DO BUGS NEED DRUGS?

GRADE TWO
Overview

In this lesson, students review the concept of bacteria and viruses and how these are spread. They explore the uses and limitations of using antibiotics to fight infections and the necessary precautions when using prescription and non-prescription medications. Proper handwashing techniques are reviewed and practiced.

Learning Outcomes

In this lesson, students will:

• Explore the similarities and differences of bacterial and viral germs
• Identify rules for safe use of prescription and non-prescription medications
• Recognize the role of physicians and pharmacists in diagnosing and treating infections and illnesses
• Practice decision making skills involving antibiotic use
• Review and practice good hand washing skills

B.C. Curriculum Learning Outcomes

Health and Career Education:

Organizer – Healthy Living
• Students will describe practices that help to prevent the spread of communicable diseases (e.g. handwashing, covering mouth when coughing, resting when sick, staying away from other when sick).

Science

Organizer – Processes of Science
• Students will use their senses to interpret observations
• Students will infer the probable outcome of an event or behaviour based on observations

Organizer – Life Skills
• Students will classify organisms according to similarities and differences.

Social Studies

Organizer – Skills and Processes
• Students will gather information for presentation
• Students will demonstrate problem solving skills in the classroom or school

Organizer – Governance
• Students will identify their roles and responsibilities within the class and school
• Students will identify how decisions are made in groups
Safe use. Medications are used to treat disease and injuries. They are powerful compounds that have strong effects on the body. Because medications are so potent, they can be harmful if not used properly. Here are some rules for medication use to protect yourself and others:

- Read the labels carefully and take medications only as directed.
- To prevent access by children or others who may not use medications properly, store them in a locked cupboard. Ask for childproof caps on medications that require storage elsewhere (e.g. a refrigerator).
- Children should only take medications with adult supervision.
- Prescription medication is just for you and is only for your current illness. Do not share prescription medication or take left over portions of previous prescriptions.

Responsible use. There are thousands of medications and each one has a specific purpose. Doctors and pharmacists know which medication is best. The doctor decides if prescription medication is needed based on symptoms, history, physical examination, and tests. Pharmacists can help with instructions about how to take medications and when choosing medication that does not need a prescription.

The correct medication depends on what is making you sick. Respiratory infections, which are very common among school-age children, are a good example. The majority of respiratory infections, such as colds, influenza, most sore throats and coughs, are caused by viruses. Pneumonia, which is one of the most serious respiratory infections, can be caused by either viruses or bacteria.

Antibiotics are medications that work against bacteria, but not against viruses. Bacteria are larger and more complex than viruses. Antibiotics work against bacteria by targeting the life processes within the bacterial cell. In contrast, viruses do not carry out any life processes that antibiotics can target. That is why antibiotics work against bacteria but not against viruses.

If all the life on earth was gathered together, 60% would be bacteria. In fact, one study has estimated that our bodies actually have more bacterial cells than human cells. Most bacteria are not harmful and are essential to life. They protect our skin against disease causing germs and help in our intestines with digestion. It is important to use antibiotics wisely so that these helpful bacteria are not harmed.
Researchers have not yet found medications that will cure viral infections like colds and influenza, so it is important to protect yourself in other ways. An annual flu immunization will most often protect against influenza. On a daily basis, the best way to protect yourself and others is to wash your hands.

Preventing illness is an important aspect of responsible use of medications. The best practice is to not get sick in the first place. Proper diet, daily exercise, and regular handwashing help adults and children stay healthy.
Lesson Outline

1. Bacteria and Viruses – page 7
2. Medications – page 8
3. Not All Bugs Need Drugs – pages 9 -10
4. Good and Bad Bacteria – page 11
5. How to Wash Your Hands – Handwashing Video – page 12

Student Activities

1. Handwashing With a Buddy – pages 14 – 15
2. Handwashing Checklist – page 16
3. Bacteria or Virus? - pages 17 – 18

Teacher Materials

1. Picture of Bugsy – page 22
2. Bacteria and Virus overhead – page 23
3. Handwashing Video – available to download from the website
4. How to Wash Your Hands poster – page 24
5. Handwashing Song Sheet – page 25
6. Practical Solutions to Handwashing Problems – pages 26 - 27
7. Recommended Children’s Book, Follow up and Home Connection – page 28
Lesson Outline

1. Bacteria and Viruses – page 7
2. Medications – page 8
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5. How to Wash Your Hands – Handwashing Video – page 12
Materials:  Bacteria and Virus Overhead

Explain to students that today they will be learning about different kinds of germs and that the right medication depends on what kind of germ is making them sick. Use the overhead to show students what bacteria and viruses look like.

