

FUTURELAB+

BIOMED

*Taking Action in Your Community:
Health Equity*


Vaccine Production and Safety Testing

Developed in partnership with:

Discovery Education and Ignited

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This document is separated into two sections, For Teachers [T] and Student Resources [S], which can be printed independently.

Select the appropriate printer icon above to print either section in its entirety.

Follow the tips below in the Range field of your Print panel to print single pages or page ranges:

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Cover Image

Coronavirus particles, (illustration).

BIOMED / TAKING ACTION IN YOUR COMMUNITY: HEALTH EQUITY

Vaccine Production and Safety Testing

DRIVING QUESTION

Do the adverse effects of a vaccine outweigh the benefits?

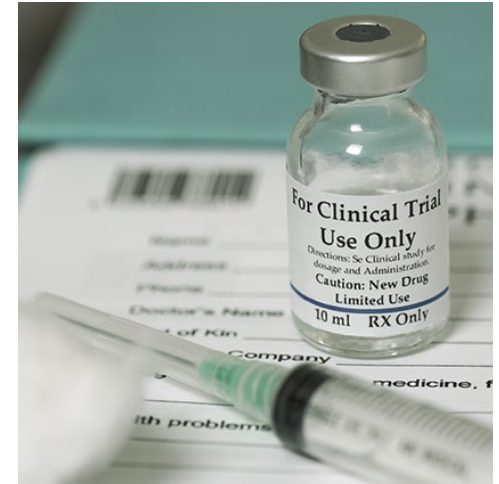
OVERVIEW

To fully understand and trust vaccines, students must learn the extensive processes required for vaccines to be approved for use. While this work occurs mostly behind the scenes, it is essential for ensuring a healthy public and the creation of medical interventions we can trust. If safety testing were to fail, then the public would quickly lose faith in vaccination programs, vaccination numbers would plummet, and populations would be left exposed.

In this lesson, students will learn the stages potential vaccines must progress through in order to be approved for public use and the continued monitoring they undergo after approval. Topics will range from the clinical trial process, the importance of including more ethnic groups in medical research, and the monitoring systems in place after approval is acquired.

ACTIVITY DURATION

Five class sessions
(45 minutes each)



ESSENTIAL QUESTIONS

How are vaccines tested before being distributed to the general public?

How do we know if a vaccine causes unintended side effects?

At what point is receiving a vaccine worth the potential consequences?

OBJECTIVES

Students will be able to:

Explain the role of the VAERS.

Examine ethical dilemmas in vaccination.

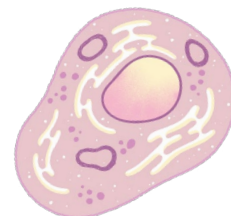
Investigate people of color enrollment in clinical trials.

Create a report on the adverse effects of typical vaccines and their commonality.

Describe the steps taken before a vaccine is approved for use in the United States.

BACKGROUND INFORMATION

In this lesson, students will learn about vaccine production and safety.

**Materials****An Off-Brand Comparable Drink****Paper Cups****Clinical Trials Capture Sheet****Diverse Enrollment Capture Sheet****Letter to Clinical Trial Rubric****VAERS Graphic Organizer****Vaccine Compensation Response
Exit Ticket****Would You Rather? Capture Sheet****Vaccine Dilemma Journal Response****Vaccine Poster Rubric****Poster Paper****Sticky Notes****Design Journal**

Pedagogical Framing

Instructional materials are designed to meet national education and industry standards to focus on in-demand skills needed across the full product development life cycle—from molecule to medicine—which will also expose students and educators to the breadth of education and career pathways across biotechnology.

Through this collection, educators are equipped with strategies to engage students from diverse racial, ethnic, and cultural groups, providing them with quality, equitable, and liberating educational experiences that validate and affirm student identity.

Units are designed to be problem-based and focus on workforce skill development to empower students with the knowledge and tools to be the change in reducing health disparities in communities.



