitis, Chlamydia, HIV, Malaria, Gonorrhoea, Syphilis, Tuberculosis	Sexual contact	Chlamydia, HIV, Syphilis
Virus	Flu, Measles, Chickenpox, Rotavirus, Norovirus, Mumps, Rubella, HIV, AIDS, Hepatitis, Ebola, Zika, Dengue, Malaria, Typhoid, Tetanus, Rabies, Polio, HIV, AIDS, Hepatitis, Ebola, Zika, Dengue, Malaria, Typhoid, Tetanus, Rabies, Polio	Blood	Bacterial meningitis, HIV, Syphilis
Fungi	Ringworm, Thrush	Touch	Flu, Measles, Chickenpox, Rotavirus, Norovirus, Mumps, Rubella, HIV, AIDS, Hepatitis, Ebola, Zika, Dengue, Malaria, Typhoid, Tetanus, Rabies, Polio
2. Symptoms		Inhalation	Flu, Measles, Chickenpox, Rotavirus, Norovirus, Mumps, Rubella, HIV, AIDS, Hepatitis, Ebola, Zika, Dengue, Malaria, Typhoid, Tetanus, Rabies, Polio
Symptoms	Disease	Mouth to mouth	Flu, Measles, Chickenpox, Rotavirus, Norovirus, Mumps, Rubella, HIV, AIDS, Hepatitis, Ebola, Zika, Dengue, Malaria, Typhoid, Tetanus, Rabies, Polio
Asymptomatic	Chlamydia	4. Prevention of Infection	
		Prevention	Disease
		Wash hands	Flu, Measles, Chickenpox, Rotavirus, Norovirus, Mumps, Rubella, HIV, AIDS, Hepatitis, Ebola, Zika, Dengue, Malaria, Typhoid, Tetanus, Rabies, Polio

TS1 Disease Match Answer sheet

TS2 - Disease Match Differentiated Answer sheet

Answer Sheet		4. Prevention of Infection	
1. Infectious Microbes		Prevention	Disease
Bacteria	Chlamydia	Wash hands	Flu, Measles, Chickenpox, Rotavirus, Norovirus, Mumps, Rubella, HIV, AIDS, Hepatitis, Ebola, Zika, Dengue, Malaria, Typhoid, Tetanus, Rabies, Polio
Virus	Chickenpox, Flu, Measles, Mumps, Rubella, HIV, AIDS, Hepatitis, Ebola, Zika, Dengue, Malaria, Typhoid, Tetanus, Rabies, Polio	Cover coughs and sneezes	Flu, Measles, Chickenpox, Rotavirus, Norovirus, Mumps, Rubella, HIV, AIDS, Hepatitis, Ebola, Zika, Dengue, Malaria, Typhoid, Tetanus, Rabies, Polio
Fungi	Thrush	Use a condom	Chlamydia, Syphilis
2. Symptoms		Unnecessary antibiotic use	Chlamydia, Syphilis
Symptoms	Disease	Vaccination	Chlamydia, Syphilis
Asymptomatic	Chlamydia		

TS2 Disease Match Differentiated Answer sheet

SH1 - Disease Match Information sheet

Methicillin Resistant Staphylococcus aureus (MRSA)	
Infectious agent	Bacteria: Staphylococcus aureus
Symptoms	Any redness in healthy individuals. Can cause skin infections, infected surgical wounds, the bacteria can be found in the hospital ward or community ward or private hospital.
Diagnosis	Tests and antibiotic sensitivity tests.
Mortality Rate	High - First given the correct antibiotics.
Transmission	Contact with infected skin contact.
Prevention	Regular hand washing.
Treatment	Resistant to many antibiotics. When some antibiotics still work. MRSA is treated by surgery.
History	First reported 1961. Increasing problem globally.
Measles	
Infectious agent	Virus: Paramyxovirus
Symptoms	Fever, cough, runny nose and sore throat, a rash, a red sore throat and a sore, red and itchy.
Diagnosis	Based on symptoms and antibody tests.
Mortality Rate	Low. But can be high in lower income countries where better care is not available.

SH1-3 Disease Match Information sheets

SH4 - Disease Match Differentiated Information sheet

Measles	
Microbe	Virus: Paramyxovirus
Symptoms	Fever, runny nose, red and sore throat, a cough, a red rash and a sore, red and itchy.
Transmission	Spread in coughs and sneezes, skin contact, touching objects with the flu virus on them.
Prevention	Vaccination, hand washing.
Treatment	Does not need to be treated.
Flu	
Microbe	Virus: Influenza
Symptoms	Headache, fever, chills, muscle aches, possibly sore throat, cough, chest pain.
Transmission	Spread in coughs and sneezes, breathing in virus in the air, direct contact.