? **Do you remember what germs are?**

Sum up:  Germs or bugs are tiny living things. They are so small that you can’t see them except with a microscope.

? **What do germs do?**

Sum up:  Germs can make you sick. When you are sick with a germ it is called an infection. Include a thorough review of “How Germs Are Spread” and “How Germs Get into Your Body” from Grade 1 Lesson.

? **Have you ever had an infection?  What kind of infection did you have?**

Sum up:  Repeat answers given by students. Colds, influenza, “stomach flu”, chickenpox, ear infections, sore throats, and pneumonia are all caused by germs. Sometimes germs cause cuts to become infected too.

? **Did you know that there are different kinds of germs?  Have you heard of viruses?  Bacteria?**

Sum up:  Some infections are caused by viruses and some are caused by bacteria.

? **Here are some pictures of viruses and bacteria.  What are some of the differences you can see between viruses and bacteria?**

Show the overhead with six images.

Sum up:
- Bacteria are bigger than viruses
- Bacteria are able to carry out life processes and divide and multiply on their own
- Viruses are simple organisms that cannot multiply or carry out any functions unless they have infected another cell.
- Bacteria are smooth and rounded in shape and viruses are more geometric shaped (like snowflakes) and have bumps on their surface.

**BUGSY SAYS BACTERIA AND VIRUSES ARE DIFFERENT.**
**Materials:** Picture of Bugsy

Introduce Bugsy to the class and explain that Bugsy is here to help them learn about medications when you are sick. Bugsy will be pointing out important messages as we go along. Bugsy knows a lot about medications and how they should be used. Bugsy especially knows about medications for “bugs”. Not bugs in your garden! We mean medications for germs that we sometimes refer to as bugs. These germs are not really bugs, but tiny living organisms that live everywhere. Most are not harmful, but some can cause us to become sick.

**Questions and Answers:**

**How many of you know the word “medication”? What do you think it means?**

Sum up: Medications are pills or liquids or ointments. They contain powerful medicines that can help you get well.

**What do medications do?**

Sum up: Medications help you get better if you are sick or injured. Some medications, like penicillin, cure infections or disease while other medications, like cough syrup or cold medicine can just help you feel better.

**If we have questions about medications, who can help?**

Sum up: Doctors and pharmacists know a lot about medications. Doctors decide if you need a prescription medication that must be made up just for you, or whether you need a non-prescription medication that is generally for anyone. The pharmacist makes up the prescription that the doctor orders or can help you decide which non-prescription medicine will help you most.

**Because medications are powerful, they need to be used carefully. What are some things you can do to use medications safely?**

Sum up:
- Medication that your doctor gives you is only for you and not to be shared with anybody else.
- The doctor or pharmacist will give you instructions on how to take the medicine. It is important to follow their instructions.
- Non-prescription medications should only be taken according to the directions on the label. The label tells how much and when to take this medication and when to see a doctor.
- Medications should only be taken with the help of an adult and should be kept out of reach of smaller children and in a safe place.

BUGSY SAYS MEDICATIONS ARE POWERFUL! USE THEM AND STORE THEM WITH CARE.
Remind the students that there are differences between viruses and bacteria. Some infections are caused by viruses and some are caused by bacteria.

? **How many of you have been to the doctor when you were sick?**

Sum up: If you are sick and go to the doctor, the doctor will figure out what is making you sick and decide whether you need medication or not. Sometimes you won’t need medicine from the doctor for your infection.

? **Does anybody know what an antibiotic is?**

Sum up: Antibiotics are medications that are given by your doctor if you have an infection that is caused by bacteria. Antibiotics work against bacteria to make you better. But antibiotics don’t work against viruses.