SOCIAL-EMOTIONAL LEARNING

Students will demonstrate self-management skills and other social management skills as they communicate with each other in a professional manner to complete their assignments. They will have opportunities to reflect on an ethical problem and determine their responses, which allow the practice of social awareness skills. Students will learn about why we should support populations that are currently understudied in genomic and clinical research.

CULTURALLY AND LINGUISTICALLY RESPONSIVE INSTRUCTION

Students will investigate the enrollment of various clinical trials and why diversity is important to scientific research. There are opportunities for students to share ideas in non-threatening ways and to explore whether scientific research provides for culturally and linguistically diverse inclusion. At the conclusion of the lesson, they will advocate for an understudied group. Students will reflect on whether it is ethical to give vaccines that are not approved for use in the United States (due to a high number of adverse reactions to at-risk populations in poorer countries where the disease has a high prevalence).

ADVANCING INCLUSIVE RESEARCH

Many members of BIPOC communities are hesitant to participate in modern scientific studies because of instances of mistreatment in the past. These include instances such as the Tuskegee Syphilis Study in the mid-twentieth century. In order to build relationships with communities that were on the receiving end of injustice, scientists and health care providers must first rebuild trust.

COMPUTATIONAL THINKING PRACTICES

This lesson focuses on how we know that the vaccines we produce are safe. In order to enact this quality control, professionals use the computational thinking strategy of collecting data in order to conduct clinical trials. Students will practice the computational thinking strategy of abstraction by summarizing why it is important to have diverse participants in clinical trials. Then, they will practice the strategy of analyzing data as they review the NIH's clinical trial database.

CONNECTIONS TO THE PRODUCT LIFE CYCLE

This lesson focuses on quality control and testing, which are important components of the **manufacturing** step of the product life cycle.

Have you ever wondered...

How do scientists know vaccines are safe?

Vaccines undergo an extensive process (usually several years) for approval before being offered to the public. Vaccines are first tested in the laboratory before being released to very small groups of closely-monitored people for any adverse effects. Then, the vaccine is tested on larger cohorts of human test subjects, and the scientists and government bodies monitor them for any side effects before it is released to the public.

What happens when someone has a reaction to a vaccine?

Vaccines are monitored for safety by the Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) through the Vaccine Adverse Effects Reporting System (VAERS). Anyone from doctors and nurses to the general public can report vaccine reactions to the VAERS, allowing oversight organizations to track possible dangers.

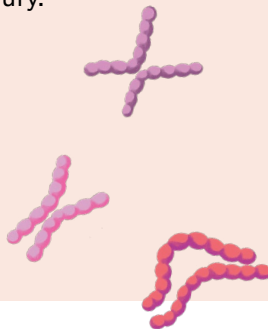
MAKE CONNECTIONS!

How does this connect to the larger unit storyline?

When looking at the use of vaccines to combat pandemics, it is necessary to understand the required safety testing even in the face of rising death tolls. It may be tempting to rush the safety testing process when under pressure, but all steps are important to assure public health. If issued vaccines are ineffective or cause a high number of adverse events, public trust in the system would fail, and events such as pandemics would continue to rage.

How does this connect to careers?

Quality control for vaccine production workers are some of the unsung heroes of the vaccine production process. It is often their job to deliver bad news to expectant vaccine researchers, and the general public knows little of their work. But without their contributions monitoring clinical trials and crunching data from the VAERS, we would all be at a much higher risk of avoidable vaccine injury.



How does this connect to our world?

The vaccine testing process is often misunderstood. When vaccines are accelerated in response to an outbreak, the public can fear the vaccine's safety. It is important that more people understand the comprehensive safety testing and monitoring process that all interventions must go through to achieve approval from our regulatory bodies. As we continue to grow as a global community, we will only see an increase in pandemic events. These procedures will again be put under pressure to act and be questioned by those already hesitant about vaccinations. It is crucial that our safety testing and monitoring system retains its high standards.

