Laboratory Exercise # 15: Hand washing

Purpose:

The purpose of this laboratory exercise is to demonstrate the effectiveness of hand washing in removing microbia from the skin.

Introduction:

The problem of nosocomial (hospital borne) infections is widely recognized, but how do we prevent this problem? The most important technique to prevent nosocomial infections is hand washing. All medical personnel should carefully wash their hands between each patient they contact. This one action alone can significantly reduce the spread of disease from patient to patient.

Materials:

Sterile swabs
Sterile water tubes
4 Trypticase soy agar plates per student
Soap - such as liquid, bar, deodorant
Surgical scrub - such as Povidine, Hibiclens, Bactoshield
Antibacterial Soaps
Plastic gloves
Trypticase Soy agar plate of Serratia marcescens

Procedure: Day # 1

1. Label the four agar plates in the following manner:

   Plate # 1 - Prior to washing  
   Plate # 2 – Hand soap washing  
   Plate # 3 – Antimicrobial soap or surgical scrub washing  
   Plate # 4 - Serratia marcescens

2. Using a sterile swab that is wet with sterile water, sample all areas of the hand, by rolling the swab over the skin.

3. Inoculate the “prior to washing plate” by rolling the swab in three directions on the surface of the agar.

4. Wash your hands with the selected soap for three minutes. Rinse with water until all the soap is gone.

5. Sample the washed hand with a sterile swab and inoculate the plate labeled soap by rolling the swab in three directions on the surface of the agar.

6. Wash your hands now with the chosen antibacterial or surgical scrub for three minutes and rinse with water.
7. Sample the hand again with a sterile swab and inoculate the plate labeled antibacterial soap or surgical scrub by rolling the swab in three directions on the surface of the agar.

8. Incubate the plates at 37° C until the next laboratory period.

9. Place a plastic glove on your right hand.

10. A student #1 will inoculate their glove with *Serratia marcescens*.

11. They will then use a sterile swab to culture their glove. This culture will be inoculated on the TSA plate labeled with the organism’s name. Now the student will shake hands with #2 student.

12. Number 2 student will then culture their hand with a sterile swab and inoculate their TSA plate. Student #2 then shakes hands with student #3.

13. The handshaking and sampling continues until all students have completed the exercise.

14. These plates are left to incubate at room temperature until the next lab period.

**Day #2:**

1. On the next laboratory period the student will observe the Hand wash plates and count the number of colonies on each. This information should be recorded on the data sheet. Each colonial morphology should be described and this information recorded on the data sheet.
   
   a. If the same isolated colony is present on the all the plates only one gram stain is required.
   
   b. All unique colonies should be gram stained and their results recorded in the data sheet.

2. Record the amount of growth on your *Serratia marcescens* plate and how many people the microorganism was transmitted to. These results will be looked at as a class.
Data:

<table>
<thead>
<tr>
<th></th>
<th># of Colonies</th>
<th>Colonial morphology</th>
<th>Gram stain &amp; shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to Wash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antibacterial soap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>or surgical scrub</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Student number on Serratia marcescens plate ____

Amount of growth on your Serratia marcescens plate ____________

To how many people was Serratia transmitted? ______

Questions:

1. What is a possible genus of the most prevalent bacteria found on the hands before washing?

2. The bacterial shapes found on the prewash plate, but not on the soap plate are most likely to be what type of bacteria?

3. Which soap was most effective in the class for reducing the number of bacteria on the hands?

4. Did the use of an antibacterial soap or surgical scrub sufficiently reduce the amount of bacteria left on the hands?

5. Which antibacterial soap or surgical scrub seemed to be the most effective?