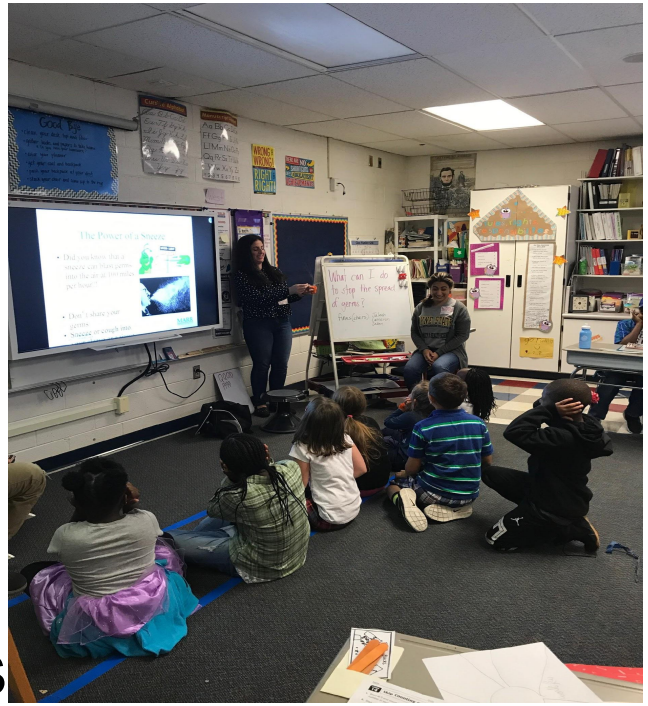
Super Protection from Superbugs: the Fight Against Antibiotic Resistance

MARR

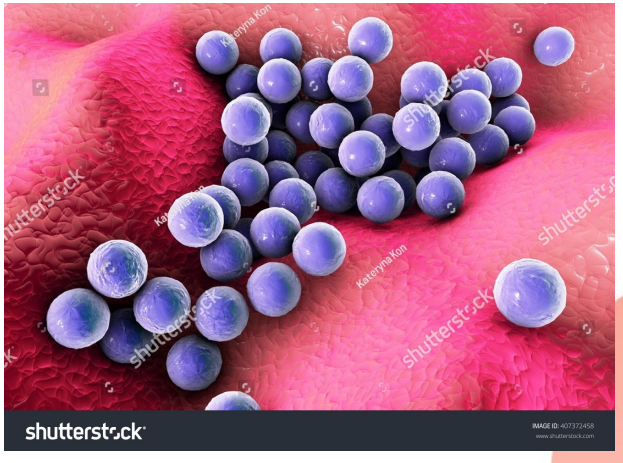
Michigan Antibiotic Resistance Reduction Coalition

What you will learn:

