Lesson Plan

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Polio and Historical Inquiry

It was the robber of hope for a generation, several generations of children. There were diseases . . . that were more devastating, affecting more children, more deadly than polio. But polio left kids crippled, and that was an image that this big strong postwar country simply couldn't abide. We had children lining up in wheelchairs, in iron lungs, whose very vitality [was drained] and everyone's hope for their future was . . .[shaken] right at the most critical time in their childhoods. And that's why polio seemed like such a horrible scourge, far more so than any number of other diseases or accidents that, any way you want to measure it, were more deadly and were fatal. And the image of a child in an iron lung is about as tearful and wrenching as we could imagine at that time, and any time certainly in this century. There were many other diseases that were bad for America, but polio broke its heart.

—Mark Sauer, polio survivor (1)

Writing about the teaching of history, Zachary Osofsky succinctly captures the purpose of a history classroom by asking this question: how is the past different from the present (2)? In the case of polio, medicine, and public health, the answer is: a lot different. Before the arrival of the polio vaccine in the mid-1950s, Americans lived for many years in fear of this dread disease. As summer appeared, so too did the specter of polio. And for the most part, the virus, for which humans are the only natural host, never failed to deliver—sometimes in epidemic proportions and sometimes less so. Students today may have difficulty comprehending the fear that polio elicited in that era (although AIDS provides a useful analogy). How have we gone from heightened anxiety to complacency in such a brief period of time?

Since large polio outbreaks occurred throughout the 1940s and 1950s, your students will have grandparents and older relatives or acquaintances who are familiar with polio and may have been directly affected by it. Collecting their accounts will familiarize your students with qualitative and quantitative analyses and demonstrate how they can be useful tools in historical inquiry. In addition, this lesson will help establish your classroom as a learning community by providing opportunity for interaction and discourse.

National Standards

This activity will fulfill the following standards in the *National Standards for United States History*:

Standard 4 in Standards in Historical Thinking: Historical Research Capabilities

Era 9: Postwar United States (1945-early 1970s)

Standard 1B: Demonstrate understanding of how social changes of the postwar period affected various Americans.

Time

This lesson should take two to three class periods, with homework.

Student Objectives

1. To draw upon quantitative and qualitative data to formulate generalizations about polio in the United States during the mid-1900s.

2. To evaluate the implementation of a vaccine study by analyzing the interests served and ethical dimensions of the study.

3. To recognize that science in the era immediately following the Second World War was seen as a powerful and objective tool, best left in the hands of experts.

4. To identify why the elimination of polio is considered an American success story.

Background

The year 2005 marks the fiftieth anniversary of the announcement that clinical trials of the Salk polio vaccine had proved successful across the United States. Before this discovery, polio knew relatively no boundaries. The March of Dimes's successful poster campaigns of the 1950s made use of clean and wholesome children in braces to drive home the point: polio must be stopped, and it would be done so with public support. The same citizenry that had been called upon to pitch in to help win World War II would be called upon again, only this time the enemy was polio.

While polio could attack anyone, anywhere, at any time, many believed slums and immigrants played a significant role in its spread. Despite mounting evidence that affluent suburban dwellers suffered from even higher rates than did inner city or rural residents, people often ignored such evidence because cleanliness was expected to lead to good health. A backlash against urban, poor, Eastern European immigrants followed. In *Dirt and Disease* (1992), Naomi Rogers notes that the power of dirt, disease, and disorder overrode the germ theory of disease; and nothing spoke to those three D's like immigrants (3). In addition, with so little known about how the virus spread, there were those in the cold war era who saw polio as a communist plot against Americans. Never mind that the Soviet Union also suffered from its own share of polio epidemics.