Day 1

Procedure

LEARNING OUTCOMES

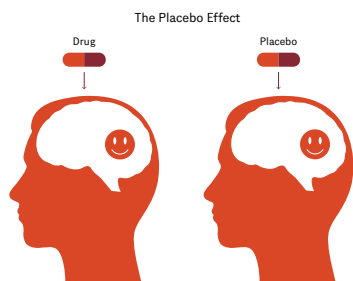
Students will be able to:

Summarize an article in two to four sentences on the role of vaccination.

Differentiate between the different stages of clinical trials.

COMPUTATIONAL THINKING IN ACTION

In this activity, students use the computational thinking strategy of collecting data in order to examine the format and structure of clinical trials.



GET THE MOST OUT OF VIDEOS

Showing videos in class is a great way to engage students and bring learning to life. But often times, watching a video becomes a passive learning experience. In order to get the most out of watching a video, it is important to engage students with a strategy that gets them to think, reflect, and share what they have learned.

Whole Group (15 minutes)

Teacher Prep > Prepare in Advance: Prepare enough small cups for your class containing an off-brand soda or soft drink.

- 1 Distribute two different small cups to students (they can be different colors or labeled “A” and “B”). Inform students that one cup is the name-brand soda and the other is an off-brand soda. Have students sample the drinks to attempt to determine which soda is which. Afterward, inform students that both cups contain the off-brand soda.

Teacher Note > If students do not want to drink soda or cannot drink it due to medical reasons (for example, individuals with diabetes), allow students to be notetakers or process observers.

- 2 In the rest of this lesson, students will be investigating the process of producing and safely testing vaccines. Present the following video to the class as an overview and introduction to the process: [Vaccine Clinical Trial 101: How do we develop and test new vaccines](#). Use *Pause* at appropriate intervals to call out main points as they are presented.
- 3 After the video, have students *Turn and Talk* with their neighbor to answer the following question: How was the soda taste test related to vaccine safety testing? At the end of a few moments, be sure to make them aware that the answer is: The test was blinded but NOT double-blinded since the teacher is aware of what is in the cups. When the students sampled the soda, they may have imagined taste differences. Blinding helps save trials from the placebo effect.
- 4 Play the following video: [Placebo Effect, Control Groups, and the Double Blind Experiment \(3.2\)](#)

Use the *Snowball Fight* strategy to have students summarize main points from the video and share a few of these aloud.

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Day 1

Continued

Procedure

Small Group (15 minutes)

- 1 Students should be divided into seven groups and read one section of a larger publication: *Understanding Clinical Trials: Appreciating Medical Heroes*, authored by clinical research figures.

Recommendations for breaking apart the article:

- Understanding Clinical Trials: Appreciating Medical Heroes
- Progress In The Last Half-Century: Breakthroughs In The Prevention And Treatment of Disease
- Demystifying Clinical Trials
- The Participant’s Perspective AND Risks & Rewards
- There’s Only One Way To Conquer Cancer: Research
- Ethics & Objectivity: A Clinical View AND Clinical Researchers: True Professionals
- A Global Reach For Participation

Teacher Note > *The article can be broken down into smaller pieces for struggling readers or especially large class sizes.*

- 2 After reading their assigned sections, have students use the *Placemat Strategy* for each member of the group to write two-to-four of the main points of their section. Then have the group decide on a short summary statement and write it in the center of the placemat. Post these around the room for a quick *Gallery Walk*.

Individual Work (5 minutes)

Each student should complete a quick Exit Ticket responding to another group’s summary.

Teacher Note > *Connect students to the career path of vaccine production quality control. Display a job advertisement for a vaccine production quality control position and discuss it with students.*

Small Group (10 minutes)

In groups of two to three students, ask them to use Healthline’s article *What Happens in Clinical Trial?* to complete the *Clinical Trials Capture Sheet* together. Students will determine which scenario describes each phase of clinical trials.