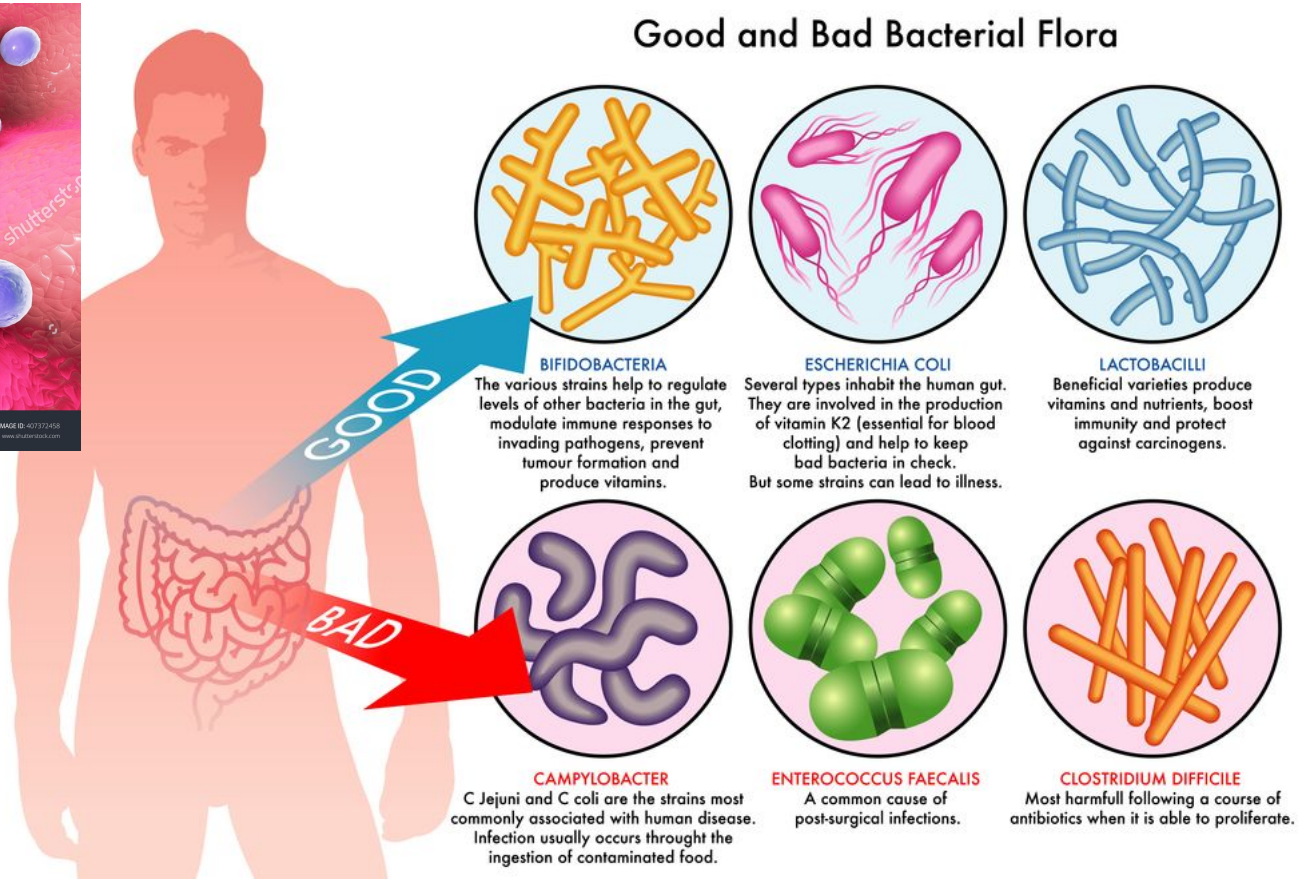


1. Where germs live and why some germs make you sick and others keep you healthy
2. Ways to prevent the spread of infection
3. How antibiotics work, how are antibiotics different from antivirals and probiotics, what types of infections are treated with antibiotics and some common side effects of antibiotics
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!

