Super Protection from Superbugs: the Fight Against Antibiotic Resistance

MARR
Michigan Antibiotic Resistance Reduction Coalition
What you will learn:

1. Where germs live and why some germs make you sick and others keep you healthy
2. Ways to prevent the spread of infection
3. How antibiotics work, how are antibiotics different from antivirals and probiotics, what types of infections are treated with antibiotics and some common side effects of antibiotics
4. What is antimicrobial resistance, how does resistance occur and what can be done to reduce resistance
Germs are everywhere! Some are good, some are bad and some good ones can turn bad!

*Staphylococcus aureus* is found on the skin of 5-30% of healthy persons.
How do you get an infection?

- Bacteria enter body
  - Through eyes, nose, mouth
  - When skin is broken
- The body has systems in place to fight infection
  - Parts of the immune system, white blood cells, attack bacteria

By National Institutes of Health (NIH) (National Institutes of Health (NIH)) [Public domain], via Wikimedia Commons
Preventing the Spread of Infection

• Avoid close contact

• Stay at home when you are sick

• Minimize touching your eyes, nose or mouth

• Wash hands frequently

• Clean and disinfect surfaces or objects
  • Cell phones have more germs than toilets!

#1 – Coliforms
#2 – *E. coli*
#8 – *C. diff*

Click here for 2 minute YouTube Video

Image from: goodfreephotos.com
Information from: www.cdc.gov/flu/protect/stopgerms.htm,
Sneezing spreads germs!

How to prevent the spread of germs:

• Cover your mouth and nose with a tissue when you cough or sneeze
  • Put your used tissue in the wastebasket
• If you don’t have a tissue, cough or sneeze into your upper sleeve, not your hands
• Always clean your hands after you cough or sneeze

Image from: upload.wikimedia.org/wikipedia
Information from: www.cdc.gov/flu/protect/stopgerms.htm
Handwashing Prevents the Spread of Infection

• Wash your hands with clean, running water and soap to REMOVE germs from your hands
• When soap and water is not available, use alcohol-based hand sanitizer to KILL most, but not all, germs

Information from:
www.cdc.gov/handwashing/show-me-the-science-handwashing.html
Graphic used with permission from APIC
Handwashing image used with permission from Google image
What Can You Do?

How long should you wash your hands for?

A. 5 seconds
B. 10 seconds
C. 15 seconds
D. 20 seconds
What Else Can You Do?

• Get vaccinated!
• Teens need 4 vaccines
  • Tetanus, diphtheria, pertussis (Tdap)
  • Meningococcal
  • Human Papillomavirus (HPV)
• Annual influenza (flu)
  • Getting the influenza (flu) vaccine reduced the risk of influenza-related death in children

Click here for a 1 minute YouTube Video

Glo Germ Activity
### Bacteria vs. Virus? What’s the difference?

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Virus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Able to live in many different types of environments</td>
<td>Requires a living host to multiply</td>
</tr>
<tr>
<td>Complex, single-celled creatures</td>
<td>Tiny without a cell structure</td>
</tr>
<tr>
<td>Many are harmless and some help with many functions of the body</td>
<td>Some viruses cause disease, and they’re very specific in the cells they attack</td>
</tr>
<tr>
<td><strong>Cause</strong> <strong>bacterial</strong> infections</td>
<td><strong>Cause</strong> <strong>viral</strong> infections</td>
</tr>
<tr>
<td>Antibiotics can be used to treat these bacterial infections</td>
<td>Antibiotics are <strong>NOT</strong> effective against viruses; anti-viral medications can be used for <strong>SOME</strong> viral infections</td>
</tr>
</tbody>
</table>

By NIAID (E. coli Bacteria) [CC BY 2.0](https://creativecommons.org/licenses/by/2.0), via Wikimedia Commons, By NIAID - Ebola Virus Particles, CC BY 2.0, [https://commons.wikimedia.org/w/index.php?curid=36038631](https://commons.wikimedia.org/w/index.php?curid=36038631)
Viruses

• Rhinovirus (common cold)
• Influenza (flu)*
• Varicella (Chickenpox)*
• Rubeola (Measles)*
• Hepatitis A*
• Hepatitis B*
• Hepatitis C
• Human Immunodeficiency Virus
• West Nile Virus

* = prevented by vaccines

Information from: https://www.cdc.gov/vaccines/vpd/vaccines-diseases.html
Image by BruceBlaus (Own work) [CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0)], via Wikimedia Commons.
Image by CDC/NIP/Barbara Rice (http://phil.cdc.gov/phil/ (ID#: 132)) [Public domain], via Wikimedia Commons.
Bacteria

- **Staphylococcus** – Skin infections
  - Methicillin-resistant *Staphylococcus aureus* MRSA
- **Streptococcus** – Strep throat, skin infections, **pneumonia***
- **E. coli**
  - Urinary tract infection
- **Haemophilus** - ear infections, meningitis*

* = prevented by vaccines

Information from: https://www.cdc.gov/vaccines/vpd/vaccines-diseases.html

Image by Jen (Self-photographed) [CC BY-SA 3.0 (https://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons. Image by James Heilman, MD (Own work) [CC BY-SA 3.0 (https://creativecommons.org/licenses/by-sa/3.0) or GFDL (http://www.gnu.org/copyleft/fdl.html)], via Wikimedia Commons
How to Treat Viruses: NO Antibiotics Please!