Day 2

Procedure

LEARNING OUTCOMES

Students will be able to:

Consider the importance of people of color in clinical research.

Investigate if clinical trials are meeting the NIH's goal of diversity.

COMPUTATIONAL THINKING IN ACTION

The "Tweet, Tweet" strategy is an effective way to use the computational thinking strategy of abstraction to identify the core components of an issue.

INDUSTRY AND CAREER CONNECTION

Students will need to collect and analyze data on real-world drug trials and compare those values to the goals of the NIH for people of color. They will use this data to make decisions about whether goals are being met.

Individual Work (10 minutes)

- 1 Have students examine why it is important to include diverse subjects in clinical trials. Students will begin by independently reading the National Institute of Health's (NIH) notice, *Including Women and Minorities in Clinical Research Background*.
- 2 After completing the text, challenge students to complete a *Tweet, Tweet* summary, which is 140 characters or less, and internet abbreviation is allowed. Have students post their "tweet" where the whole class can review and conduct a quick *Gallery Walk*.

Small Group (15 minutes)

- 1 About 10 years ago, the NIH issued an initiative for clinical trials to ramp up their inclusion across race, ethnicity, and gender. In small groups of two to three, have students use the FDA's *2020 Drug Trials Snapshots Summary Report* to examine the enrollment of women and understudied populations in different actual drug trials.
- 2 Ask students to respond to snapshots using the *Diverse Enrollment Capture Sheet*.

Whole Group (10 minutes)

- 1 Present this video on the importance of diverse clinical trials to the class: *Focus on Diversity for Covid-19 Vaccine Clinical Trial*.
- 2 Following the video, have students *Brainstorm* illnesses that disproportionately affect communities of color. Are some of these illnesses prevalent within their community?

Teacher Note > Some examples are:

African Americans—diabetes, hypertension, sarcoidosis, lung cancer, stroke, asthma

Asian Americans—hepatitis B, lung cancer, tuberculosis, liver cancer, suicide

Hispanic Americans—diabetes, chronic liver disease, hypertension

Women—Alzheimer's, GI problems, depression, chronic pain, autoimmune diseases

Ashkenazi Jewish—cystic fibrosis, Tay-Sachs

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Day 2

Continued

COMPUTATIONAL THINKING IN ACTION

Here, students are gaining experience with the computational thinking strategy of analyzing data as they navigate the NIH's clinical trial database.

Procedure

Individual Work (10 minutes)

Ask students to search the *NIH clinical trial database* for a trial they believe may help members of a particular community of color. Once they determine which study they would like to use, students should write a letter to the administrators of the study to explain the importance of including people of color in the clinical trial.

Teacher Note > *The studies' titles may look daunting, but students can use the "keyword" search feature to look up a specific illness. If they click on the number next to the title, it will open a page giving more information about the study. Use the [Letter to Clinical Trial Rubric](#) to assess student work. Additionally, this activity will take longer than the allotted ten minutes. Inform students that they will begin this activity during class but will need to complete it outside of class.*



Day 3

Procedure

LEARNING OUTCOMES

Students will be able to:

Craft questions of varying difficulties on the topic of the VAERS.

Analyze data from the vaccine injury compensation program.



Whole Group (5 minutes)

Have students watch the video: *Tell Me More: Vaccine Safety* using the instructional strategy: *AEIOU*. This video from the CDC discusses how vaccine safety continues beyond clinical trials. Have students share their takeaways using the participation protocol *Raise a Righteous Hand*.