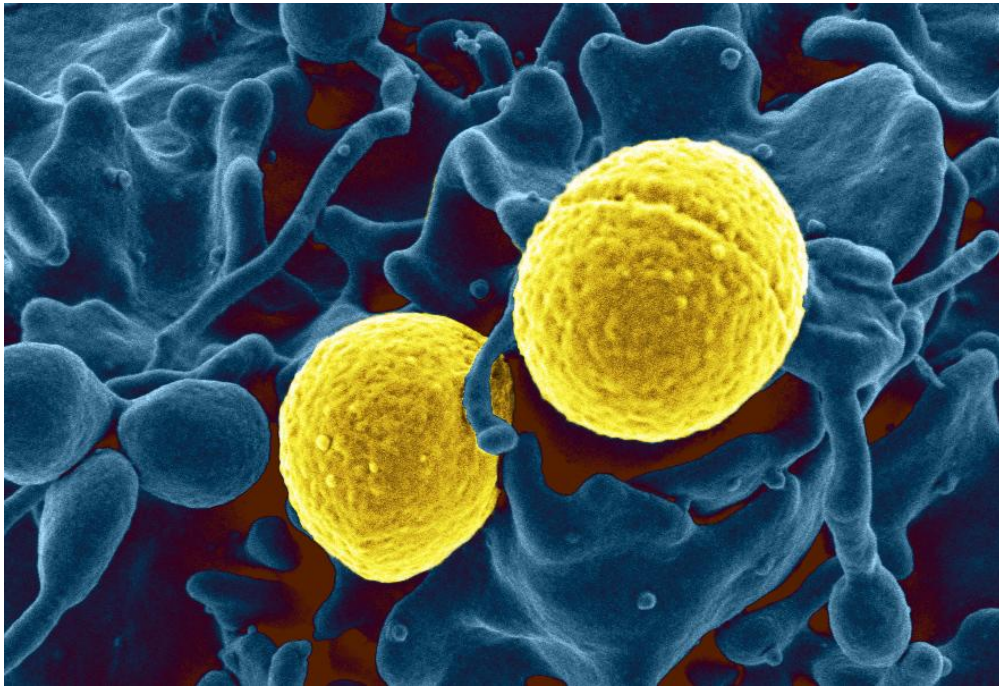


***Staphylococcus aureus* is found on the skin of 5-30% of healthy persons**



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!

Click here for 2 minute YouTube Video

Image from: goodfreephotos.com
Information from: www.cdc.gov/flu/protect/stopgerms.htm, https://science.howstuffworks.com/life/cellular-microscopic/top-10-germs-smartphone2.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

Click here for 2 minute YouTube Video

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?

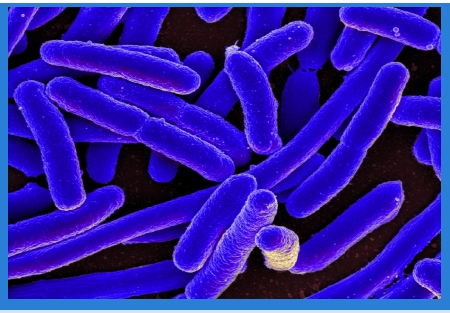
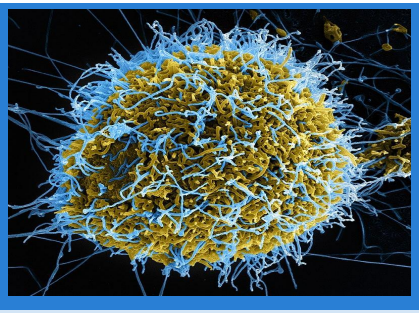
- Get vaccinated!
- Teens need 4 vaccines
  - Tetanus, diphtheria, pertussis (Tdap)
  - Meningococcal
  - Human Papillomavirus (HPV)
  - Annual influenza (flu)
    - Getting the influenza (flu) vaccine reduced the risk of influenza-related death in children

Click here for a 1 minute YouTube Video

Flannery B, et al. Pediatrics.2017;139(5):e20164244

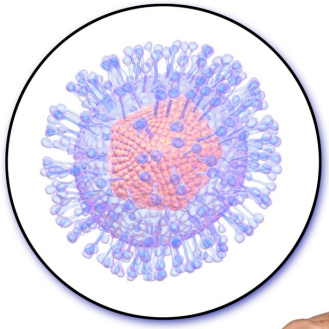
Glo Germ Activity

Bacteria vs. Virus? What's the difference?

