***Biology***

# Rx for Survival

Teacher Guide

**Who Infected Whom?**

Students build on their understanding of disease transmission as they investigate the outbreak of a disease transmitted by direct human-to-human contact. They develop hypotheses for the pathway of disease transmission and then test their hypotheses by using simulated saliva samples. The concept of an asymptomatic carrier is introduced.

**Key Concepts and Process Skills:**

1. Making decisions about complex issues often involves trade-offs (i.e. giving up one thing in favor

of another).

2. A hypothesis is an explanation based on observed facts or an idea of how things work. New

information may lead to revision of a hypothesis.

3. Infectious diseases can spread rapidly through a population.

4. Diseases can be caused by infectious agents, genes, environmental factors, lifestyle, or a

combination of these causes.

5. Disease is a breakdown in the structure or function of a living organism.

6. Analyzing trends in how a disease spreads can suggest ways of preventing its further spread.

Epidemiologists track patterns of disease transmission in order to develop procedures for reducing

the spread of disease.

7. A carrier of a disease does not exhibit symptoms of the disease, but can transmit it to others.

**Key Vocabulary**

carrier epidemiologist hypothesis trade-offs

disease evidence infectious

**Background Information**

**Carriers:**

The best-known case of a carrier in the history of disease is ‘Typhoid Mary.’ Mary Mallon was an Irish immigrant who worked on Long Island as a cook for a wealthy New York family. When six of eleven people in the household became sick with typhoid fever within a one-week period, investigators were unable to track the disease to the usual causes of either contaminated water or food. The family turned to George Soper, a sanitary engineer. He discovered that the family had hired a new cook shortly before the disease outbreak. By reconstructing her work history, he discovered that seven of the eight families she had worked for in the past ten years had experienced typhoid outbreaks. Health officials tested Mallon’s feces, which contained a high concentration of the bacteria that cause typhoid. She was subsequently isolated in a cottage at a facility for patients with infectious diseases on a tiny island near New York City.

Like many other carriers, she was eventually released, but told to stay in touch with the health department and not work with food. She complied for a while, but eventually took a new name and returned to cooking, again spreading typhoid fever. She was again traced and sent to live in isolation. This time, her isolation lasted 23 years.

It is unclear to what extent her lengthy isolation was due to her unwillingness to submit to health department supervision and give up her job as a cook or due to prejudice against her for her Irish immigrant status. Other non-compliant carriers were not isolated as she was. However, her story illustrates the difficult trade-offs between the rights of an individual and the desire to protect healthy people from infection that must be considered in developing public health policies.

**References**

Leavitt, Judith Walzer. *Typhoid Mary: Captive to the Public’s Health.* Boston: Beacon Press, 1996.

Ochs, Ridgely. ‘Dinner with Typhoid Mary.’ *Long Island: Our Story*.

<http://www.lihistory.com/7/hs702a.htm> (2001)

**Lab Tests**

*Interpreting Test Results:* If the solution turns pink, this is a positive result for the disease in the

saliva. If the solution remains clear, there is no disease in the saliva

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| **Name** | **Symptoms?**  **(yes or no)** | **Disease Test Results** | **Is this person a carrier?**  **(yes or no)** |
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