Small Group (25 minutes)

- 1 Have students look at how adverse reactions to vaccines are reported and tracked. Students should be in groups of two to three. Distribute a copy of Bloom's Taxonomy to students to aid them in creating questions. They should investigate the CDC's website on the *Vaccine Adverse Event Reporting System*. Using the website as a guide, students should seek to write 10 questions of increasing difficulty using the *VAERS Graphic Organizer*.
- 2 Ask groups to swap questions with another group in the room and then attempt to answer the questions using the website as a guide.
- 3 Help students see the rarity of severe reactions by directing them to the *Vaccine Information Statement (VISs)* website. Ask students to choose a vaccine information statement from a common vaccine and look for how common different side effects are.

Whole Group (10 minutes)

Another aspect of monitoring and promoting vaccine safety is the National Vaccine Injury Compensation Program, which seeks to mitigate any citizens' concerns of injury from the vaccine. As *The Vaccine Injury Court* video will discuss, receiving compensation does not mean that a vaccine was, in fact, responsible for an injury. Still, it serves to provide support to families in which an injury may have occurred. The very existence of the court is often misunderstood and pointed to as proof of vaccines being unsafe.

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Day 3

Continued

INDUSTRY AND CAREER CONNECTION

Students will need to analyze data released by the vaccine compensation program and, from that analysis, draw conclusions about vaccine safety.

Procedure

Individual Work (5 minutes)

Following the video, students should write a personal response using both what they learned from the video and the data at the top of the [Vaccine Compensation Response Exit Ticket](#).

Teacher Note > Today, students learned about vaccine quality control. Encourage advanced students to research what is done by an individual working in vaccine quality control to ensure safety in vaccine production. They should be able to verbally summarize their findings to you.



Day 4

Procedure

LEARNING OUTCOMES

Students will be able to:

Identify important considerations in comparing the risks and benefits of vaccines.

Reflect on ethical dilemmas involving vaccinations.

Small Group (15 minutes)

In groups of three or four, have students discuss a series of risks versus benefits scenarios using the *Would You Rather? Capture Sheet*.

Whole Group (10 minutes)

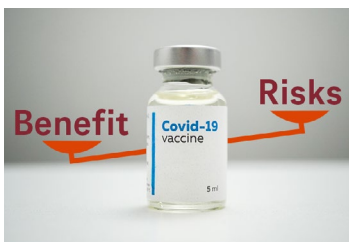
- 1 Discuss the following questions with students using *Raise a Righteous Hand*: When you and your group were reading the scenarios, which factors were important to you? How did your group decide on a scenario?
- 2 Have students begin exploring the risks versus benefits of vaccines and whether those benefits outweigh the risks. Play the *Are Vaccines Safe?* video. Have students come to the board and write down a benefit or risk they learned from the video.

Independent Work (20 minutes)

- 1 Give students the *Vaccine Dilemma Journal Response Rubric*.
- 2 Students should independently read the article *The vaccine dilemma: how experts weigh benefits for many against risks for a few*.
- 3 When finished reading, students should respond to the article section using the *Vaccine Dilemma Journal Response Capture Sheet*.

Teacher Note > *Students have learned a lot in this lesson about how federal agencies such as the CDC and NIH handle vaccine safety. Encourage advanced students to research local and state agencies for their area to find out how they handle vaccine safety. They should write a brief paragraph detailing their findings.*

- 4 Provide time for students to respond to the guiding questions and project connections in their **Design Journal**. They will explain how vaccines are produced, tested, and approved for public use.



Day 5

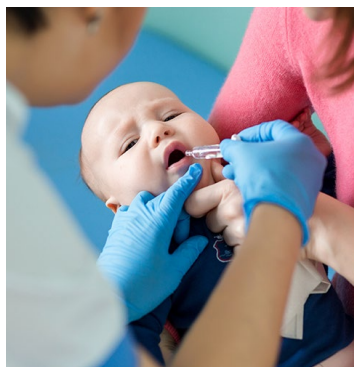
Procedure

LEARNING OUTCOMES

Students will be able to:

Explore vaccine safety information.

Create a report on the adverse effects of typical vaccines and their commonality.