? **Do antibiotics work against bacteria?** Yes

? **Do antibiotics work against viruses?** No

? **What are some of the diseases caused by viruses?**

Most diseases that affect your nose and throat are caused by viruses. Some examples are colds, influenza and most sore throats and coughs.

? **What are some of the diseases caused by bacteria?**

Pneumonia is a very serious illness that can be caused by bacteria. Another bacterial infection is “strep” throat. A test by your doctor can show if a sore throat is a common viral infection or a bacterial “strep” infection. Some skin infections such as “staph” are also caused by bacteria and can be found in open cuts, sores or wounds.

? **Has anyone ever had to take an antibiotic when they were sick?**

Sum up: Infections that are caused by bacteria can be treated with an antibiotic. If the infection is caused by viruses, antibiotics will not work to get rid of the infection. So sometimes your doctor will not give you medication when you are sick, but will tell you what you can do to feel better.
So what can you do if you have an infection caused by a virus?

Sum up: Stay home and rest, get plenty of sleep, and drink lots of liquids. The pharmacist can suggest medications to help you feel better. To keep your germs from spreading to someone else, wash your hands. Ask other people in your home to wash their hands too.

Name some of the things you do to feel better or look after yourself when you are sick:
- Stay at home and cuddle up with a blanket
- Use tissues to catch sneezes and coughs
- Throw used tissues directly into the garbage, not left laying around and wash your hands afterwards
- Keep well hydrated
- Wash your hands often and ask others to do the same
- Watch a favourite movie at home
- Eat warm chicken soup
- Read favourite books or draw
- Get plenty of rest and take naps
- Eat popsicles for a sore throat
- Gargle with salt water

BUGSY SAYS NOT ALL BUGS NEED DRUGS.
Did you know that not all bacteria are bad?

Sum up: Explain to students that not all bacteria are bad for you. There are good bacteria and bad bacteria.

Did you know that everyone has bacteria on their skin?

Sum up: Everyone has bacteria on their skin. (Pretend to inspect the skin on your arm.) They are so small that you can’t see them, but they live there all of the time. These are “good” bacteria. The good bacteria help keep out the bad bacteria that can make you sick.

Did you know that everyone has bacteria inside of them?

Sum up: We all have good bacteria in our intestines. (Pat your tummy.) We need these good bacteria to help us digest our food.

So you see that not all bacteria are bad for you. Many are important for our bodies to be healthy.

BUGSY SAYS MOST BACTERIA ARE GOOD. ONLY A FEW ARE BAD AND CAN MAKE YOU SICK.

What would happen if you took an antibiotic but your infection was caused by a virus?

Sum up: Antibiotics don’t work against viruses, so they wouldn’t make you get better. Besides the antibiotic would work against all those good bacteria you have on your skin and in your intestines.

So taking medications when you don’t really need them can have bad effects on your body. This is one reason why it is important to only take medications according to the instructions from your doctor and pharmacist.

Don’t share your medications with anyone else.

BUGSY SAYS USE MEDICATIONS CAREFULLY.
**Materials:** Handwashing Video – available to download from the website

Remind students that handwashing keeps us well. If you stay well, medications aren’t needed.

Inform students that they are going to see a handwashing video that will show them the proper way to wash their hands. Tell them to pay close attention to the video, because later they will be pairing up with a buddy and will need to know all the steps.

**Note:** Some students may have seen this video previously. For those students, ask them to use the video to make sure they remember all the steps of good handwashing. The video is included for all grades (K-Grade 3) to reinforce previous learning and as catch-up for students who have not seen it before.

Play the video. Then review the steps.
1. Wet your hands.
2. Apply plain soap.
3. Rub your hands together for 20 seconds or the time it takes to sing Twinkle, Twinkle. Rub all parts of your hands including palms, between your fingers, backs of hands, thumbs, wrists, fingertips and nails.
4. Rinse your hands.
5. Dry your hands with a disposable towel.
6. Use the towel to turn off the taps and let yourself out the washroom door.

*Last, don’t forget to leave the washroom/sink area neat and tidy!*

Ask students what they remember from the video about the parts of the hands that need to be scrubbed. If students have trouble remembering, show the video again.

