



# A Trending View of Proficiency Testing of Throat Swabs Cultures

**Performance of Canadian  
clinical laboratories**

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# Introduction

- **Clinical relevancy challenges**

- Clinical relevant specimens look like and act like clinical samples
- Specimens must be processed in a timely fashion and on appropriate media
- Information needs to be interpreted in a clinical meaningful manner
- Antibiotic susceptibility testing must be performed using clinically appropriate drug selections



## **CLINICALLY MEANINGFUL AND RELEVANT REPORT**

Address pre- and post- analytic components of the laboratory cycle

# Introduction

- Throat cultures are frequently received samples in the clinical laboratory
- CMPT considers throat cultures as identification and clinical relevancy challenges
- It is important that laboratories distinguish normal throat flora from pathogens causing pharyngitis
- CMPT sent 29 throat culture challenges between 1999 and 2013

# Objectives

- To evaluate the performance of medical laboratories doing clinically relevant proficiency testing of throat culture samples
- Retrospective analysis of results to detect performance trends, weaknesses, and reporting practices.

# Methods

## Proficiency Testing Scheme

- Bacteriology surveys: 4 times → set of 2-5 different specimens.
- At least one clinical relevancy challenge.
- Reports and results are evaluated according to a grading system.
- Feedback to participants: individual reports.
- Critique:
  - highlights the main issues observed
  - comparison of laboratory performance
  - grading explanation.

# Methods

## Specimens

- Swabs containing a mix of organisms:
  - **Background:** *Moraxella catarrhalis*  
viridans group streptococcus (VGS)
  - **Negative for Pathogen specific:**  
± *Streptococcus pneumoniae*, *Haemophilus influenzae*,  
*Staphylococcus aureus*, *Neisseria meningitidis*,  
group B streptococcus, small colony β- hemolytic  
streptococcus (*Streptococcus anginosus* group)
  - **Positive for Pathogen specific:**  
*Streptococcus pyogenes*,  
group C (GCS) and G (GGS) β-hemolytic streptococcus  
*Archanobacterium haemolyticum*

# Methods

## **History**

- Simulated history: age, gender, and symptoms of hypothetical patients

## **Laboratories**

- Representing all provinces and territories except Quebec

## **Quality Control**

- Samples remained viable and stable for a minimum of 14 days

# Methods

## Grading

- Suitable for grading:  $\geq 80\%$  consensus among referee laboratories

### Acceptable

- **Pathogen specific:** report pathogen
- **Pathogen negative:** report pathogen specific negative

### Unacceptable

- **Pathogen specific:** misidentification, pathogen negative
- **Pathogen negative:** report pathogen, report organism identification, report 'normal flora'



# Results

- 29 throat swab challenges between February 1999 and August 2013
  - 17 pathogen negative challenges
  - 12 pathogen positive challenges
- Average number of participants: 140 (91 – 181)

# Results

Specimen composition – Pathogen negative samples	% Acceptable
<b>N. meningitidis</b> + <i>M. catarrhalis</i> + VGS	97
<b>H. Influenzae</b> + <i>M. catarrhalis</i> + VGS	92
<b>S. pneumoniae</b> + <i>M. catarrhalis</i> + VGS	89
<b>small colony <math>\beta</math>-hemolytic</b> + <i>M. catarrhalis</i> + VGS	95
<b>S. aureus</b> + <i>M. catarrhalis</i> + VGS	92
<b>small colony <math>\beta</math>-hemolytic</b> + <i>M. catarrhalis</i> + VGS	59
<b>S. pneumoniae</b> + <i>M. catarrhalis</i> + VGS	95
<b>small colony <math>\beta</math>-hemolytic</b> + <i>M. catarrhalis</i> + VGS	84
<b>Group B streptococcus</b> + <i>M. catarrhalis</i> + VGS	88
<b>small colony <math>\beta</math>-hemolytic</b> + <i>M. catarrhalis</i> + VGS	60
<i>M. catarrhalis</i> + VGS	94
<i>Candida albicans</i> + <i>M. catarrhalis</i> + VGS	92
<i>M. catarrhalis</i> + VGS	97
<b>S. aureus</b> + <i>M. catarrhalis</i> + VGS	91
<i>M. catarrhalis</i> + VGS	99
<b>Group B streptococcus</b> + <i>M. catarrhalis</i> + VGS	93
<b>small colony <math>\beta</math>-hemolytic</b> + <i>M. catarrhalis</i> + VGS	57
<b>Average</b>	<b>87</b>

VGS: viridans group streptococcus

# Results

Pathogen-positive challenge	% Acceptable
Group A streptococcus + <i>M. catarrhalis</i> + VGS	99
Group A streptococcus + <i>M. catarrhalis</i> + VGS	100
Group A streptococcus + <i>M. catarrhalis</i> + VGS	91
Group A streptococcus + <i>M. catarrhalis</i> + VGS	97
Group A streptococcus + <i>M. catarrhalis</i> + VGS	99
Group A streptococcus + <i>M. catarrhalis</i> + VGS	100
<b>Average</b>	<b>98</b>
group G streptococcus + <i>M. catarrhalis</i> + VGS	67
group G streptococcus + <i>M. catarrhalis</i> + VGS	90
<b>Average</b>	<b>79</b>
group C streptococcus + <i>M. catarrhalis</i> + VGS	79
group C streptococcus + <i>M. catarrhalis</i> + VGS	91
<b>Average</b>	<b>85</b>
<i>Arcanobacterium haemolyticum</i> + <i>M. catarrhalis</i> + VGS	35*
<i>Arcanobacterium haemolyticum</i> + <i>M. catarrhalis</i> + VGS	67
<b>Average</b>	<b>51</b>