Small Group (37 minutes)

- 1 In groups of three to four, have students complete the concluding project for this lesson. Ask them to use this [CDC website](#) to find a brief overview of symptoms, as well as any necessary vaccine safety information.

Teacher Note > *By clicking on the vaccine name, information about the illness will display. On the right menu, there is an option called “A Closer Look at Safety Data.”*

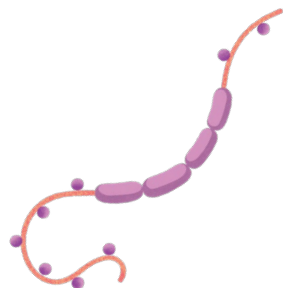
- 2 Students should select four common childhood vaccines and create small posters or flyers for each, explaining both the benefits and safety concerns for each vaccination, as well as the commonality of adverse reactions.

Teacher Note > *Here is the CDC’s [Child & Adolescent Immunization Schedule for childhood vaccinations](#). It may be beneficial to display the list while students are selecting their vaccines.*

Whole Group (8 minutes)

Have students display their posters or flyers around the room. Reserve the last five minutes of class for a [Gallery Walk](#). Ask students to walk around the room and leave sticky notes next to other groups’ works with comments or compliments.

Teacher Note > *Use the [Vaccine Poster Rubric](#) to assess student work.*



National Standards

Next Generation Science Standards

ETS1.A: Defining and Delimiting Engineering Problems

Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.

Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.

Science and Engineering Practices

Constructing an explanation

Evaluate the claims, evidence, and/or reasoning behind currently accepted explanations or solutions to determine the merits of arguments.

Crosscutting Concepts

Patterns

Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

Cause and Effect

Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

Career and Technical Education (CTE)

A4.3

Use information and communication technologies to synthesize, summarize, compare, and contrast information from multiple sources.

A5.1

Use the Internet and World Wide Web to collect and share scientific information.

A5.4

Interpret information and draw conclusions, based on the best analysis, to make informed decisions.

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National Standards

CTE

Continued

A5.6

Read, interpret, and extract information from documents.

A7.1

Identify agencies at the local, state, and federal levels.

A7.2

Be aware of the role of agencies in promoting patient safety, quality control, and entrepreneurship.

Clinical Trials Capture Sheet**ANSWER KEY****Do not share with students****Directions**

Read Healthline's article [What Happens in Clinical Trial?](#) and relate each statement to a phase of clinical trial.

1. This is the first stage where randomization is used.

Phase III

2. Medication is given to 850 people with kidney disease, and they are monitored for a few years for side effects.

Phase II

3. To ensure a new diabetes medication is safe, 10 volunteers are given very small doses.

Phase 0

4. Researchers continue to monitor a medication's efficacy and side effects for many years after it has been released to the market.

Phase IV

5. The new treatment is given to less than 100 healthy people.

Phase IV

6. Researchers give 1,250 patients who struggle with Parkinson's disease a new medication to help with tremors. 1,250 other patients are given a placebo. Both sets of participants are monitored for five years.

Phase III

7. The research group wants to determine the highest dose they can safely administer.

Phase I

8. This is the stage where researchers are most likely to see long-term side effects.

Phase III

9. Cancer researchers are trying to figure out if a medication should be given orally or intravenously.

Phase I

10. These studies are usually conducted double-blind.

Phase III

Diverse Enrollment Capture Sheet**ANSWER KEY****Do not share with students****Directions**

Read through the FDA's *2020 Drug Trials Snapshots Summary Report* and answer the following questions using the data tables.

