6. There are three levels of Epidemiological Technicians. The primary duties of an Epidemiological Assistant III are as follows: assists in project planning such as developing data collection instruments and materials, techniques, and time lines; monitors project time lines and schedules using project management software applications; performs liaison work between project and participants and/or outside groups to obtain or submit pertinent study data or administrative information; assists in conducting literature reviews by searching library or on-line services as directed; develops and prepares statistical reports, construct tables and graphs for presentation or publication using basic statistical techniques and software applications; performs study-related administrative support such as managing office and assisting in tracking project budget; screens and assists in hiring lower level project staff; assists in supervising office or project staff; monitors quality of data collected by field personnel; makes recommendations for improvement in data collection procedures; pretests and assists in refining data collection and input instruments, and documents survey instrument instructions; tailors existing protocols to specifications for individual studies; revises and prepares protocol manuals; prepares progress reports and presents information at meetings; and performs all of the duties of the Epidemiological Assistant II. Epidemiological Technicians are often Licensed Practical Nurses who have taken upgrading, specialized programs, and/or on-the-job training.

2.11 INVESTIGATION: OBSERVING THE EFFECTS OF ANTISEPTICS

(Page 125)

Prediction

(a) Antiseptics inhibit or prevent bacterial growth. Students may predict that antiseptics such as Lysol, alcohol, or antibacterial soap (used on skin surfaces) are stronger than mouthwash (applied orally).

Experimental Design

(a) **Variables**: Controlled: bacterial culture, culture medium, temperature, time, light, moisture, amount of antiseptic used, and method of application
Independent: type of antiseptic used
Dependent: bacterial growth

Materials

labratory apron
incubator
petri dish containing nutrient agar and bacterial culture
wax marker
soft pencil
3 different antiseptics (e.g., Lysol, Purell, mouthwash)
masking tape
ruler
three 50-mL beakers
disinfectant
hole punch
forceps
bleach

Procedure

1. Obtain the petri dish inoculated with a bacterial culture. Using a wax marker, divide the bottom of the petri dish into four sections. Number each section: 1, 2, 3, and 4.
2. Add approximately 10 mL of different antiseptics to three different 50 mL beakers. Label each beaker with the antiseptic used.
3. Using a hole punch, make three discs of filter paper. With a soft pencil, label the discs to signify the three types of antiseptic. Using forceps, place each disk into one of the three beakers and allow the discs to soak for 4 min.
4. With the forceps, place the three different antiseptic discs in the centres of the sections of the petri dish marked 1, 2, and 3, and close the lid. Tape the dish shut across the top and bottom in the form of an "X". Write your initials, the date, class period, and teacher's name on the petri dish.
5. Record which antiseptic was placed in each numbered section of the petri dish.
6. Invert the petri dish and place it in an incubator, set at 30°C (if using yogurt, 43°C is permissible).
7. Wash the work station with a disinfectant. Wash your hands thoroughly.
8. Check the petri dish after 48 h. Using the metric ruler, measure the diameter of the growth ring around each disc. Make qualitative observations of the growth patterns.
9. Record data in the observation table below.
10. Return all petri dishes to the teacher for proper disposal.
11. Wipe down all surfaces with a disinfectant. Sterilize with bleach all containers and tools that were used.
12. Wash hands thoroughly.

Safety Precautions

- Some bacteria cause disease.
- Wear gloves throughout this investigation.
- To prevent sample contamination and student infection, do not remove tape once dish is taped shut.
- Wash your hands thoroughly with soap before and after the investigation.
- Clean your work area with a disinfectant solution.
- All culture materials should be sterilized before use.
- Incubation temperatures should not exceed 30°C; however, yogourt bacteria can be incubated at 43°C.

Observation Table

Petri dish section	Measurement	Qualitative observations
1		
2		
3		
4		

Analysis

(c) The more effective the antiseptic is, the less growth will appear on a petri dish.

(d) If antibacterial agents affect bacterial growth, there should be little or no growth in the areas of application. Students can rank each antibacterial agent tested on the basis of the zones of inhibition seen on the agar plates.

Evaluation

(e) The most effective antiseptic will have the largest zone of inhibition on a petri dish; the least effective, the smallest zone of inhibition. Specific answers should be given.

(f) Difficulties might have arisen in the following areas: bacterial growth (yogurt must contain an active bacterial culture); contamination of sectors from overuse of antibacterial agent; the incubation period.

(g) New factors to investigate: repetition of experiment using standard bacterial culture instead of yogurt; testing of disinfectants as well as antiseptics.

Synthesis

(h) Disinfectants are stronger chemicals, designed to be used on surfaces other than the human skin. It is likely that disinfectant use would have resulted in largest zones of inhibition.

(i) Students should evaluate package claims on the basis of experimental results. The following is some general information on antibacterial soaps as well as a product summary by the manufacturer Sunshine Products Inc.

- Scientific studies comparing antibacterial soap to regular soap give apparently contradictory results on their effectiveness. Some students show it is better and others suggest that it is worse, and still others show no difference.
- All studies indicate that antibacterial soaps are more effective at reducing infections by some organisms (especially *Staphylococcus* and *Streptococcus*). They are worse at preventing some types of infections (especially some Gram-negative organisms). The antibacterial soaps often kill more beneficial bacteria that live on our skin and protect us from some Gram-negative organisms. They make no difference for some types of infections, such as cytomegalovirus (CNV) or *Clostridia* (the bacteria that cause gangrene).
- This product profile is taken from a company Web site: www.sunshineproducts.com/ab.html. Sunshine's Antibacterial Soap is formulated as a gentle yet effective hand soap to help in the reduction of microorganisms. The soap contains an active ingredient called chloroxylenol, which has a broad-spectrum antimicrobial action. It attacks Gram-positive and Gram-negative organisms as well as yeasts and fungi, including methicillin-resistant *Staphlococcus aureus* (MRSA).

CAREER CONNECTION

An extensive listing of Canadian training programs in the field of Environmental Health and Safety is available on the *Nelson* Science Web site. All provinces and territories are represented. A wide range of options, from courses and seminars to diplomas, undergraduate and graduate degrees is evident. There is a growing need for specialists in this discipline.