UNIVERSITY OF ROCHESTER
Life Sciences Learning Center

LSLC Outbreak!

Introduction:
As a researcher located at a prominent disease control lab, you receive the following letter:

> Dear Dr._____,
>
> People in our town are getting sick with terrible coughs, fevers, and muscle aches. Our hospital is starting to get overcrowded and we really need your help figuring out how to deal with this outbreak! What should we do?
>
> Sincerely,
> Mayor Frayda Needles
> Koff City, IS

Name at least three pieces of information that would help the mayor:

1. _____
2. _____
3. _____
4. _____

How is the disease spreading?
To understand how a disease might spread quickly through a population, scientists sometimes create a model of what is happening.

Recreate Koff City's **epidemic** with the following activity (an outbreak of a disease is called an epidemic when a lot of people are affected).

The Epidemic:

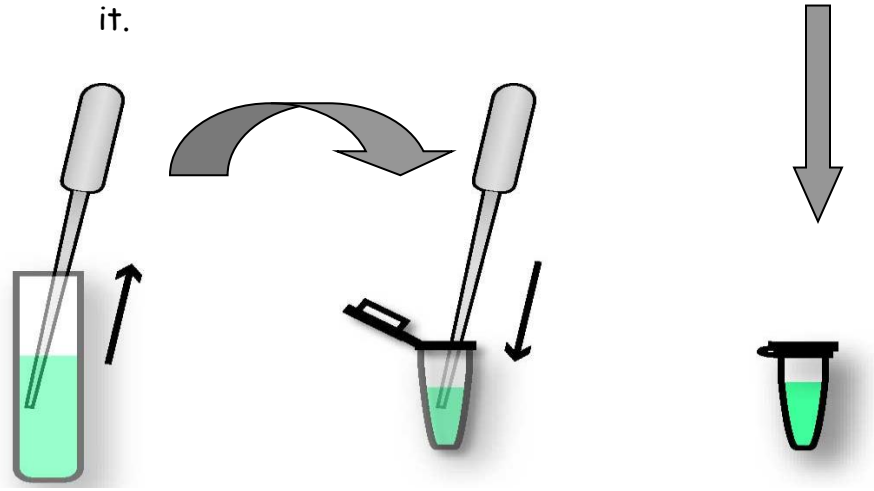
You will be given a 15 mL tube of liquid that represent body fluids. You will be mixing these fluids with three DIFFERENT people in your group.

This models any kind of contact with another person's body fluids, like being near a sneeze, using a public phone or toilet or sharing a can of soda.

What to do:

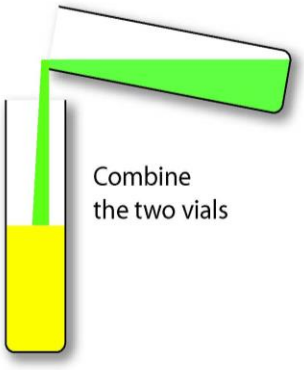
1. SAVE 1 mL OF YOUR 'BODY FLUID' FOR TESTING LATER:

- Use a transfer pipette to put about 1 mL of your fluid into a small tube with your number on it.
- Put this tube on the shelf above your bench to be tested later.

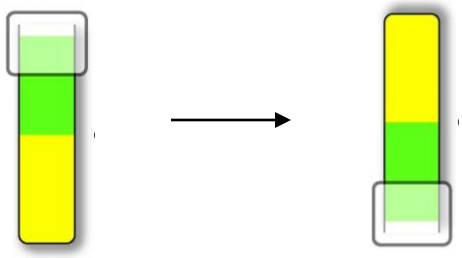


2. EXCHANGE FLUIDS:

- When instructed by your teacher, pour the liquid from your 15 mL tube into your partner's 15 mL tube.



- Cap the tube and invert the tube several times to mix the fluids.



- Pour half of the mixed solution back into your 15 mL tube.
- Record your partner's number as EXCHANGE #1 in your data table.
- You will be assigned the next person to exchange with. Repeat mixing process and record the other person's number as EXCHANGE #2 in your data table.
- You will mix fluids with one more person. Make sure to record the last person's number in EXCHANGE #3 in your data table.

3. RECORD EXCHANGE DATA:

My Tube Number _____

Exchange #1 with_____ (Your partner's #)

Exchange #2 with_____ (2nd person's #)

Exchange #3 with_____ (3rd person's #)

Was your vial infected? This is how you can find out…

Hold your tube securely and uncap it. Your instructor will add an indicator chemical to your tube. Then observe your tube; you may see something occur in the tube that indicates (shows) whether you were infected or not!

Was your vial infected? _____

4. RECORD CLASS DATA:

Class tube #'s that were **infected**	**Exchange #1** (Tube #)	**Exchange #2** (Tube #)	**Exchange #3** (Tube #)

What tube # started the infection? _____

What other information would be helpful to figure out which tube was infected first?

_____

Treatment Choices:

Now that you've figured out who started the infection, you can **quarantine** (keep separate) anyone who has been in contact with that person to keep the infection from spreading.