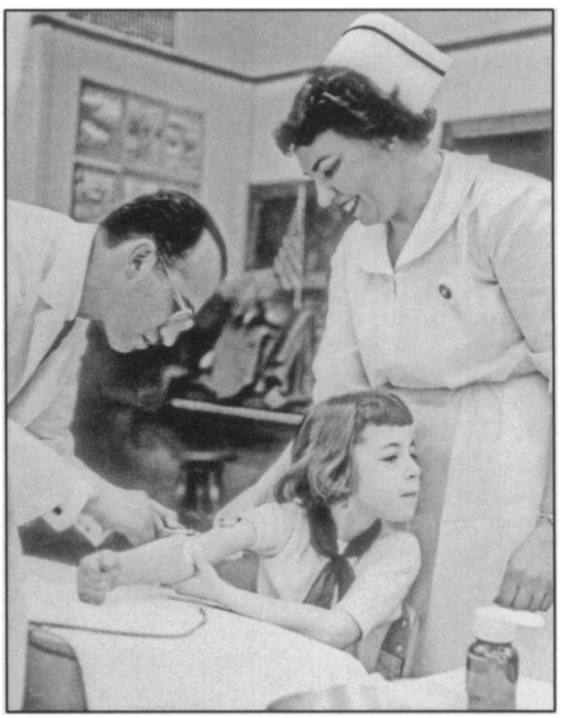
The first well-documented polio epidemic in the United States occurred in New York City in 1916. At the time the polio virus was known to be the causative agent, but it remained a mystery as to how one "caught" polio. Did it have something to do with the new method of pasteurizing milk? Was it carried by flies, mosquitoes, and household cats? Was the virus carried on clothes, coal dust, or street grit, and then easily transmitted to humans? Was polio waterborne, contributing to the likelihood that exposure to pond water, drinking fountains,

and ordinary tap water would result in polio? Or, since so many school children suffered from polio, could it be due to the posture necessitated by bending over their school desks? (4)

With so many suspected transmitters, avoidance and preventive strategies were numerous, if not somewhat bizarre. Many public libraries, water fountains, swimming pools, and movie theaters were shut down during the summer months. Mothers who had to go grocery shopping were encouraged to leave their children home. Cats, whether household or stray, were killed by the thousands. Children were forced to take afternoon naps to avoid stress (4).

And yet, even with all of this cleaning, sterilizing, and resting, the incidence of polio continued to climb. Ironically, it seemed to grow the most in countries with sound water and sanitation programs (5). Did crowded and unsanitary conditions aid in early immunization to the virus? Early enough, perhaps, that maternal antibodies in infants completely or partially fought off the disease? Were children in the United States just too clean and protected, thereby reducing infant exposure to polio but leaving them vulnerable as they aged? In the U. S., children aged six to nine constituted the group most susceptible to polio. When exposure occurred at this time of life rather than infancy, the severity of the disease was often much worse—a trait common to childhood viral infections.

When the National Foundation for Infantile Paralysis (NFIP) began in 1938, the United States was still deeply mired in the Great Depression and unprepared to treat thousands of crippled children and adults. Few people had medical insurance, and there was little federal money for rehabilitation or polio research. Those with polio were often isolated from the public and taken to special treatment facilities such as The Home for Incurables or The Hospital for the Ruptured and Crippled. As late as 1939, only 300 hospitals in the entire country would accept polio patients.



Jonas Salk administers a dose of the "dead virus" vaccine to a child. (Image courtesy of the History of Medicine Division of the National Library of Medicine.)

At first, the NFIP tackled the growing problem of patient care and physical rehabilitation. As it became apparent that there would be no cure for polio, attention shifted to prevention. Enter Jonas Salk, Albert Sabin, and a host of other researchers who drew on medical breakthroughs such as tissue culture techniques and flu vaccine production to help advance their work.

A rift subsequently emerged between Salk and Sabin, revolving around each scientist's approach to vaccine production. Salk favored using a killed virus for polio vaccination while Sabin believed that a weakened, but still live, virus would offer more antibody production and longer-lasting protection. Salk and his University of Pittsburgh laboratory staff worked on a killed virus vaccine from 1947 to 1952. Hundreds of monkeys served as test animals, as Salk's team sought to identify how many types of poliovirus existed (there are three) and to test the vaccine. At the end of 1951, the NFIP granted Salk approval to begin vaccine testing on humans. But which humans?

Traditionally, human testing had been accomplished using institutionalized children and jail inmates. Each group can serve as an "ideal" testing cohort—isolated from the media, easy to track since subjects are rarely transient, and often oblivious to the dangers of the testing. Salk convinced the NFIP that a group of volunteers awaited him at the D.T. Watson Home for Crippled Children and the Polk School for the Retarded and Feeble-Minded. Pennsylvania state authorities agreed and testing began in June of 1952, the same year that the highest number of polio cases in the U. S. was ever recorded—over 57,000 nationwide.

Initial experiments proved that the vaccine did protect against polio and, contrary to what Sabin believed, that the killed-virus vaccine stimulated high and long-lasting antibody production. Such encouraging findings paved the way for the design of a massive inoculation program for school children.

