STUDENT ACTIVITY SHEET
Using Blood-Typing to Determine Causes of Death in Surgery Patients

Purpose
To use blood-typing to solve a real-world problem.

Scenario
In a local hospital on Tuesday, September 10, four surgery patients died either during or immediately after surgery. All were routine surgeries that normally have low mortality rates. As a member of the hospital board, you are very concerned, so you decide to investigate this situation to determine whether negligence or criminal activity occurred.

You find that there were ten surgeries performed that day. Normally for these types of surgeries, the mortality rate is 0.1%. All patients were given 1–3 units of blood from the hospital blood bank. All patients were typed the day before surgery. All blood bags used in the surgeries were preserved and are available for testing.

You are a qualified lab technician and decide to do the investigating yourself.

The following is a record of the patients, their blood types, blood types received, and surgery.

Name	Blood Type	Surgery	Blood Received	Outcome	Units
Mr. S. Smith	A+	gallstones	O– bag 1	OK	1
Mr. Jones	A–	gallstones	AB– bag 2	death	2
Ms. Johns	AB+	tonsillectomy	O– bag 3	OK	1
Ms. Tims	A+	kidney stones	AB– bag 4	death	1
Mr. Williams	B+	hernia	AB+ bag 5	death	3
Ms. Ellis	B–	kidney stones	B– bag 6	OK	2
Ms. Post	AB+	hysterectomy	AB+ bag 7	death	1
Mr. Ackerman	AB+	gallstones	AB+ bag 8	OK	1
Mrs. Carter	O–	lump removed	O– bag 9	OK	1
Mrs. Patterson	AB–	face lift	AB– bag 10	OK	2

Materials
Per group
- blood-typing kit
  Artificial blood-typing kits are available from Sargent-Welch (800/727-4368, P.O. Box 5229, Buffalo Grove, IL, 60089, www.sargentwelch.com, *#WL54859) and from Flinn Scientific (800/452-1261, P.O. Box 219, Batavia, IL, 60510, #FB1225).*

- glass slides
- wax pencils
- gloves
- "blood" samples from each patient
- "blood" samples from each bag

Safety, Handling, and Disposal

It is your responsibility to specifically follow your institution's standard operating procedures (SOPs) and all local, state, and national guidelines on safe handling and storage of all chemicals and equipment you may use in this activity. This includes determining and using the appropriate personal protective equipment (e.g., goggles, gloves, apron). If you are at any time unsure about an SOP or other regulation, check with your instructor.

Artificial blood does not pose the hazards real blood does, but you should wear gloves. Cleaning the slides in a 10% bleach solution is an option.

Procedure

Examine the data and answer the following questions.

1. Explain to the other hospital board members why this situation needs to be investigated.

2. Use the steps in the scientific method.
   a. Define the problem.
   b. Gather information.
   c. Make a hypothesis.
   d. Design and implement an experiment to test your hypothesis.
   e. Create a data table to record the results of the blood-typing.

Name	Blood Type	Blood Type Received
Mr. S. Smith		
Mr. Jones		
Ms. Johns		
Ms. Tims		
Mr. Williams		
Ms. Ellis		
Ms. Post		
Mr. Ackerman		
Mrs. Carter		
Mrs. Patterson		

f. Accept or reject your hypothesis and support your answer with data.
g. What happened to Mr. Jones?
h. Explain why Ms. Johns did not have any problems, even though they gave her the wrong type of blood.
i. Did any of the patients who received type O have any problems? Explain why someone who received type O– in surgery might have a problem with agglutination.
j. Explain on a cellular level why giving someone type B if he or she is type A would be a problem.
k. Why did this day have an abnormally high mortality rate?
l. Do you think this is a case of criminal activity or negligence?