1. Across all studies, what was the percentage of participants who were women?

56 percent

2. What percentage of all participants were Black/African American, Hispanic Americans, or Asian Americans?

Black/African American: 8 percent, Hispanic: 11 percent, Asian: 6 percent, Total: 25 percent

3. Which drug trial has the highest percentage of women enrolled?

CERIANNA at 100 percent

4. Which drug trial has the highest percentage of Black/African Americans enrolled?

PIZENSY at 31 percent

5. Which drug trial has the highest percentage of Hispanic American participants?

LAMPIT at 99 percent

6. Which drug trial has the highest percentage of Asian Americans enrolled?

CERIANNA at 83 percent

7. Which drug trial has the lowest percentage of White participants?

CERIANNA at 15 percent

8. How many drug trials have no female participants?

Three (Ga 68 PSMA-11, ORGOVYX, and VILTEPSO)

9. How many drug trials have no Black/African Americans enrolled?

Eight (GAVRETO, IMCIVREE, KLISYRI, LAMPIT, MONJUVI, ONGENTYS, OXLUMO, and VILTEPSO)

10. Do any drug trials have no people of color enrolled?

No

11. Find a drug trial with little to no people of color participation. How could a lack of representation skew results?

ZEPOSIA, which treats multiple sclerosis, has 99 percent white participants. The lack of representations means that people of color with multiple sclerosis do not know how the treatment will affect them, and it could alter results with what symptoms are experienced and how strongly.

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Diverse Enrollment Capture Sheet

Directions

Read through the FDA's *2020 Drug Trials Snapshots Summary Report* and answer the following questions using the data tables.

1. Across all studies, what was the percentage of participants who were women?

2. What percentage of all participants were Black/African American, Hispanic Americans, or Asian Americans?

3. Which drug trial has the highest percentage of women enrolled?

4. Which drug trial has the highest percentage of Black/African Americans enrolled?

5. Which drug trial has the highest percentage of Hispanic American participants?

6. Which drug trial has the highest percentage of Asian Americans enrolled?

7. Which drug trial has the lowest percentage of White participants?

8. How many drug trials have no female participants?

9. How many drug trials have no Black/African Americans enrolled?

10. Do any drug trials have no people of color enrolled?

11. Find a drug trial with little to no people of color participation. How could a lack of representation skew results?

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Clinical Trials Capture Sheet

Directions

Read Healthline's article *What Happens in Clinical Trial?* and relate each statement to a phase of clinical trial.

1. This is the first stage where randomization is used.

2. Medication is given to 850 people with kidney disease, and they are monitored for a few years for side effects.

3. To ensure a new diabetes medication is safe, 10 volunteers are given very small doses.

4. Researchers continue to monitor a medication's efficacy and side effects for many years after it has been released to the market.

5. The new treatment is given to less than 100 healthy people.

6. Researchers give 1,250 patients who struggle with Parkinson's disease a new medication to help with tremors. 1,250 other patients are given a placebo. Both sets of participants are monitored for five years.

7. The research group wants to determine the highest dose they can safely administer.

8. This is the stage where researchers are most likely to see long-term side effects.

9. Cancer researchers are trying to figure out if a medication should be given orally or intravenously.

10. These studies are usually conducted double-blind.

FUTURELAB+**Letter to Clinical Trial Rubric**

Score	3	2	1
Grammar, spelling, structure	Little to no spelling or grammatical errors, the letter is polished and professional.	Some spelling or grammatical errors, some problems with the structure of the letter.	Multiple spelling errors, incomplete.
Connection to people of color	There is a strong connection between the illness and the people of color group, which the student clearly identifies.	There is some connection between the selected illness and a people of color group, the student draws minimum connections.	The selected illness is not more prevalent in a specific people of color and no specific illness is mentioned.
Connection to an illness	There is a strong connection between the illness and the drug study, which the student clearly identifies.	There is some connection between the selected illness and the drug trial, the student draws minimum connections.	The selected drug trial is not connected to the selected illness and the specific drug trial or illness not mentioned.
Argument	Student makes a strong argument for diversity inclusion, including details and citing supporting facts.	Student makes an argument for diversity inclusion, but the argument lacks details and supporting facts.	Student makes little to no argument for why diversity is important to their clinical trial.
Final Score			

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VAERS Graphic Organizer

Directions

Using the *Vaccine Adverse Event Reporting System* as a guide, write 10 questions of increasing difficulty about how adverse reactions to vaccines are reported and tracked.