The clinical testing was enormous in both scope and design. A field trial had to be administered to prove the safety and efficacy of the vaccine, since earlier ones in the 1930s had triggered the disease in a number of volunteers. Because Salk's work was so highly publicized, moreover, the public already had high expectations that his laboratory's vaccine would work and would be quickly available. Such expectations required that the testing be completed in one year (6).

The fact that polio in the United States had such a low incidence rate—only about 50 per 100,000 people, compared to the incidence of cancer today at 566 per 100,000—required that many children be part of the testing. The lower the incidence, the larger the sample size must be. This large sample required a tremendous amount of planning and logistical support. In addition to the nearly half million child volunteers who would receive the vaccine, the unpaid efforts of parents, school principals, teachers, nurses, state and county health officials, and doctors required considerable planning. Support had to continue after immunization, too, as children in experimental and control groups had to be tracked and community physicians needed to report suspected polio cases promptly. Costs of the 1954 field trials were funded largely through public donations to the NFIP—no tax dollars were used.

While Jonas Salk was receiving most of the publicity, Albert Sabin remained in the background, continuing his research with a weakened vaccine throughout the 1950s and 1960s. Sabin also was heavily funded by the NFIP but once word of the Salk vaccine's success spread, Sabin had to redirect his efforts to locate another country where he could test his work. The Soviet Union provided such an opportunity.

Sabin's live but weakened polio vaccine had an advantage: it could be administered orally, in the form of a sugar cube. The vaccine entered the digestive system in the same manner that the polio virus did. Only a single dose was required. There would be no need for boosters and Sabin predicted that the body would begin making antibodies in days rather than weeks, as was the case with the Salk vaccine.

Although it seems strange that Sabin was allowed to test his vaccine in the Soviet Union during the cold war, he was given permission in 1956 to visit and speak with Soviet virologists and health officials. He spent one month in Leningrad, and upon his return requested permission to send his strains of polio virus to the Soviet Union for testing. Despite Defense Department concerns about biological warfare

dangers, the State Department approved shipment of the virus to the Soviet Union. With Sabin's help, the Soviets produced the vaccine and inoculated ten million children during the first five months of 1959. In 1960, the incidence of polio in the Soviet Union dropped dramatically.

In 1964, the American Medical Association endorsed the Sabin vaccine over the Salk vaccine. Every year, however, a handful of children contracted polio from the Sabin live vaccine and in 2000 the Centers for Disease Control recommended returning to the Salk vaccine for childhood immunization.

Procedure

Before beginning the lesson, ask your students what they know about polio. Keep track of student responses on the board and return to their answers after completing the lesson to correct any misconceptions or to add to their responses. Then ask students what else was occurring during the mid-1900s. It is important for students to understand the context in which polio was feared and combated. One reason why the spread of polio was halted when it was is due to the rapid growth of science and technology after World War II. Another factor was increased accessibility to mass media. Television, radio, and the press played a large role in advertising the March of Dimes and reporting new developments for polio treatment and prevention.

Perhaps most important was the fact that the scientific atmosphere after the war was charged with cold war tensions. The search for a polio vaccine became an affirmation of American scientific and technological progress. As such, it was viewed as a triumph of the American system. American science was bold and innovative, and dedicated American scientists possessed the "can-do" attitude that typified American life after the Second World War. With this background knowledge, students are more apt to ask good questions during their interviews. It also helps them form stronger generalizations once the interview data has been collected and categorized.

Part 1: Interviewing

Jean Piaget, the noted psychological theorist, believed that "a ready-made truth is a half-truth" (7). While he generally had the development of logical thinking in mind, I contend this half-truth style of learning also occurs when students merely read about polio and post-World War II technology—a ready-made truth in the text. There is something quite powerful about having a person tell you where he or she was when polio shots became available in 1954 or how polio affected their friends and relatives. I have had students tell me, "You could be quarantined and your father could not enter the house for months. . . ." When I point out that the text offers similar information the students reply, "Yes, but that's not the same thing."