Sum up and demonstrate by imitating the video: Palms, between the fingers, backs of hands, thumbs, wrists, fingertips and nails. This step should take about 20 seconds, or the time it takes to sing the Twinkle, Twinkle song.

Review the song. Ask the students to practice rubbing all the parts of their hands: palms, between fingers, backs, thumbs, wrists, and fingertips and nails as they sing.

**BUGSY SAYS REMEMBER ALL THE STEPS OF HANDWASHING**
Student Activities

Grade 2

1. Handwashing With a Buddy – pages 14 – 15
2. Handwashing Checklist – page 16
3. Bacteria or Virus? - pages 17 – 18
Handwashing prevents illness and the need for medications. The objective of this activity for the students is to practice the steps of good handwashing and receive help and feedback from their buddy.

Note that handwashing practice is a component of all parts (K - Grade 3) of this program. It is included here because the need for medications is reduced if children stay well by practicing regular handwashing. The handwashing exercise can be conducted concurrently with the coloring exercise above.

Post the How to Wash Your Hands poster and the Twinkle, Twinkle poster in the washroom ahead of time. Explain to the students that they will be going to the washroom/sink area with a buddy. Buddies should help each other to complete all the steps of handwashing properly including rubbing all parts of their hands with soap and timing this step by singing the Twinkle, Twinkle song. Review the steps if needed.

Distribute one Handwashing Checklist sheet to each pair of students. The sheet can be folded in half so there is a checklist on each side. A piece of cardboard can be inserted in between to make a firm writing surface. Students will need to take the checklist and a pencil or marker with them to the washroom/sink area.

Pair up the students and send them in small groups to the washroom/sink area.

Buddies should take turns washing their hands. While one student washes, the other observes and records whether each step was completed. Remind students to use the posters in the washroom/sink area as visual cues. Buddies should help each other to complete all the steps of handwashing.

Collect the checklists and identify steps that seem difficult. Practical Solutions to Handwashing Problems may help to make handwashing easier for your students. Discuss problems with the class and ask students for suggestions and solutions.
HANDWASHING with a Buddy - Student Activity

Use this activity after students have viewed the handwashing video to practice good handwashing technique.

Materials

- Hang the How to Wash Your Hands poster and the Twinkle, Twinkle song poster in the washroom/sink area ahead of time.
- Handwashing checklist, one folded sheet per pair
- Clipboard or cardboard to write on

Optimal Group Size

- One pair of students at each sink.

Directions

- Explain to the students that they will be using the buddy system to practice handwashing in the washroom/sink area. One student will be washing their hands while their buddy watches and makes helpful suggestions. Then they will reverse the process so that their buddy has a turn washing.
- Show buddies how to use the handwashing checklist to record their observations.
- Remind students to use the posters as visual cues.
- Review the six steps of handwashing:
  1. Wet hands
  2. Apply plain soap
  3. Rub hands together for 20 seconds and sing the song: Twinkle, Twinkle. Wash all hand surfaces including:
     - Palms
     - Between fingers
     - Backs
     - Thumbs
     - Wrists
     - Fingertips and nails
  4. Rinse hands to get the germs off (about 10 seconds)
  5. Dry hands with a paper towel
  6. Use the paper towel to turn off the tap and open the washroom door

Leave the washroom/sink area neat and tidy

- Pair up the students; send small groups to the washroom/sink area, one pair per sink.

Key Message

HANDWASHING is the best way to stop the spread of infections.
HANDWASHING CHECKLIST

- Wet hands
- Apply plain soap
- Rub hands together. Sing the Twinkle, Twinkle song.
  - Palms
  - Between fingers
  - Backs
  - Thumbs
  - Wrists
  - Fingertips and nails
- Rinse hands
- Dry hands with a paper towel
- Taps off with a paper towel
- Leave washroom/sink area neat and tidy
BACTERIA OR VIRUS?

Using the Bacteria and Virus overhead, review with students the differences between bacterial and viral germs, including their size, shape and contents. Bacteria are larger and have a smooth, round shape with many cell parts inside of them, while viruses are smaller, geometric shapes and have no cellular parts inside of them. Viruses need to attach themselves to a host cell to survive.