Level of Difficulty

Easy

Moderate

Hard

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Would You Rather? Capture Sheet

Directions

Respond to the following scenarios with your group.

1. Would you rather receive \$50 today or have a 50 percent chance of receiving \$100 in one week?

2. Would you rather be traveling in a car with no brakes or an airplane with no landing gear?

3. Imagine four doors are in front of you. If you choose the correct one, you win a million dollars. If you choose the wrong one, you owe a million dollars. The other two are empty. Which door do you choose?

4. Would you rather cliff dive in a dangerous area or skydive with a parachute that has a hole?

5. Would you rather be chased by a lion for a hundred yards or a family of angry skunks for two miles?

6. Would you rather never see your best friend ever again, or get to see all of your friends but only for half an hour every week?

7. Would you rather be allergic to your favorite food or not be able to taste any food?

8. Would you rather be stuck up a tree or down a ravine?

9. Would you rather have the ability to time travel, but you couldn't control where you went, or the ability to run incredibly fast, but you couldn't control when it happened?

FUTURELAB+**Vaccine Dilemma Journal Response Rubric**

Score	3	2	1
Grammar, spelling, structure	Little to no spelling or grammatical errors, the letter is polished and professional.	Some spelling or grammatical errors, some problems with the structure of the letter.	Multiple spelling errors, incomplete.
Argument	Student makes a strong argument for why it is or is not ethical to approve a vaccine for use in third world countries, including details and citing supporting facts.	Student makes an argument for why it is or is not ethical, but the argument lacks details and supporting facts.	Student makes little to no argument for why it is or is not ethical to approve a vaccine for use in third world countries.
Final Score			

FUTURELAB+**Vaccine Poster Rubric**

Score	3	2	1
Overall Appearance	Posters/flyers are neat and eye-catching, color and details included.	Students have made some efforts in appearance, some color or detail included.	Posters are sloppy, rushed, lack color or details, include a lot of empty space.
Vaccine #1 Benefits	Student includes details and specific facts.	Benefits are incorrect or include little detail.	No benefits to the vaccine are listed.
Vaccine #1 Risks	Student includes details and specific facts.	Risks are incorrect or include little detail.	No risks to the vaccine are listed.
Vaccine #1 Commonality	Includes multiple common adverse events, detailed.	Commonality is incorrect or incomplete.	Commonality of adverse events not mentioned.
Vaccine #2 Benefits	Student includes details and specific facts.	Benefits are incorrect or include little detail.	No benefits to the vaccine are listed.
Vaccine #2 Risks	Student includes details and specific facts.	Risks are incorrect or include little detail.	No risks to the vaccine are listed.
Vaccine #2 Commonality	Includes multiple common adverse events, detailed.	Commonality is incorrect or incomplete.	Commonality of adverse events not mentioned.
Vaccine #3 Benefits	Student includes details and specific facts.	Benefits are incorrect or include little detail.	No benefits to the vaccine are listed.
Vaccine #3 Risks	Student includes details and specific facts.	Risks are incorrect or include little detail.	No risks to the vaccine are listed.
Vaccine #3 Commonality	Includes multiple common adverse events, detailed.	Commonality is incorrect or incomplete.	Commonality of adverse events not mentioned.
Vaccine #4 Benefits	Student includes details and specific facts.	Benefits are incorrect or include little detail.	No benefits to the vaccine are listed.
Vaccine #4 Risks	Student includes details and specific facts.	Risks are incorrect or include little detail.	No risks to the vaccine are listed.
Vaccine #4 Commonality	Includes multiple common adverse events, detailed.	Commonality is incorrect or incomplete.	Commonality of adverse events not mentioned.
Final Score			