# Results

Common causes of unacceptable grades		
Pathogen positive	pathogen specific negative report	84%
	different pathogen	16%
Pathogen negative	pathogen specific report	69%
	non-pharyngitis pathogen	24%
	'normal flora'	7%

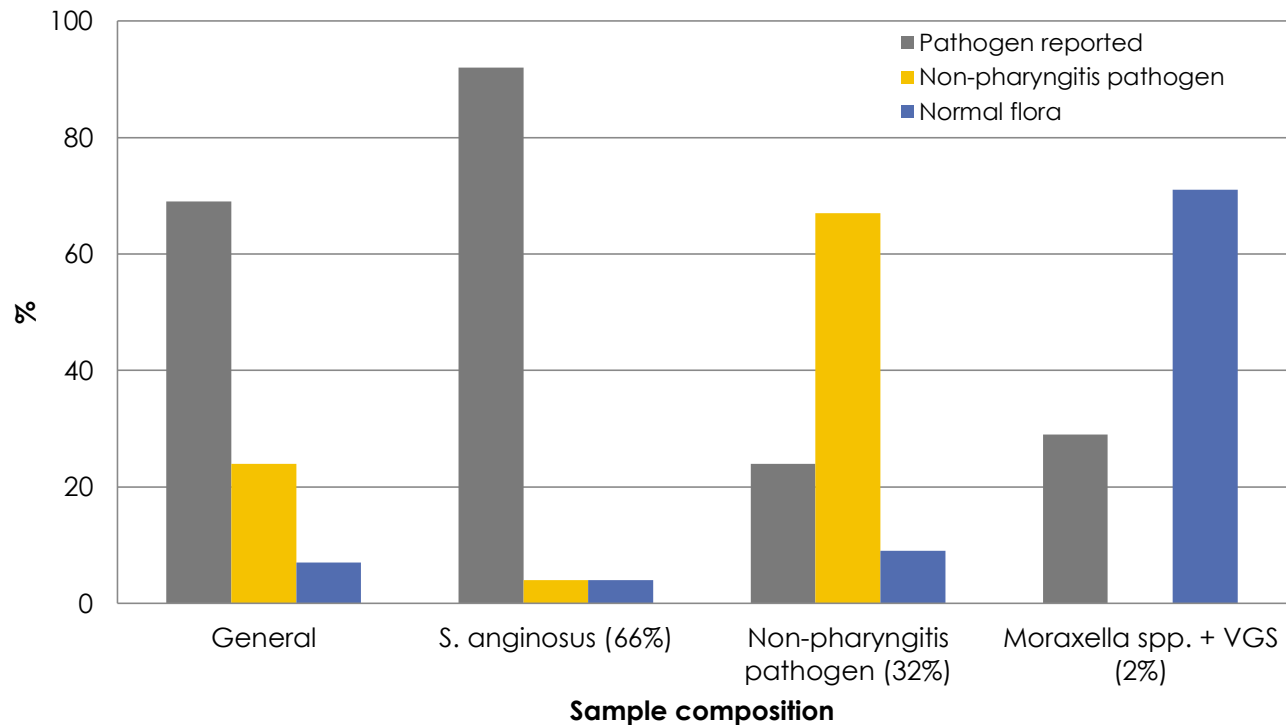
Distribution of unacceptable reports in pathogen negative specimens

Specimen composition	Unacceptable	%
<i>Moraxella</i> species + VGS (n <sup>1</sup> =3)	7	2
<i>S. pneumoniae</i> , <i>H. influenzae</i> , GBS, (n <sup>1</sup> =9)	97	32
small colony $\beta$ -hemolytic streptococcus (n <sup>1</sup> =5)	199	66
Total errors	303	100

<sup>1</sup> n: number of challenges

# Results

## Unacceptable reports - Pathogen negative challenges



# Discussion

- Appropriate results were reported in 88 percent of samples.
- 8% false negatives
- 11% false positives
- Best performance:
  - *S. pyogenes* positive challenges
  - Background flora challenges

# Discussion

- Less frequently isolated throat pathogens are being missed by some laboratories →
  - GCS, GGS, and *A. haemolyticum*'s incidence may be underestimated
- $\beta$ -hemolytic *S. anginosus* group is frequently mistaken for pyogenic  $\beta$ -hemolytic group A, C, or G streptococcus

# Value of PT testing

- Clinical relevancy challenges add value to PT.
- Laboratories that perform well in the analytical phase could still struggle with proper interpretation of results.
- Proficiency testing reports, similar to clinical reports, should be interpretable and unambiguous.



# Conclusions

- Value of clinical relevancy challenges for proficiency testing
- Clinical relevance challenges ensure that participants are continually challenged to revise and improve not only their analytical capabilities but also their reporting practices.