The Spread of Infection section aims to teach students how poor hand hygiene, respiratory hygiene and improper care with food can lead to the spread of microbes and disease.

Section 2.3, Food Hygiene, teaches students how easily potentially harmful microbes on raw food can transfer to humans. Students act as chefs for the class and prepare a pretend chicken sandwich. In this activity students literally see how far they have spread harmful microbes!

Learning Outcomes

All students will learn that:

- Microbes can be found on our food and can transfer to humans
- Cooking food properly can kill harmful microbes
- Bacteria multiply very quickly

More able students will learn that:

- Refrigeration only stops microbes growing, it doesn’t kill them
Harmful microbes found in food can lead to food poisoning, which can be dangerous and can kill—though this is rare. The symptoms of food poisoning can last for days and include stomach pains, diarrhoea, vomiting, nausea and fever. The symptoms usually come on suddenly, but can occur several days after eating contaminated food. They will usually get better on their own.

Not all microbes associated with food are harmful, here are examples of some of the good, bad and ugly microbes associated with food.

**Useful Microbes** can be used to make food and drink, e.g. the yeast *Saccharomyces cerevisiae* is used to make bread and beer. *Lactobacilli* bacteria are used in yogurt and cheese making.

**Harmful Microbes** can cause food poisoning e.g. the bacteria *Salmonella*, *E. coli* and *Campylobacter* are commonly found on raw meats and can cause diarrhoea and vomiting in humans and sometimes even death.

**Food Spoilage Microbes** do not usually cause harm to humans. These are generally mould or bacteria, e.g. the fungus *Rhizopus stolonifer* causes bread mould and the bacterium *Pseudomonas* can cause the green discolouration on bacon and other meat.

**How can we prevent food poisoning and delay food spoilage?**

Most microbes we find on food grow best between 5°C and 40°C in warm and damp places. They generally dislike places that are too warm and are killed at temperatures above 70°C. In cooler temperatures, below 5°C, most bacteria multiply very slowly, if at all. Some bacteria will die, but many survive and can start to multiply again if warm conditions return. This is why we keep our food in the fridge and cook our meat well before we eat it.

Sometimes harmful microbes found on food can spread to other foods, for example via hands, or kitchen utensils and cause illness when those foods are eaten. They can also be spread if raw meats are washed and microbes splash onto work surfaces or other foods. This is known as cross-contamination.

### Alternative Suggestion
- Fine glitter or glitter hair gel may be used as an alternative to the Glo Gel. It is important that the glitter transfers easily from one source to another. Different coloured glitter may be used to represent different types of microbe.
- Cinnamon and oil may also be used.

### Advance Preparation
1. Copy SW1 and SW2 or SW3 for each student.
2. Shape a chicken breast fillet out of play-dough for each group and cover with the Glo gel or powder.
3. Establish an oven/microwave area for each group. This could be in the form of a toy oven or a sheet of A4 paper labelled oven.
4. Cut the crepe paper into strips to represent lettuce and tomatoes or purchase plastic toy food.
1. Explain to the students that some microbes like to grow in nice warm damp places, like inside our bodies, and when they find somewhere they like, they grow and multiply! But they don’t like places that are very warm or cold. Tell the class that for this lesson they will be looking at how harmful microbes can enter our bodies through the food we eat!

2. Ask students if they know why we cook food or keep it in a fridge. Explain that putting food in the fridge only slows or stops microbial growth, it doesn’t kill them. The microbes will grow again when they come out of the fridge. The only way to kill microbes is to cook food until it is really hot and cooked all the way through. This is because very warm temperatures kill many harmful microbes.

3. Discuss with the class which foods contain the most harmful bacteria. Show the class pictures of various food types (SH 1) and ask them which they think contain the useful/harmless bacteria and which contain the harmful.

**Answers**

**Fruit and Vegetables:** Useful and Harmful – Most of the microbes found on fruit and vegetables are harmless but sometimes harmful microbes can be found in the soil in which they are grown. It is therefore important to wash all fruit and vegetables before eating.

**Milk:** Useful microbes – fresh milk contains *Lactobacillus* bacteria which help us digest food.

**Yogurt:** Useful microbes – yogurt also contains *Lactobacillus* bacteria which help us digest food.

**Bread:** Useful/Harmless microbes – the yeast *Saccharomyces cerevisiae* helps bread to rise.

**Raw Chicken:** Harmful microbes – raw chicken may contain *Salmonella, E. coli* or *Campylobacter* bacteria all of which can cause food poisoning in humans.

**Raw Sausages:** Harmful microbes – raw meat may contain *Salmonella* or *E. coli* bacteria which can cause food poisoning in humans.

4. Show students how these foods should be stored in the fridge, i.e. meat on the bottom shelf. A web game to help students remember these points can be found at [www.e-bug.eu](http://www.e-bug.eu).

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**Main Activity**

1. This activity is for groups of 2 – 3 students. Tell the students that they will be making a pretend chicken sandwich. Show them their cooking area.

2. Before they start the activity, ask the students how they think they should prepare the chicken sandwich based on what they have learned in the class. They may wish to follow the guidelines in [SH 2](#).