SH4-5 Disease Match Differentiated Information sheets

SW1 - Disease Match Worksheet

Disease match		3-Transmission	
1. Infectious Microbes		Transmission	Disease
Bacteria	Chlamydia	Sexual contact	
Virus		Blood	
Fungi		Touch	
		Inhalation	
		Mouth to mouth	
2. Symptoms		4. Prevention of Infection	
Symptoms	Disease	Prevention	Disease
Asymptomatic		Wash hands	

SW1 Disease match worksheet

SW2 - Disease Match Differentiated Worksheet

Disease match		4. Prevention of Infection	
1. Infectious Microbes		Prevention	Disease
Bacteria	Chlamydia	Wash hands	
Virus		Cover coughs and sneezes	
Fungi		Use a condom	
		Unnecessary antibiotic use	
		Vaccination	
2. Symptoms			
Symptoms	Disease		
Asymptomatic			
Fever			

SW2 Differentiated Disease match Worksheet to match SH4 and TS2

Lesson Plan



≡ Introduction

1. Begin the lesson by explaining to the class that sometimes microbes can be harmful to humans. Bacteria can produce toxins when they reproduce which are harmful to the body. Viruses enter the body and stick to the cell surface multiplying inside our cells and destroying them. Some fungi like to grow on our skin making it itchy and sore. Find out how many different words students know for microbes – germs, bugs, etc.
2. Ask the class to create a list of infections (infectious diseases) by brainstorming any diseases they have heard of. Do they know what microbes cause the diseases? Ask the students what disease they think poses a threat to students in the class today? Tell them that in the early 1900s the disease of greatest threat was measles; many children who caught measles then died of the disease. Thankfully today we now have a vaccine to prevent this.
3. Tell the class that bacteria and other microbes that can cause infection and which can spread easily from person to person are called infectious. Discuss the difference between an infectious microbe and a non-infectious one. An example of a non-infectious microbe is the *Lactobacilli* bacteria we learned about in lesson 2. Discuss with students the various routes of transmission, i.e. touch, water, food, body fluid and air. Identify any infectious diseases mentioned in the brainstorming session and how they are transmitted.

≡ Main Activity: Infectious Disease Group Discussion

1 Discover the different types of infectious diseases caused by harmful microbes and their characteristics

2 By working in groups, fill in the various subheadings (symptoms, transmission, treatment)

3 Present your results to the class



Disease match

1. Infectious Microbes

Microbe	Disease
Bacteria	
Virus	
Fungal	

2. Symptoms

Symptoms	Disease
Exophthalmos	
Fever	
Rash	
Sore throat	
Weakness	
Lethargy	
White discharge	

3. Transmission

Transmission	Disease
Sexual contact	
Blood	
Touch	
Inhalation	
Mouth to mouth	

4. Prevention of infection

Prevention	Disease
Wash hands	
Cover coughs and sneezes	
Use a condom	
Avoid unnecessary antibiotic use	
Vaccination	

5. Treatment of infection

Treatment	Disease
Antibiotics	
Bed Rest	
Antifungals	
Pain killer	

Procedure

- Group your diseases under according to the heading of symptoms.
- Do you notice any similarities or differences between the diseases based on each of the headings?

Infectious Disease Group Discussion

- This activity should be carried out in groups of 3 – 5 people. Explain that during this activity students are going to learn about some infectious diseases that cause problems in the world today.
- Provide each group with the disease cards found in SH1 – SH3. (Differentiated version: SH4 – SH5)
- Tell the class that sometimes scientists need to group diseases under different headings to address different problems. Each group should examine the headings on SW1. (Differentiated version: SW2)
- Ask each group to complete SW1 (Differentiated version: SW2) for the first heading – Infectious microbe. After a few minutes, ask a spokesperson in each group to read out their results. Write all the results on a white board for discussion.
- After each heading in SW1/2 has been completed, discuss the class results.
 - Infectious organism: Remind students

that there are three main types of microbes. It is important to identify the microbe causing the disease in order to treat the disease properly, e.g. antibiotics cannot be used to treat viruses (this will be covered in lesson g of the resource).

- Symptoms:** Students may notice that some diseases exhibit similar symptoms, e.g. fever or rash. You may wish to discuss how important it is for people to visit their doctor when they are ill to receive a correct and accurate diagnosis.
- Transmission:** Many diseases are transmitted very easily through touch or by inhalation. Other diseases are quite specific and require the transfer of blood or other bodily fluids.
- Preventative measures:** People can prevent the spread of, and protect themselves against, infection by employing a few simple steps. Regular hand washing and covering our

coughs and sneezes has been shown to reduce the incidence of many common infections. The correct use of a condom can reduce the transmission of many STIs. Vaccines are used to prevent certain infections, many of which were once more common than today.