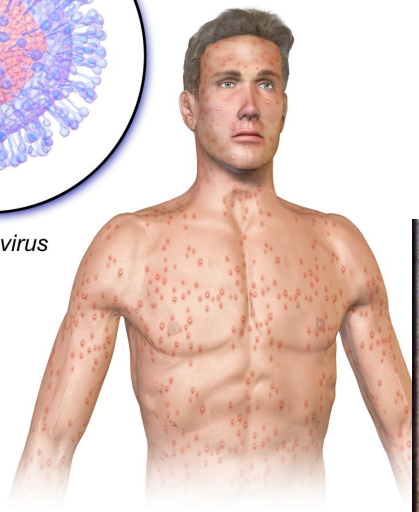
Bacteria 	Virus 
Able to live in many different types of environments	Requires a living host to multiply
Complex, single-celled creatures	Tiny without a cell structure
Many are harmless and some help with many functions of the body	Some viruses cause disease, and they're very specific in the cells they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

Viruses

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



Varicella-zoster virus



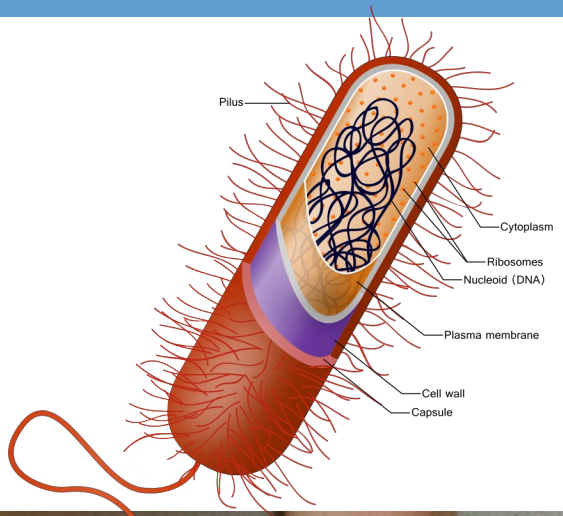
Rubeola (Measles)

*** = prevented by vaccines**

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

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

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?

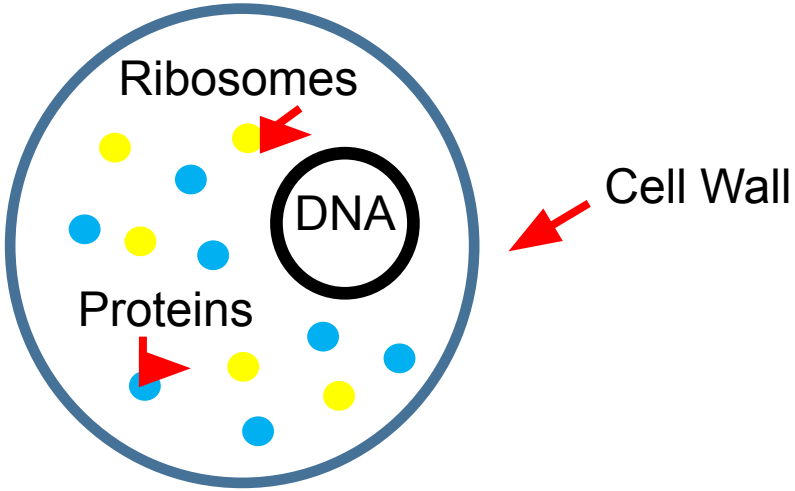
Probiotics	Antibiotics
Live microorganisms, found in some yogurts and foods, that are intended to have health benefits	Kill or inhibit bacteria that cause infection
Help digest food, destroy bacteria that cause disease, and produce vitamins	Also interact with other bacteria in and on your body, which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

NO!