3. When the task is complete ask each group how good they have been in keeping their kitchen clean. Explain to students that their ‘raw chicken’ was coated with a special gel that represents the harmful bacteria. They couldn’t see the gel because in real life they wouldn’t be able to see the harmful bacteria.

4. Shine the UV light on a test area of Glo Gel on your hand so the students can see how it works. Then go around each group and see how much harmful bacteria they spread around their kitchens and on the food they are about to eat.

5. Ask students what they should have done to ensure that the harmful bacteria did not go onto the sandwich or cooked ingredients, i.e. wash their hands and the benches after touching the raw chicken.
2.3 Spread of Infection
Food Hygiene

Lesson Plan

Plenary

1. Provide students with handout **SW 1** to complete.

2. Check for understanding by asking students:
   a. Why were there harmful bacteria all over the kitchen?
      *The harmful bacteria are spread all over the food preparation area by the student’s hands because they didn’t wash their hands after touching the raw meat.*
   
   b. Why is it important to wash hands before and after cooking?
      *There may be harmful microbes on our hands and there are a lot of harmful bacteria on the surface of raw meat, many of which can cause food poisoning.*
   
   c. How could we prevent the spread of the harmful bacteria?
      *There are many ways in which we can prevent the spread of harmful microbes when preparing food*
      i. Wash hands on a regular basis when preparing food, especially after handling raw meat and before touching food which should be eaten raw, i.e. salad vegetables.
      ii. Use separate chopping boards for raw meat, cooked meat, vegetables, bread, etc.
      iii. Use separate knives for raw meat and cooked meat.
      iv. Raw meats should not be washed to avoid harmful microbes splashing onto other foods and surfaces.
   
   d. If someone ate the contaminated chicken sandwich what might happen?
      *They would probably get ill with food poisoning.*
   
   e. Why are there usually no harmful bacteria on cooked chicken?
      *We cook chicken well to kill any harmful bacteria living there. The high cooking temperatures kill harmful bacteria.*
   
   f. Why do we store food in a fridge?
      *The fridge is quite a cold environment (4°C). In cooler temperatures, below 5°C, most bacteria multiply very slowly, if at all. Some bacteria will die, but many survive and can start to multiply again if warm conditions return.*

3. Ask students if they were surprised at how many things they touched in their own kitchen when they made a sandwich. Remind them that if the food was contaminated with harmful microbes then they would have spread these harmful microbes all over their kitchen.

Extension Activity

1. This activity can be carried out either individually or in groups of 2 – 4 students.

2. Provide students with **SW 3**.

3. Students should identify 9 ways in which the group are not being careful about spreading infection and provide a reason for each.
1. Raw meat should be kept on the bottom shelf of the fridge or on a plate to prevent the blood and harmful microbes dripping onto and contaminating the other items in the fridge.

2. Normal fridge temperatures (2–5°C) stop microbes from growing and multiplying. Leaving the fridge door open heats up the fridge and allows the microbes to grow and multiply until there are enough to become dangerous.

3. Licking the spoon can spread any harmful microbes from the mouth into the food mixture or alternatively, any unwanted microbes in the raw mixture into the mouth.

4. Using a tissue to cover your mouth when coughing or sneezing helps prevent the spread of infection.

5. Hair and mucus on the inside of the nose trap any unwanted microbes we may breathe in. The ‘snot’ picked from the nose may contain many harmful microbes which can be spread onto our food or other people by our hands.

6. Raw eggs have been known to harbour harmful bacteria such as Salmonella, which could lead to a gut infection if ingested.

7. All cuts and spots should be covered when cooking, to stop microbes spreading from blood to food.

8. The pencil may have come into contact with harmful microbes around the room and putting it in the mouth can spread these microbes to the mouth or gut.

9. Flies are known to carry potentially harmful microbes from source to source.
Which of the following foods have useful/harmless microbes and which have the harmful microbes?

- Fruit and Vegetables
- Milk
- Yogurt
- Bread
- Chicken
- Sausages
Cut the chicken into smaller pieces and put on a plate.

Put the chicken in the oven to cook.

Cut your lettuce, tomatoes and cucumber and begin to prepare your sandwich.

Prepare the bread for the sandwich and when ready take the chicken out of the oven.

Layer the sandwich with the salad ingredients and chicken and serve on plates.

Everyone sit around their benches ready to eat.
Always wash hands after handling raw meats.

My Observations
After preparing the sandwich this is where I saw the bacteria:

- On the sandwich
- On the chicken
- On the preparation area
- On my hands
- Other places

What about YOUR Kitchen?
1. Imagine all the bacteria on your hand are painted blue and you will leave a blue mark every time you touch something.
2. In the box provided draw a plan of your kitchen. Make a blue mark on everything you would touch to make a sandwich.

My Conclusions
1. If we don’t wash our hands after touching the raw chicken what could happen?
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2. How can we stop the microbes from the raw chicken spreading to other areas?
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3. If someone ate the sandwich with the microbes on it, what might happen?
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Never wash raw meat as this could splash harmful microbes onto other foods.
Can you circle 9 things that the students in this cookery class should not be doing and why?
Can you circle 9 things that the students in this cookery class should not be doing and why?