- e. Treatment: It is important to note here that not all illnesses require medical treatment; some require bed rest and an increased fluid intake; however, painkillers may be used to alleviate some of the symptoms. Highlight to the students that antibiotics are only used to treat bacterial infections.

Fascinating Fact

According to the WHO, the top 10 causes of death in 2019 accounted for 55% of the 55.4 million deaths worldwide. Four out of ten were caused by infectious diseases.

Learning Consolidation

Ask students to write a paragraph or three statements to summarise what they have learned during the lesson.

Discussion

Why do we see infectious diseases that used to be found in a single region, all over the world today?

Many infectious diseases start in a specific region or country. In the past the infection could easily be contained or isolated. Today, however, people travel faster, more frequently and further than ever before. A person travelling from Australia to England can make the journey in under a day, stopping off at Hong Kong en route. If this person has a new strain of the flu virus, they could spread it to anyone they came into contact with on the plane, people they come into contact with at Hong Kong airport and people they came into contact with when they landed in England. These people could also carry the flu to other people they come into contact with all over the world. Within a few days, this new strain of influenza virus could be found worldwide!!! You may want to discuss how quickly the virus causing the disease COVID-19 spread around the world.

What is an infectious disease?

An infectious disease is a disease that is caused by a microbe and can be spread to other people.

What is a disease?
An illness or sickness characterised by specific signs or symptoms.



Answer Sheet

1. Infectious Microbes

Infectious Microbe	Disease
Bacteria	Bacterial meningitis, Chlamydia, MRSA
Virus	HIV, Chickenpox, Flu, Measles, Glandular Fever
Fungi	Thrush

2. Symptoms

Symptoms	Disease
Asymptomatic	Chlamydia, MRSA
Fever	Flu, Measles, Chickenpox, Bacterial meningitis
Rash	Bacterial meningitis, Chickenpox, Measles
Sore throat	Flu, Glandular fever
Tiredness	Glandular fever
Lesions	HIV
Whitish discharge	Chlamydia, Thrush

Points to Note

MRSA is an antibiotic resistant bacterium, it is specifically resistant to methicillin and some other commonly used antibiotics. Its resistance status is attributed to the overuse and misuse of this and other antibiotics. Treatment is still via antibiotic therapy, however, MRSA is also developing resistance to these as well.

3. Transmission

Transmission	Disease
Sexual contact	Chlamydia, HIV, Thrush
Blood	Bacterial meningitis, HIV
Touch	Flu, Measles, Chickenpox, MRSA
Inhalation	Flu, Measles, Chickenpox, Bacterial meningitis
Mouth to mouth	Flu, Glandular fever

4. Prevention of Infection

Prevention	Disease
Wash hands	Flu, Measles, Chickenpox, MRSA, Bacterial meningitis
Cover coughs and sneezes	Flu, Measles, Chickenpox, Bacterial meningitis
Use a condom	Chlamydia, HIV, Thrush
Avoid unnecessary antibiotic use	MRSA, Thrush
Vaccination	Chickenpox, Measles, Flu

5. Treatment of Infection

Treatment	Disease
Antibiotics	Chlamydia, Bacterial meningitis, MRSA
Bed Rest	Chickenpox, Glandular fever, Measles, Flu
Antifungals	Thrush
Fluid Intake	Chickenpox, Glandular fever, Measles, Flu





Answer Sheet

1. Infectious Microbes

Infectious Microbe	Disease
Bacteria	Chlamydia
Virus	Chickenpox, Flu, Measles
Fungi	Thrush

2. Symptoms

Symptoms	Disease
Asymptomatic	Chlamydia
Fever	Flu, Measles, Chickenpox
Rash	Chickenpox, Measles
Sore throat	Flu
Whitish discharge	Chlamydia, Thrush

3. Transmission

Transmission	Disease
Sexual contact	Chlamydia, Thrush
Touch	Flu, Measles, Chickenpox
Inhalation	Flu, Measles, Chickenpox
Mouth to mouth	Flu

4. Prevention of Infection

Prevention	Disease
Wash hands	Flu, Measles, Chickenpox
Cover coughs and sneezes	Flu, Measles, Chickenpox
Use a condom	Chlamydia, Thrush
Unnecessary antibiotic use	Thrush
Vaccination	Chickenpox, Measles, Flu

5. Treatment of Infection

Treatment	Disease
Antibiotics	Chlamydia
Bed Rest	Chickenpox, Measles, Flu
Antifungals	Thrush
Fluid Intake	Chickenpox, Measles, Flu