Information from: https://nccih.nih.gov/health/probiotics/introduction.htm#hed2

How Antibiotics Work

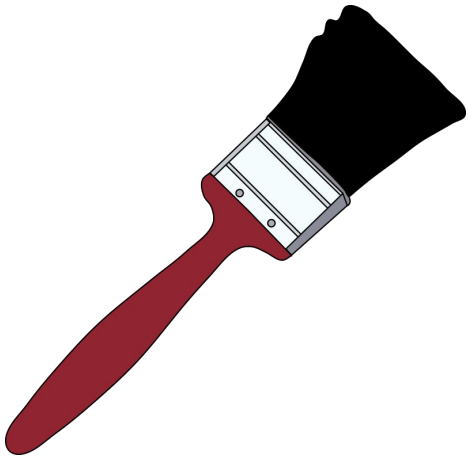
- Antibiotics kill bacteria by binding and attacking different parts of the cell



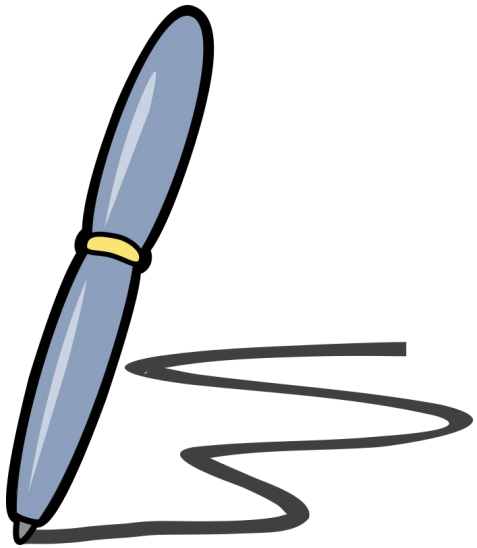
Carroll KC et al, editors. Jawetz, Melnick & Adelberg's Medical Microbiology:eChapter28.
Millan et al. (2016) Clinical Infectious Diseases

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?

