



50 minutes total

Lesson Plan 09 Quality Control

Overview of Activities

1. Introduction
2. Quality Control Presentation
3. Aseptic Practices
4. Health and Safety
5. Review

Learning Outcomes

At the end of this session participants will be able to:

1. Describe aseptic practices
2. Explain the importance of aseptic practices
3. Evaluate the risks to health and safety in drinking water quality testing

Materials & Preparation

- Activity: Introduction
- Glo Germ™ powder or lotion and UV (fluorescent) light (optional)
- Glitter (optional)
- Prepare: Secretly apply Glo Germ™ powder or lotion to one or two people, either participants or facilitators, prior to the lesson (optional)
- Alternatively: Secretly apply Glo Germ™ powder to two small balls or objects
- Prepare: Topic Sheets on flip-chart paper with headings: Personal Preparation; Preparation of Work Space; and Sanitary Methods for Microbiological Testing

Recommended Reading

- Technical Brief: Quality Control in Drinking Water Quality Testing



Introduction

Option 1 Activity: Cross contamination demonstration.

1. Prior to the lesson, apply Glo Germ™ powder or lotion to one or two people out of sight of the other participants. Alternatively, apply lotion to their hands then sprinkle with glitter.
2. Play an energizer game of your choice that includes participant interactions, e.g., ask the participants to line-up in order of height (tallest to shortest) **without talking**. Repeat the task by date of birth (oldest to the youngest). *Trainer tip: make sure the people with Glo Germ™ powder on their hands actively participate in this game.*
3. Invite participants to return to their seats.
4. Explain that you marked one or two members of the group before the exercise with marker material to show how easily cross contamination occurs.
5. Darken the room and use the UV (fluorescent) flashlight to illuminate the areas where the Glo Germ™ powder has spread to people and items in the room. You should see bright spots of fluorescence where this has happened. Pass around several UV flashlights and allow participants to detect the contamination on themselves and others.
6. If glitter lotion is used, the spread of glitter will be evident on hands, faces and clothing.
7. Explain that this is a demonstration of cross contamination.
8. Present the learning outcomes or an overview of the lesson.

Option 2 Activity: Cross contamination demonstration.

1. Sprinkle Glo Germ™ powder onto two balls or small objects in advance of the lesson. Don't let participants see you do this.
2. Form a circle with all the participants and play the Ball Toss Name Game.
3. Go around the circle once and have everyone say their name.
4. Call someone's name who is across from you and toss them the ball. They will then say someone else's name and throw to them. Continue until each participant has been thrown to once and the ball or object is back in your hands.
5. Repeat the same process throwing to the same person. Wait until the first object has gone to the third or fourth person, then start the second object. *Trainer tip: speed it up!*
6. Invite participants to return to their seats.
7. Explain that you marked the ball before the exercise with fluorescent material to show how easily cross contamination occurs.
8. Darken the room and use the UV flashlight to illuminate the areas where the Glo Germ™ powder has spread to people in the circle. You should see bright spots of fluorescence where this has happened. *Trainer tip: pass around several UV flashlights if possible and allow participants to detect the contamination on themselves and others.*
9. Explain that this is a demonstration of cross contamination.
10. Present the learning outcomes or an overview of the lesson.

Quality Control Presentation



1. Ask: “What is quality control (QC)?”
 - Quality control is routine activities whose purpose is to limit errors
 - Basic set of procedures to remove or reduce errors
2. Ask: “Why is quality control important in drinking water quality testing?”
 - Minimizes errors
 - Ensures reliable and consistent test results
3. In pairs, discuss factors that may affect test results. Allow a few minutes for discussion then ask pairs to share with the group.
 - Differences in measurement
 - Changes in environmental conditions (e.g., light, temperature, humidity, power supply)
 - Human error (e.g., testing while tired, distracted or in a hurry)
 - Interpretation (e.g., colour perception or colour blindness)
 - Differences in chemical quality or equipment calibration
 - Poor training leading to technical errors

Key Points

- Rare for the same person to get the exact same result for a repeated test.
- Measurements and observations are always subject to some error.

Aseptic Practices



1. Explain that working together, in groups, they will write down as many ideas as possible about the topic on the sheets placed around the room. Describe each topic heading using the descriptions below. They have two minutes at each poster before moving to the next.
 - Personal Preparation: How to avoid contamination from bacteria on skin, hair and personal items
 - Preparation of Work Space: How to avoid contamination from work surfaces and equipment
 - Sanitary Methods for Microbiological Testing: How to avoid contamination from careless handling and poor technique

2. Divide the participants into three groups and provide each group with a set of markers.
3. Ask each group to start at a different topic sheet. After two minutes, tell groups to move to the next topic. They should read what the previous group(s) wrote and add only new ideas that have not yet been written.
4. When groups return to the topic they started, ask them to walk around the room and read the other pages.
5. Refer participants to the handout Effective Aseptic Practices in their workbook. Discuss any missed points with the group.
6. Explain that these are Aseptic Practices in microbiological testing.
 - Procedures used when working with microorganisms to prevent secondary or cross contamination
 - Basic sanitary steps to use when working with microorganisms
7. Aseptic practices prevent secondary and cross contamination in microbiological testing.
 - Secondary contamination is contamination of a sample or equipment with bacteria from skin, hair, environment, air etc.
 - Cross contamination is contamination from one sample to another, e.g., during transport or from one Petri dish to another

Trainer Tip

In a larger group, the activity can be doubled up with two sets of posters. Groups should be no bigger than four and ideally two to three.