But, how will you treat people who are already infected?

Bacteria can be killed using antibiotics, but not all bacteria can be killed by all antibiotics. For example, many types of bacteria are not killed by the antibiotic penicillin. Those bacteria are said to be **resistant** to penicillin.

Sensitivity Disk Test:

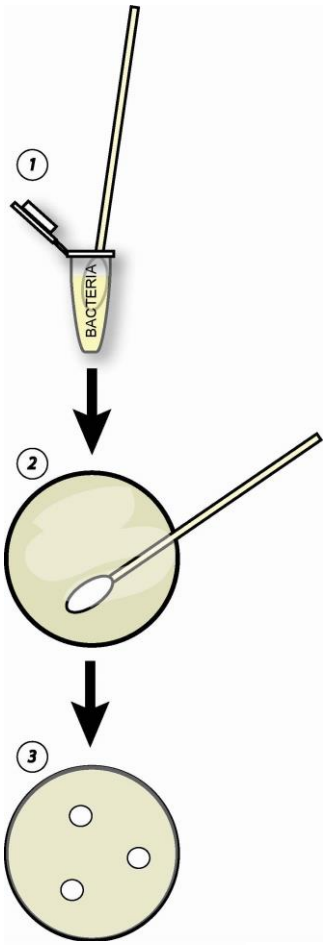
This method shows whether bacteria are sensitive to an antibiotic, or whether they are resistant to an antibiotic. Small paper disks have been soaked with antibiotics. You will place these disks onto an agar plate that you have swabbed with the bacteria isolated from patients of Koff City's outbreak.

If the bacteria are sensitive, they will be killed by the antibiotic in the disk. There will be a clear area around the disk where bacteria will not grow.

What will happen if the bacteria are resistant to an antibiotic? _____

_____

Materials	
Disks soaked with Neomycin	Koff City's bacteria in a tube
Disks soaked with Tetracycline	Sterile swab
Disks soaked with Penicillin	One agar plate



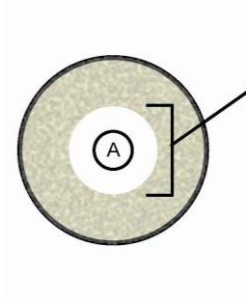
1. Dip a sterile swab into a Koff City's bacteria

2. Wipe the swab completely over the agar plate (get bacteria ALL OVER the plate)

3. Place a **neomycin** disk on the plate, a **tetracycline** disk on the plate and a **penicillin** disk on the plate.*

* *Do not move the disks once they are placed!*

4. Incubate the plate at room temperature for one to two days.



5. Measure the diameter of the clear area on plate and use the chart in below to determine if the bacteria are resistant to the antibiotic on the disk.

Antibiotic	Bacteria is **resistant** if clear area measures:	Bacteria is somewhat affected if clear area measures:	Bacteria is **affected** if clear area measures:
Neomycin (N)	12 mm or less	13-16 mm	17 mm or more
Penicillin (P)	12 mm or less	13-17 mm	18 mm or more
Tetracycline(T)	11 mm or less	12-13 mm	14 mm or more

What antibiotic would be the best antibiotic to give to patients in Koff City?

_____

Prevention Choices:

Contact with contaminated body fluids like **saliva** or with **feces** is the most common way bacterial infection spreads. The bacteria enter a person through exposed mucous membranes like the **mouth, eyes, or an open wound**.

Name at least 3 ways that people can **prevent** contact with sources of bacterial contamination?

1. _____
2. _____
3. _____
4. _____

Testing prevention choices:

The hospital in Koff City wants to test which cleaner is best at killing the bacteria that is causing the epidemic. The cleaning choices have been narrowed to the following four chemicals:

- ECover non-chlorine bleach
- Citrasol
- Pinesol
- Lysol Kitchen Spray

Your lab technician has already put disks soaked in the four cleaners on an agar plate with Koff City's bacteria. Your job is to measure the diameter of the clear area around the disk and determine which cleaner the hospital should use.

	ECover cleaner	**Citrasol cleaner**	**Pinesol cleaner**	**Lysol Kitchen Spray cleaner**
Diameter of clear area in mm				
Rank (1-4)				

Which cleaner should the hospital chose? _____

Prevention Awareness:
Watch the *Infection Prevention* movie. Can you spot people doing things that would result in passing on infection?

How was bacteria transferred in the movie?_____

_____

_____

_____

_____

Test how well you wash your hands!

People are told to wash their hands to prevent the spread of germs, including bacteria.

How well do people *really* wash their hands? Try this test:

1. Your teacher will give you a small amount of GloGerm on your hand.

2. Rub your hands together thoroughly, working the GloGerm all over both hands and between your fingers.

3. Wash your hands as you would normally, using soap and water at the sinks.

4. **Put on your safety goggles**.

5. Check how much GloGerm is left on your hands by shining a UV light on your hands.

How did you do? _____

_____

What would you advise people exposed to Koff City bacteria concerning hand washing?

_____

_____