I have each student interview two people who were at least young adolescents during the mid-1900s. In a large class, one interview per student works fine. The biggest concern that students initially have is that they will not find anyone who knows anything about polio. From my experience, this problem will not occur. Even if polio did not directly affect the interviewees, most teenagers and adults at that time knew of someone who had polio or will remember avoidance strategies and news about the vaccine. The interview can be either loosely or heavily scripted, and there is a potential danger with each approach. A loose script beginning with the question "Tell me about polio" can prove rich if the respondent is comfortable talking with students. But if that individual is short with his or her answers, students may not know how to pursue questioning. A heavily scripted interview may lose insightful information because the students concentrate on sticking to the script and do not probe beyond the written questions. I suggest role-playing, in which you act as an interviewee, before allowing the students to start their interviews. By modeling the process, students can see how to ask open-ended questions, when to probe for answers, and how to redirect an interviewee back to the topic of polio.

Students should begin their interviews with the statement "What can you tell me about polio?" If the interviewee identifies someone that he or she knew who had polio, the student will need to collect the following information about the patient: gender; age when polio was contracted; the year that polio was contracted; and the city and state where the individual lived at that time. This information is used in the mapping section of this lesson. From my experience, most interviewees will identify family members or friends who contracted polio.

Part 2: Post Interview Procedures

I usually give students one week to complete their interviews. At that point, all questions and responses need to be organized and, if possible, typed. While some students may want to write out their interviews in paragraph form, I have found the following "question and answer" format makes coding easier:

> Example: An Interview with Albert Smith
>
> September 1, 2004
>
> Albert is my grandfather who grew up in Chicago, Illinois. He was in sixth grade when the polio shots were given out at his school. He now lives in Phoenix, Arizona.
>
> I: What can you tell me about polio?
>
> A: Well, when I was little we couldn't go swimming at all. The park pool was shut down during the summer and my mother would not let me and my brother swim in the pond behind our house.

Students follow the same format for all their interviews, which typically are one to three pages long. Collect and review the interviews before using them for the next part of the lesson. At this point you can either enter the demographic data into a class spreadsheet or ask students to do it. (I discuss the spreadsheet further in the mapping part of this lesson.) Then return the interviews and ask the students what should be done with the collected data. All too often this type of student work is collected, graded, and returned. If this is where the lesson ends, students will never get the chance to go beyond their own data. For a historical inquiry approach to succeed, students need to know they will share their ideas with each other and that the entire class will participate in a discussion of the work.

I suggest that you allow groups of three to four students to combine their data. With highlighters and large pieces of paper, they will need to devise a coding or category system to organize their information as they sift through interviews, looking for key words, events, and patterns. While the number of categories they will require depends on the questions asked and responses received, I recommend five to six. Categories need to be general enough to subsume but specific enough to tease out different quotes. This process is not easy, and you will be busy facilitating and suggesting at this point in the lesson.

My students usually come up with at least these categories: event; strategy; social structure; and science. They use scissors to cut out quotations from their interviews and tape them under the category heading that they have written on their large pieces of paper. Using tape allows students to move the quotations from one category to another. While I offer examples below, the approach to historical inquiry will be lost if students are not able to sift through their data and come up with their own unique categories.

Event Category

Students will find quotes addressing who got the disease, how severe the disease was, where the disease was contracted, and treatments offered for polio:

- "I was about 14 or 15 years old. I remember complaining to my mother that I was losing feeling in my legs and felt extremely ill."
- "My best friend in high school had a severe case and was put in an iron lung for several weeks. When he recovered he was paralyzed from the neck down."

Avoidance Category

In this category students place quotations that deal with avoidance strategies, whether enforced by mothers (you will find a strong emphasis on the mother's duty to protect the family during in this period) or by local public health officials:

- "During this time all the public pools were closed along with restrictions against gatherings of people."
- "My mother made me take a nap every day for the whole summer, and I was in the tenth grade!"

Social Category

This category addresses how interviewees dealt with the threat of polio on a day-by-day basis and how society stigmatized those with polio.

- ". . . contracting polio disease meant I would die for sure."
- "The news in Chicago in the 1950s had a special segment every night about certain infectious diseases. They would talk about how many people were infected that day and where these people were taken."
- "Yellow quarantine stickers were placed on the front doors."

Science and Technology Category

With this category, interviewees discuss iron lungs, the Sister Kenny polio treatments, polio shots, the virus itself, and Jonas Salk:

- "I was a polio pioneer . . . . I remember when nurses or doctors came to the school and lined us up to give us the experimental shot and after that the certificate. It says polio pioneer and I still have it."
- "I think Salk got the Nobel Prize for finding the cure [a mistaken impression] (8)."