• There are a few antiviral drugs to treat some viruses
• Important to manage the symptoms
  • Rest
  • Fluids
• Over-the-counter medications for fever, aches, pains and cough

Vaccines prevent some viral infections (e.g. annual flu shot)
# Do Probiotics Help Antibiotics Work Better?

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<td>Live microorganisms, found in some yogurts and foods, that are intended to have health benefits.</td>
<td>Kill or inhibit bacteria that cause infection.</td>
</tr>
<tr>
<td>Help digest food, destroy bacteria that cause disease, and produce vitamins.</td>
<td>Also interact with other bacteria in and on your body, which may result in side effects or antibiotic resistance.</td>
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</table>

![Image of probiotics and antibiotics]

Information from: [https://nccih.nih.gov/health/probiotics/introduction.htm#hed2](https://nccih.nih.gov/health/probiotics/introduction.htm#hed2)

By Ashley Steel [CC BY 2.0](https://creativecommons.org/licenses/by/2.0), via Wikimedia Commons

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How Antibiotics Work

- Antibiotics kill bacteria by binding and attacking different parts of the cell

Different Antibiotics Kill Different Bacteria

• Broad-spectrum antibiotics kill the bacteria that are causing the infection AND other bacteria

• Narrow-spectrum antibiotics kill the bacteria that are causing the infection without killing as many other bacteria

Information from: https://www.cdc.gov/drugresistance
How Does Antibiotic Resistance Occur?

1. Lots of germs. A few are drug resistant.
2. Antibiotics kill bacteria causing the illness, as well as good bacteria protecting the body from infection.
3. The drug-resistant bacteria are now allowed to grow and take over.
4. Some bacteria give their drug-resistance to other bacteria, causing more problems.

Image from: www.cdc.gov/antibiotic-use/community/about/antibiotic-resistance-faqs.html
Why Do We Care About Antibiotic Resistance?

Have you heard of MRSA infections in schools?
Antibiotic Resistance KILLS!

Estimated minimum number of illnesses and deaths caused annually by antibiotic resistance*:

At least 2,049,442 illnesses, 23,000 deaths

*bacteria and fungus included in this report

Antibiotic resistance adds $20 billion in extra health care costs PLUS the cost to society in lost productivity of $35 billion per year

Image from: https://www.cdc.gov/media/dpk/2013/images/untreatable/img43.jpg
What does not kill me makes me stronger!
Antibiotics are life-saving drugs, but...

**Common/Serious Side effects**

- Allergic reactions
- Nausea, vomiting, diarrhea
- Severe diarrhea --- *C. difficile* ("C. diff")
Side Effects of Antibiotics Can Be Serious!

- *Clostridium difficile (C. diff)* is a bacteria that is found in the colon of 2-5% of people
- Antibiotics can kill off your “good” bacteria in your colon and allow *C. diff* to cause an infection
  - Symptoms: watery diarrhea, fever, nausea, abdominal cramping, dehydration, loss of appetite
- There is an estimated 17,000 kids who get *C. diff* each year

Information from: peggyfoundation.org

Click the box to read Kaley’s *C. diff* story
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Information from: cdc.gov/antibiotic-use/community/pdfs/Viruses-or-Bacteria-Factsheet-Eng.pdf
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Appropriate Antibiotic Use – it’s not just about using only for infections caused by bacteria!

Your healthcare provider addresses the 5 RIGHTS:

- Right antibiotic
- Right Diagnosis
- Right Dose
- Right Time
- Right Duration (length of treatment)
How to Properly Take An Antibiotic

- Patients are responsible for taking antibiotics as prescribed
  - With a full glass of water
  - With food or without food
- Take at the correct time
- Do not skip doses
- Do not save it for later
- Never share antibiotics
  - it may be a different bacteria or a virus that your antibiotic won’t work against
- Do not flush unused antibiotics
  - Ask your pharmacist how to properly dispose of antibiotics
Appropriate or Inappropriate Antibiotic Use?

- 4 year-old female with an ear infection
- Prescribed an antibiotic at the first visit
- Many ear infections get better on their own
- Guidelines recommend the “watch and wait” method for many children with an ear infection

Inappropriate Antibiotic Use

Image from: https://peggyfoundation.org/story/kaley/
Appropriate or Inappropriate Antibiotic Use?

- 9 year-old girl with a cough and cold
- This infection is most likely caused by a virus
- The patient is given a prescription for an antibiotic

**Inappropriate –** Antibiotics should not be given for a viral infection
Appropriate Antibiotic Use Activity
What Else Can You Do To Spread the Message on Antibiotics?

• Ask your parents and family members what they know about antibiotic resistance

• Share with your parents and family members what you learned today about antibiotic resistance
Spread the word...not the germs

• Covering your cough and washing your hands can prevent the spread of disease

• Antibiotics should only be used to treat infections caused by bacteria, NOT viruses

• Not using antibiotics the right way can lead to antibiotic resistance

• You can help by telling your family members what you learned during this presentation