Introduce the student activity sheet “Bacteria or Virus?” and have students work either independently or in pairs to decide which of the shapes are bacterial and which are viral. Have them colour-code the shapes one colour for bacteria and another colour for viruses. Students may add some of their own germ-shapes using the definitions mentioned above. Have them label each shape with either B for bacteria or V for virus. Students then work with a partner to discuss their reasoning for each decision.
BACTERIA OR VIRUS?
SCOPING OUT THE GERMS

Distribute the “Scoping out the Germs” sheet and have students work in pairs or triads. Introduce this activity by explaining that infections are caused by either bacterial or viral germs that can only be detected with the use of a microscope. When the doctor sends a sample from the infected area to the laboratory, the lab technician then puts this sample under the microscope to identify whether it is a bacteria or a virus causing the infection. The results of this test are then sent back to the doctor. Remember, “Not all bugs need drugs!”

The four body shapes or “patients” on the page have an infection and need some help in treating it. Each student is to draw a cluster of either bacteria, viruses, or a combination of both on each of the patients on the page. Demonstrate on a chart or overhead where these germs would most likely be located (the ears, throat, chest or perhaps an open wound) and how “microscopic” these germs actually are. For this exercise, students will draw the bacterial or viral shapes large enough to be distinguished.

Students then pass their sheet to a partner who will look closely, as if through a microscope, and decide if the germs on each of the bodies are a bacteria or a virus or both and whether the doctor will prescribe an antibiotic for this person or not. Remind students that if there are both bacterial and viral germs, an antibiotic would be prescribed to kill the bacterial growth. Students pass their patient charts back to their owner and discuss what they found and the decisions they made.

Debrief as a whole class including ways that these infections may have started and the importance of keeping hands clean and away from your face as well as staying away from others when you or they are sick.

Explain to students that we rely on our own, natural immune systems to kill off most viral infections. The body has many ways of fighting off these viruses, but this usually takes several days or even weeks. It is important to eat nutritious foods, drink lots of water and get plenty of rest in order for the immune system to do its job.

Discussion Points

? Do antibiotics work against viruses? against bacteria?
? What is the best way to stay well and not need medications?

Key Messages

NOT ALL BUGS ARE THE SAME. THE RIGHT MEDICATION DEPENDS ON WHAT IS MAKING YOU SICK.
ANTIBIOTICS WORK AGAINST BACTERIA BUT NOT AGAINST VIRUSES.
HANDWASHING IS THE BEST WAY TO STOP THE SPREAD OF INFECTIONS.
Scoping Out the Germs

The four patients below each have an infection and need some help in deciding whether they need antibiotics or not. Draw a cluster of either bacterial or viral germs on each patient. Remember where these infections usually start!

<table>
<thead>
<tr>
<th>Patient Name</th>
<th>Lab Technician: Bacteria or Virus?</th>
<th>Doctor: Antibiotic or No Antibiotic?</th>
</tr>
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Teacher Materials

Grade 2

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2. Bacteria and Virus – overhead – page 23
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BACTERIA

VIRUSES
HOW TO WASH YOUR HANDS

1. WET YOUR HANDS
2. APPLY PLAIN SOAP
3. RUB HANDS TOGETHER
4. RINSE YOUR HANDS
5. DRY YOUR HANDS
6. TURN OFF TAP WITH PAPER TOWEL

LEAVE THE WASHROOM NEAT AND TIDY
Handwashing Song

Twinkle, twinkle little star,
Look how clean my two hands are,
Soap and water, wash and scrub
Get those germs off rub-a-dub,
Twinkle, twinkle little star,
Look how clean my two hands are.
## Practical Solutions to Handwashing Problems