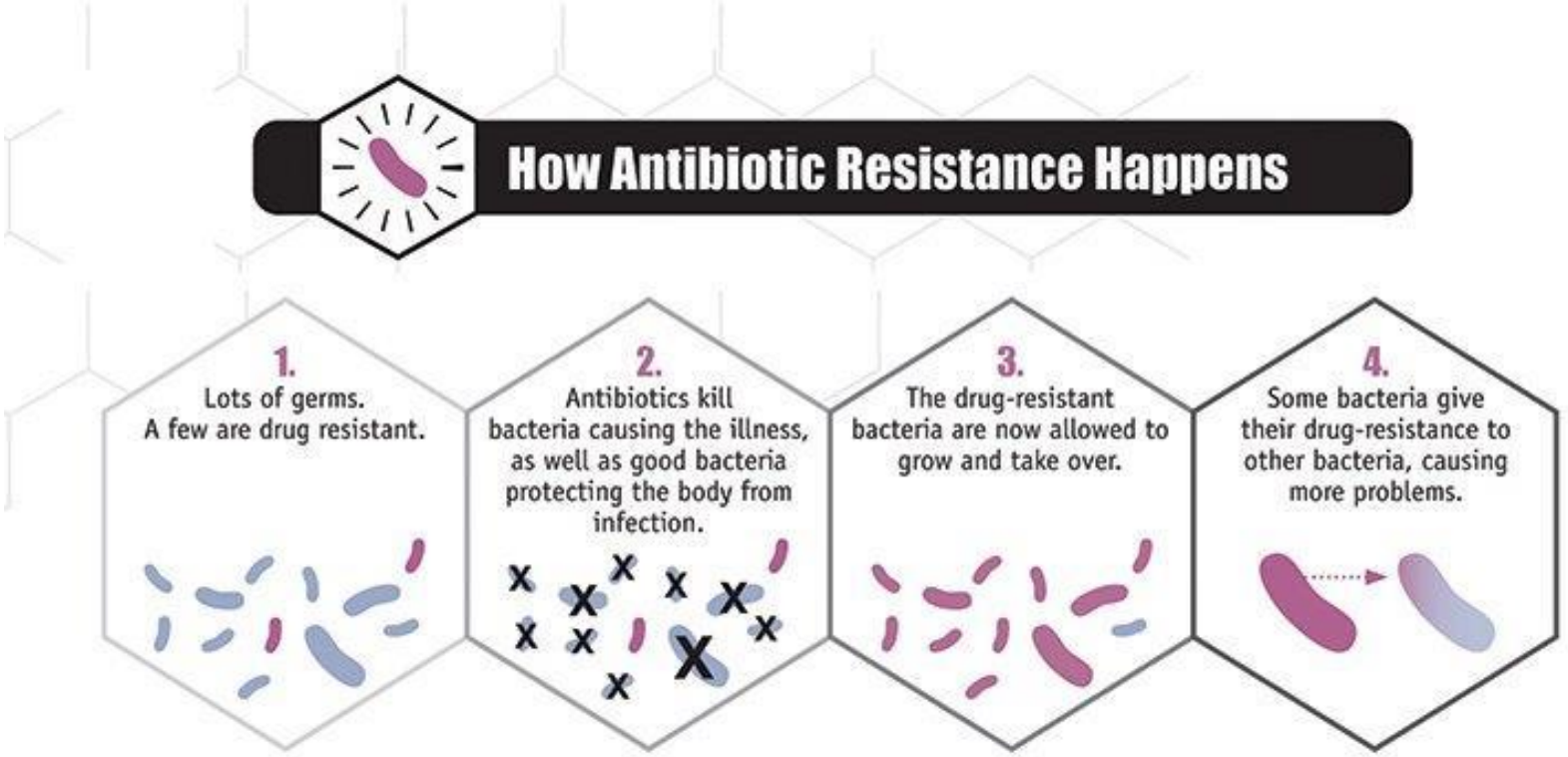
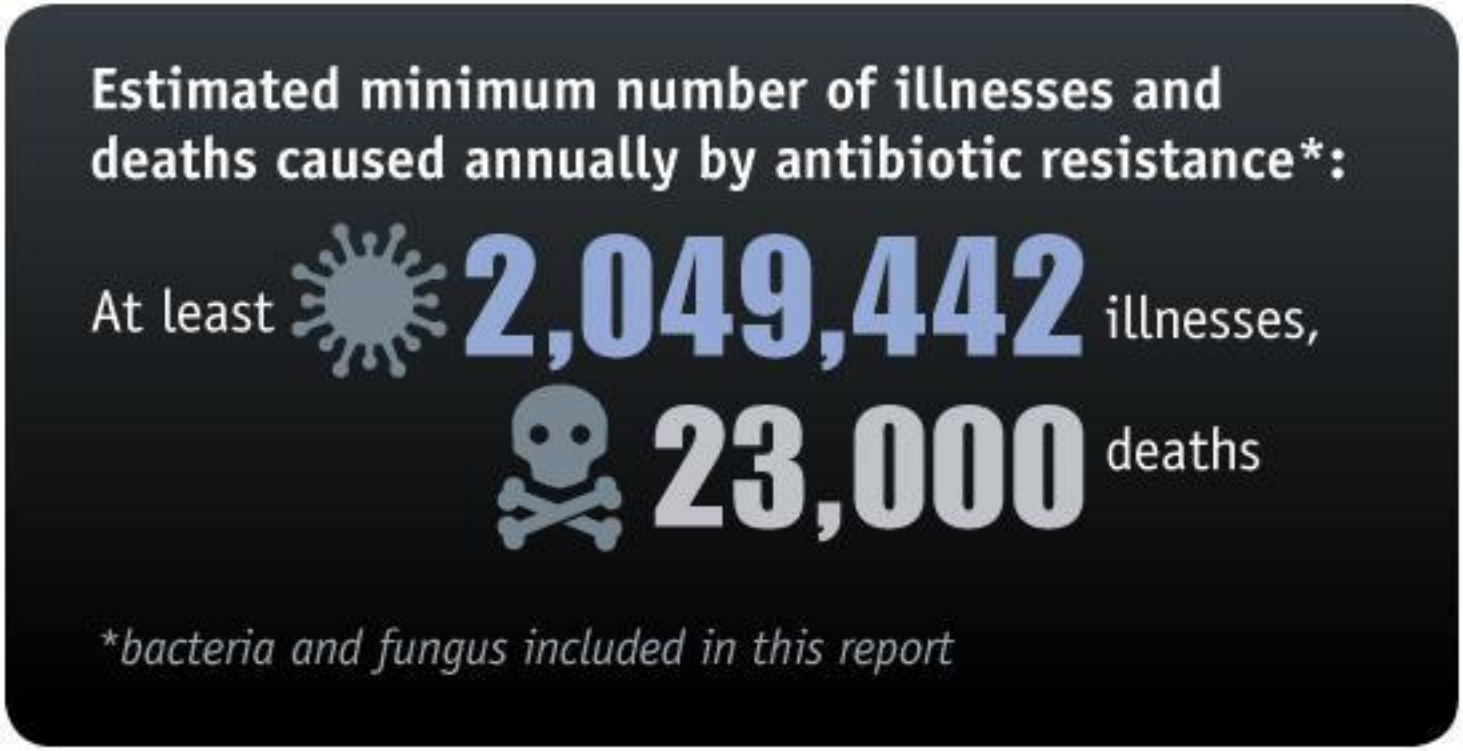