By pooling their interviews, students can see the power of many voices. To enable students to construct meaningful knowledge they must be given time to analyze and discuss their findings, first among themselves and then as a whole class. Once the individual groups have devised distinct categories and placed quotations in each, they may begin making generalizations about polio, backing them up with interview data. For example, patterns and themes within the categories can lead to the following generalizations:

- Polio affected everyday life during the 1940s and 1950s and generated changes in behavior.
- How polio was spread was initially unknown, and no age group appeared immune.
- Disease severity was inconsistent and treatments varied.
- The public health history of polio is filled with ironies.

The generalizations should be written on large pieces of paper that can be affixed to a classroom wall. Presenting everyone's work in this manner allows students to see commonalities and differences between each group.

Part 3: Mapping

The purpose of collecting data about gender, age, year, and geographic location is to plot this information on a map and enter it into a spreadsheet. I use a large political map of North America, and each year's students plot their own data on the map. After several years, the map provides students with additional data to use while working on their categories and generalizations about polio. It also allows students to see that good historical inquiry is often strengthened by using multiple sources.

I use a particular color sticker to denote three age groups: infant to six years; seven years to eighteen years; and adult. The stickers are numbered and placed on the city or town where the particular individual contracted polio. By numbering the stickers you can keep track of the data on a spreadsheet that can simply be updated as more students undertake the activity. A sample spreadsheet is shown below.

In using the map and spreadsheet, certain erroneous assumptions about polio begin to fade. For example, not every polio victim was young. Nor did polio suddenly appear in the 1950s, and not every polio patient became paralyzed. Why, then, are these the images that we have? The NFIP focused tremendous attention on polio, marketing its cure to Americans through the March of Dimes poster children, movie theater collections, and door to door collecting. The image of a child in braces, facing adversity with dogged determination, motivated Americans to open their wallets and pocketbooks like never before. Such strategies revolutionized the way in which charities raised money, recruited volunteers, and organized chapters with local, grass-roots efforts. This concept of philanthropy available to everyone, no matter how large or small their donation, created a new model of giving in the United States (9).

Sample Spreadsheet

Map Number	Age	Gender	Year of Onset	Location
1	6	male	Early 1950s	Little Rock, AR
2	19	male	1948	Washington, DC
3	19	female		Needham, MA
4	4	male	1948	Detroit, MA
5	8	female	1942	Warren, OH

Conclusion

Today it is difficult to understand the massive sigh of relief that accompanied the announcement that an effective polio vaccine had finally been discovered. For most of us, the vaccine has always existed. Investigating polio in depth allows students to see that this circumstance was not always the case. Combining interviews with other historical sources, students can begin the process of reaching their own conclusions about the multifaceted history of polio and where it belongs in the context of the history of public health, non-profit organizations, the funding of scientific enterprises, and the rapid rise of science and technology during and after World War II.

Endnotes

1. As quoted in Nina Gilden Seavey, Jane S. Smith, and Paul Wagner, *A Paralyzing Fear: The Triumph Over Polio in America* (New York: TV Books, 1998), 16.
2. Zachary Osofsky, "American History in American Classrooms," *History Matters* 16 (2003): 1.
3. Naomi Rogers, *Dirt and Disease: Polio Before FDR* (New Brunswick, NJ: Rutgers University Press, 1992), 118.
4. Jeffrey Kluger, *Splendid Solution: Jonas Salk and the Conquest of Polio* (New York: G.P. Putnam's Sons, 2004), chapter 1; Jeffrey Kluger, "Conquering Polio," *Smithsonian* 36 (April 2005): 82-89.
5. David M. Oshinsky, *Polio: An American Story* (New York: Oxford Press, 2005), 6.
6. Paul Meier, "Polio Trial: An Early Efficient Clinical Trial." *Statistics in Medicine* 9 (1990): 13-16.
7. Jean Piaget, *To Understand is to Invent: The Future of Education*, George-Anne Roberts, trans., reprint (New York: Viking Press, 1974, 1973), 51.
8. Neither Jonas Salk nor Albert Sabin received the Nobel Prize for their work with polio. John Enders, Frederick Robbins, and Thomas Weller received the Nobel Prize in Physiology and Medicine in 1954 for their breakthrough in growing polio virus in tissue culture.
9. Oshinsky, *Polio*, 5.

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