


# Case 1: School Sores

## the Microbiology Laboratory questions

the patient

Stephanie O.  
Age: 6




the red sores around her nose and mouth are characteristic of a common bacterial skin infection: **Impetigo**

**Bullous Impetigo**

- characterized by localized bullae (up to 2cm in diameter)
- main causative agent: *Staphylococcus aureus*

2 clinical presentations



**Non Bullous (Impetigo Contagiosa)**

characterized by small vesicles that rupture and dry to form crusts

- caused by either *S.aureus*, *S.pyogenes* or both

70% of all cases

the most common clinical presentation

What samples are taken for lab testing?

The physician may take a swab sample of the infected area

Swabbing at the center of the rash will prevent collection of normal microflora on the skin

Samples of the pus can be collected through aspirations using a sterile syringe and needle

the clinical presentation of the patient most closely resembles Impetigo Contagiosa

How important is the Microbiology Laboratory in the diagnosis of this disease?

Usually, a physical examination of the sores by the physician is enough to diagnose impetigo.

The lab results allow the selection of the most effective course of treatment by identifying the etiologic agent and its antibiotic susceptibility.

What are the most common bacterial pathogens associated with this infectious scenario?

**Staphylococcus aureus**

- Gram-positive
- non-sporulating
- non-motile
- round
- 0.5-1.5µm in diameter
- grow in clusters
- facultative anaerobes
- found in the nostrils, perineum, underarm region, and between fingers and toes




**Streptococcus pyogenes**

- Gram-positive
- non-sporulating
- non-motile
- round or ovoid
- 0.6-1.0µm in diameter
- grow in chains
- facultative anaerobes
- found in the pharynx and mouth, lower GI tract, vagina and on the skin



## Laboratory Tests & Expected Results

**Gram stain**

*S. aureus*: Gram+ cocci clusters  
*S. pyogenes*: Gram+ cocci chains

Crystal Violet  
Iodine Treatment  
Decolourization  
Counterstain with Safranin

Gram-positive (purple)  
Gram-negative (pink)

**Bacitracin Susceptibility Test**

A zone of inhibition around the bacitracin infused disc indicates sensitivity

*S. aureus*: Bacitracin resistant  
*S. pyogenes*: Bacitracin sensitive

**Coagulase Test**

Detects the presence of the enzyme coagulase

(+)result: observe clumping

*S. aureus*: Coagulase (+)  
*S.pyogenes*: Coagulase (-)

**Test of Agglutination**

Latex particles coated in IgG will agglutinate with protein A if it is present on the cell

*S. aureus*: (+)test  
*S. pyogenes*: (-)test

**PYR Test**

Detects the presence of the enzyme pyrrolidonyl arylamidase

(+)result: observe production of red colour

*S. aureus*: PYR (-)  
*S. pyogenes*: PYR (+)

**Mannitol Salt Agar (MSA) Test**

High salt (7.5% NaCl) concentration selects halotolerant organisms

*S. aureus* can grow and ferment mannitol which changes the media colour to yellow  
*S. pyogenes* shows no growth

**Catalase Test**

Detects the presence of the enzyme catalase

rxn: H<sub>2</sub>O<sub>2</sub>->H<sub>2</sub>O+O<sub>2</sub>

(+)result: observe O<sub>2</sub> bubbles

*S. aureus*: Catalase (+)  
*S. pyogenes*: Catalase (-)

**DNase Test**

Detects the presence of the enzyme DNase

The media contains DNA molecules and methyl green, a cation that binds to the (-) charged DNA

If DNase is present, DNA is lysed and methyl green can no longer bind which results in colourless zones around the colonies.

*S. aureus*: DNase (+)  
*S. pyogenes*: DNase (+)

**Lancefield Test**

Lancefield group solutions are mixed with bacterial sample. Antigens present will agglutinate.

*S. pyogenes*: (+)test  
Agglutinate with A group  
*S. aureus*: (-)test

**Hemolysis Test**

Observe the hemolysis pattern on blood agar

B-hemolysis (complete)  
α-hemolysis (partial)  
γ-hemolysis (no hemolytic activity)

*S. aureus*: B-hemolysis  
*S. pyogenes*: B-hemolysis