Image from: www.cdc.gov/antibiotic-use/community/about/antibiotic-resistance-faqs.html

Why Do We Care About Antibiotic Resistance?

Have you heard of MRSA infections in schools?

Antibiotic Resistance KILLS!

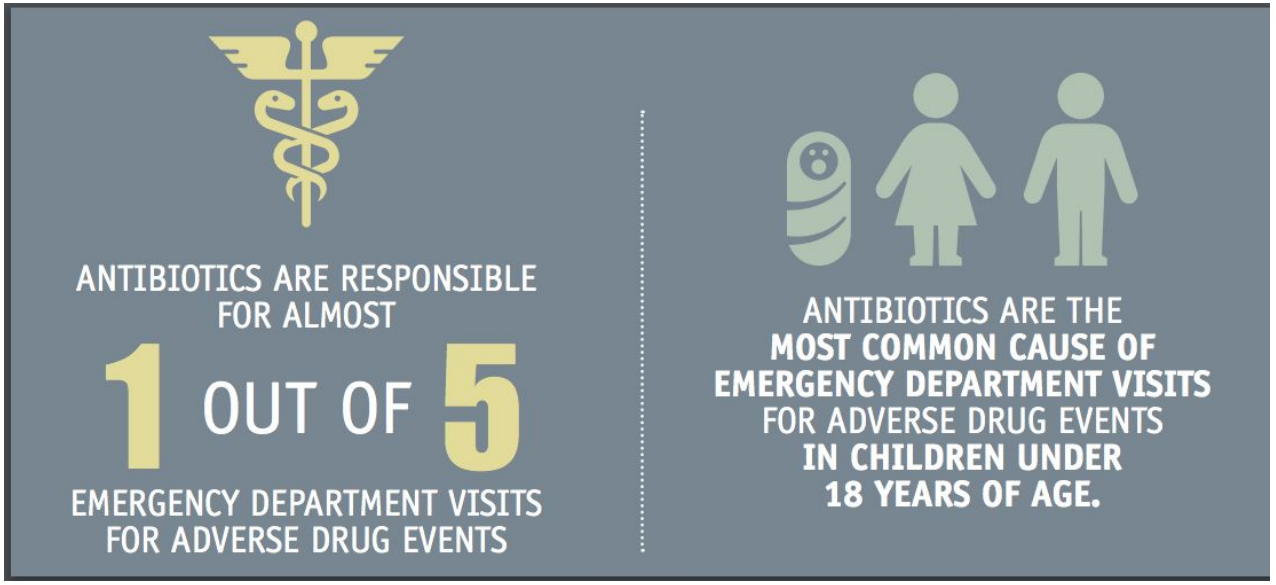


Antibiotic resistance adds **$20 billion** in extra health care costs PLUS the cost to society in lost productivity of **$35 billion** per year

Image from: https://www.cdc.gov/media/dpk/2013/images/untreatable/img43.jpg
CDC. Antibiotic Resistance Threats in the United States, 2013.