10 minutes

Health and Safety

1. Read the Health and Safety Scenario to the group.

Health and Safety Scenario:

You have been asked by your manager to collect water samples from a rural water supply system (source, transport water, treated water and storage water) where your organization has implemented a HWTS project.

The project is not familiar to you but there is a community wash promoter (CWP) working in the area who can show you around. There is a vehicle and driver available to take you to the village but you will have to walk in to collect water from the source.

The trip will take approximately one hour each way.

2. Ask the participants to discuss, in pairs, the possible hazards in this water quality testing scenario

Examples:

- Highly contaminated water sources, e.g., feces or chemicals
- Sample site location may be dangerous or difficult to access
- Falls or other accidents
- Burns, cuts, other physical injuries
- Difficulty to get help if needed

3. Ask: "What can be done to help reduce health and safety concerns in this scenario?"
Record ideas.

- Have CWP accompany you to the sample site
- Use personal protective equipment, e.g., lab coat, gloves, safety glasses
- Wear appropriate clothing, e.g., closed toe shoes or boots, long pants
- Carry first-aid kit, fire extinguisher and/or other safety equipment
- Know emergency contact information
- Inform your supervisor of estimated time frame for the trip
- Read and follow safety procedures
- Know and follow safe waste disposal procedures

4. Ask: "Who is responsible for the technician's health and safety in this scenario?"

- Project implementer is responsible to provide safety equipment and training, e.g., fire extinguishers, safety glasses, gloves, first-aid kits, water safety and first-aid training
- Technician is responsible to use equipment and products properly; to read safety information of chemical reagents (e.g., arsenic, methanol); to safely dispose of samples and waste

Key Points

- Safety equipment should be routinely checked and all staff should be trained in their use.
- It is important to make sure that everyone knows who to call in an emergency.
- During water sampling, a basic first-aid kit should be carried at all times, and should not be left in the transport vehicle if staff need to move far away from it.
- Samples and any waste generated during testing may contain pathogens or chemicals that may be harmful to health and must be properly and safely disposed.

5 minutes

Review



1. Play finger review game.
2. Ask participants to stand.
3. Instruct participants to point one finger up for a True statement and down for a False statement.

4. Read each statement to the group and allow them to indicate if it is True or False:
- Test results should always be exactly the same no matter who does the test.
False, test results are seldom exactly the same.
 - It is good to use a fan in the testing area when testing for E. coli.
False, many contaminants are spread by dust particles that land on sterile surfaces.
 - Never eat or drink in the testing area.
True, food or drinks in the lab area are easily contaminated by microorganisms or chemicals.

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Effective Aseptic Practices

Handout

Basic sanitary steps to prevent contamination when working with microorganisms include:

Personal Preparation (avoid contamination from bacteria on skin, hair and personal items)

- Tie back long hair
- Wash hands with soap and water and/or hand sanitizer
- Cover cuts with waterproof plasters (i.e., BAND-AIDS) (alternatively plastic gloves can be used)
- Secure loose clothing and jewelry (e.g. ties, flowing sleeves, long necklaces)
- Wear personal protective equipment such as a lab coat and eye protection, if possible
- Roll down sleeves and button up lab coat to protect normal clothes from accidental spills

Preparation of Work Space (avoid contamination from work surfaces and equipment)

- Choose a smooth non-absorbent work bench for micro testing to prevent contamination if there is a spill
- If necessary, cover the work bench with heavy plastic
- Disinfect the workbench with commercial disinfectant or alcohol before setting up
- Place testing implements (pipettes, forceps, media bottles, testing equipment etc.) on clean paper towels and replace when spillage occurs
- Clean and sterilize testing equipment and sample containers
- Minimize air flow in the testing area (fans and open windows). Many contaminants are spread by dust particles that land on sterile surfaces

Sanitary Methods (avoid contamination from careless handling and poor technique)

- Do not touch the membrane filtration equipment, such as the bronze disc and the collar
- Do not touch the inside of sample containers, Petri dishes, lids or caps
- Do not have food or drinks in the testing area
- Do not leave Petri dishes open when they are not being used
- Sterilize forceps between uses by using a flame
- Cover nose and mouth when sneezing (use tissue or elbow)
- Test least contaminated samples first (e.g., filtered water first, then storage water, and source water last)
- Test blank samples to detect secondary contamination (one for every 10-20 tests)
- Do not use fingers or objects to aid in colony counting (especially objects used for other purposes like pens)
- Clean up workspace before moving to a different task
- Properly dispose of waste
- Disinfect work space when work is complete
- Clean and disinfect equipment before storing
- Store testing equipment in a clean and secure place