<table>
<thead>
<tr>
<th>Problem</th>
<th>Hygiene Principle</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soap or paper towels not available</td>
<td>Handwashing by students, teachers and staff is the best way to stop the spread of infections in schools.</td>
<td>Inform custodial staff and/or principal. Suggest that the school administration hold an information session for custodial staff about the importance of handwashing. Handwashing protects custodial staff too.</td>
</tr>
<tr>
<td>Taps go off automatically and water does not run long enough</td>
<td>Water needs to run long enough to rinse off soap and germs.</td>
<td>Have students wash hands with a buddy so they can assist each other with the tap. Students should use a paper towel to push in the tap if they have already washed their hands.</td>
</tr>
<tr>
<td>Warm water not available</td>
<td>Cold water is a deterrent to handwashing.</td>
<td>Discuss with school administration. If it is not possible to have warm water, use cold. Cold water is less comfortable but will work (with soap) to remove germs from the hands.</td>
</tr>
<tr>
<td>Children cannot reach the taps or sink</td>
<td>Handwashing is important for all children.</td>
<td>Provide a stool or step that does not tip.</td>
</tr>
<tr>
<td>Need to conserve water. Taps should not be left running.</td>
<td>Good handwashing technique includes using a paper towel to turn off the taps. This prevents recontamination of the hands from dirty taps.</td>
<td>Suggest that students get their paper towel before washing their hands so that it is available when they need to turn off the taps. The towel can be tucked under the arm or into a pocket until it is needed.</td>
</tr>
<tr>
<td>Paper towel dispenser is far away from the sink</td>
<td>Hands can be recontaminated by touching the lever or button to dispense a paper towel.</td>
<td>Show students how to use an elbow or forearm to dispense the towel or suggest they get the paper towel before washing their hands.</td>
</tr>
<tr>
<td>Paper towel dispenser has a lever or button</td>
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<td>Solution</td>
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<tr>
<td>Wastebasket is not near the door</td>
<td>Hands can be recontaminated by touching the washroom door or handle. Good handwashing technique includes using the paper towel to open the washroom door. To avoid making a mess, it’s best to have the wastebasket near the door.</td>
<td>Move the wastebasket close to the door or prop open the door. If that’s not possible, suggest that students take the towel with them and throw it away in the classroom.</td>
</tr>
<tr>
<td>Handwashing takes too much time</td>
<td>Handwashing prevents illness and reduces absenteeism. In the long run it saves time.</td>
<td>Establish routine times for students to wash their hands. Before lunch and after recess are ideal. Teach good handwashing technique and remove barriers so that students become proficient.</td>
</tr>
<tr>
<td>Custodial staff concerned about the mess in the washroom</td>
<td>Washrooms/sink areas should be neat and tidy.</td>
<td>Reinforce the final message of good handwashing with the students to properly throw away their paper towel in the wastebasket.</td>
</tr>
<tr>
<td>Don’t know if antibacterial soap is in use</td>
<td>Plain soap does not promote antibiotic resistance and is equally effective in preventing the spread of germs.</td>
<td>Ask about the soap that is used in your school. Read the ingredients. If the soap contains “triclosan” it is antibacterial soap. Antibacterial soap has negative medical side effects and does not work any better than plain soap. If antibacterial soap is in use, suggest switching to plain soap. Plain soap is generally less expensive.</td>
</tr>
</tbody>
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Recommended Children’s Book


Follow-up and Home Connection

- Encourage students to share what they learned about medications with their parents, siblings and other students. A group presentation at a school assembly would help students to develop their presentation skills as well as to help convey important messages about disease prevention.
- Have students discuss with their families what disease prevention policies or procedures are in place at their parent’s workplaces, local restaurants, shopping malls, community centers, airports and other frequently attended places to reduce the spread of illness.
- Arrange a field trip or a class visit with a pharmacist or public health professional to discuss with students their roles and advice on prescription and non-prescription medicines.
- Consult the Do Bugs Need Drugs? website for current information about medications for children:  http://www.dobugsneeddrugs.org/parents/
- Include the “Do Bugs Need Drugs?” website information in your newsletters and bulletin boards for parents.
- Invite health professionals to Parent Meetings to discuss current concerns and advice on illness and medications.
- For help with barriers to good handwashing technique, refer to Practical Solutions to Handwashing Problems.

Acknowledgement

This teaching resource was developed by the Do Bugs Need Drugs? program in collaboration with Alberta Health and Wellness and Alberta Education. The program was adapted to meet the British Columbia Education curriculum by Joanne Matheson, Educational Consultant.