Resistance Activity

Antibiotics are life-saving drugs, but...

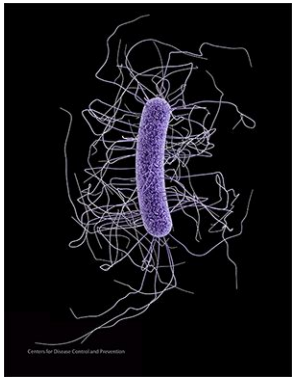


<u>Common/Serious Side effects</u>

- 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



Click the box to read Kaley's *C. diff* story

Information from: peggyfoundation.org

Illness	Usual Cause		Antibiotic Needed
	Viruses	Bacteria	
Cold/Runny Nose	✓		
Bronchitis/Chest Cold (in otherwise healthy children and adults)	✓		
Whooping Cough (pertussis)		✓	
Flu (influenza)	✓		
Strep Throat		✓	
Sore Throat (except strep)	✓		
Middle Ear Infections	✓	✓	
Urinary Tract Infection		✓	

Information from: cdc.gov/antibiotic-use/community/pdfs/Viruses-or-Bacteria-Factsheet-Eng.pdf

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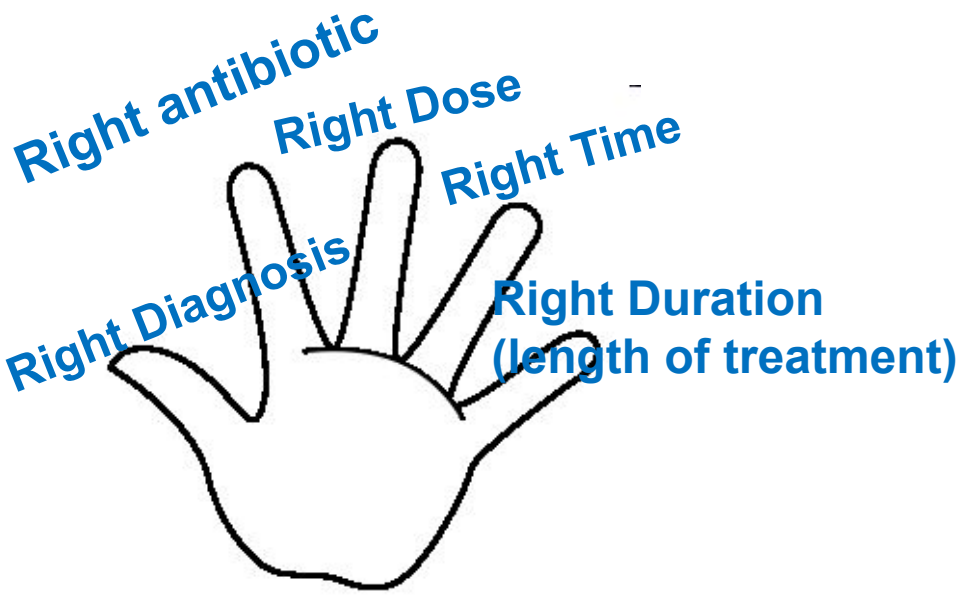
Strep Throat		✓	
Sore Throat (except strep)	✓		
Middle Ear Infection	✓	✓	
Urinary Tract Infection		✓	

Appropriate Antibiotic Use – it's not just about using only for infections caused by bacteria!

Your healthcare provider addresses the 5 RIGHTS:



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
- Prescri
  anti
  vi
- Ma
  better
  - Guidelines recom
    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 infec
likely
- The p
prescript
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