| PROGRAM Standard Operating Procedure – Laboratory Services | |
|---|---|
| Title: MIC20400 – Gram stain reporting in LIS-Sterile Fluid Specimens | Policy Number: |
| Program Name: Laboratory Services | |
| Applicable Domain: Lab, DI and Pharmacy Services | |
| Additional Domain(s): | |
| Effective Date: | Next Review Date: |
| Issuing Authority:<br>Director, Health Services | Date Approved: |
| Accreditation Canada Applicable Standard: N/A | |

**GUIDING PRINCIPLE:**
Critical fluid specimens, including CSF, need to be read extensively as low numbers of organisms may be seen and the presence of microorganisms from a normally sterile site is likely to indicate infection with that organism. Due to the nature of these specimens, fluid samples for microbiology culture are considered STAT and the gram stain needs to be read within 1 hour of receipt in the laboratory during regular microbiology hours.

**PURPOSE/RATIONALE:**
This standard operating procedure describes how to report the gram stain results of sterile fluids in the LIS in a consistent manner.

**SCOPE/APPLICABILITY:**
This procedure applies to Medical Laboratory Technologists (MLTs) reporting the gram stain of sterile fluid specimens in the LIS.

**SAMPLE INFORMATION:**

| **Type** | • Sterile fluids, including CSF<br>• Refer to MIC10100-Microbiology Specimen Processing |
|---|---|

**REAGENTS and/or MEDIA:**
- Methanol
- Gram Crystal Violet
- Gram Iodine (Stabilized)
- Gram Decolorizer
- Gram Safranin

**SUPPLIES:**

- Ringed cytology slide
- QC slide
- Immersion oil
- Slide storage tray

**EQUIPMENT**

- Hot plate
- Microscope

**SPECIAL SAFETY PRECAUTIONS:**

Containment Level 2 facilities, equipment, and operational practices for work involving infectious or potential infectious materials or cultures.

- Ensure that appropriate hand hygiene practices be used.
- Lab gown must be worn when performing activities with potential pathogens.
- Gloves must be worn when direct skin contact with infected materials is unavoidable.
- Eye protection must be used when there is a known or potential risk of exposure of splashes.
- All procedures that may produce aerosols or involve high concentrations or large volumes should be conducted in a biological safety cabinet (BSC).
- The use of needles, syringes and other sharp objects should be strictly limited.

All patient specimens are assumed to be potentially infectious. Routine Practices must be followed. Since viable micro-organisms are used, all cultures must be handled with appropriate precautions. All equipment in contact with cultures should be decontaminated by appropriate methods.

**QUALITY CONTROL:**

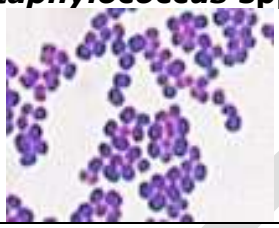
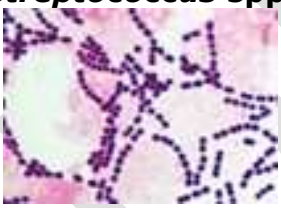
- Quality control is performed daily
- A TQC order is automatically generated daily to record the QC results
- Refer to MIC60060-Microbiology Stain Quality Control

**PROCEDURE INSTRUCTIONS:**

| Step | Action |
|---|---|
| **Reporting fluid specimens in the LIS** | |
| **1** | • Pending gram stain orders are found in the LIS Resulting Worklist: **Resulting Worklist → GRM/MISC_1of2**<br>  <br>• Press enter or double click to open worklist |

<table>
<tr><td>2</td><td>
<ul>
<li>Enter the accession number on the slide and select enter to mark the order</li>
<li>Select enter again to open Result Entry or double click on accession number to open</li>
</ul>
</td></tr>
<tr><td>3</td><td>
<u>Under low power (X10, LPF):</u> screen slide to locate good specimen areas to obtain an overall impression of cell types present
<ul>
<li>Observe slide for stain crystals:
<ul>
<li>If an excess of precipitated stain is observed, prepare another smear</li>
<li>If precipitate continues, use freshly filtered crystal violet</li>
</ul></li>
<li>Determine if slide has been properly decolorized:
<ul>
<li>Depending on the source of the specimen, the background should be generally clear or gram negative</li>
<li>If white blood cells are present, they should appear completely gram negative</li>
<li>If slide is over decolorized, prepare another smear</li>
</ul></li>
<li>Determine if thickness of smear is appropriate:
<ul>
<li>For proper interpretation, areas must be no more than one cell thick, with no overlapping of cells. Prepare a new slide if unreadable</li>
</ul></li>
<li>Examine for evidence of inflammation:
<ul>
<li>Determine areas representative of inflammation and areas of contamination with squamous epithelial cells</li>
</ul></li>
</ul>
</td></tr>
<tr><td>4</td><td>Add one drop of immersion oil to the slide. In a representative area with predominance of inflammation or purulence using the oil immersion lens (100X), examine 20 to 40 fields to observe cell morphology and gram reaction.</td></tr>
<tr><td>5</td><td>
<u>Under oil immersion (X100, OIF)</u>: quantitate epithelial cells, white blood cells, red blood cells and bacteria as follows:
<table>
<tr><th>None seen</th><th>No cells seen</th></tr>
<tr><td>1+</td><td>< 1 cell seen</td></tr>
<tr><td>2+</td><td>1 - 9 cells seen</td></tr>
<tr><td>3+</td><td>10 - 25 cells seen</td></tr>
<tr><td>4+</td><td>> 25 cells seen</td></tr>
</table>
NOTE: Only report “None seen” for white blood cells and bacteria. If no epithelial cells or red blood cells are seen, do not report this
</td></tr>
<tr><td>6</td><td>Under the test code: STGM1, use the STGM1 keypad to report the quantity of epithelial cells, white blood cells, red blood cells and bacteria seen. Report cells in this order to maintain consistency with reporting.</td></tr>
</table>

**REPORTING INSTRUCTIONS:**

| IF | REPORT |
|---|---|
| No white blood cells seen on gram stain | Report: **"No white blood cells seen"** |
| No bacteria seen on gram stain | Report: **"No bacteria seen"** |
| Epithelial cells, white blood cells, red blood cells seen on gram stain | • Quantitate and report using the **STGM1** keypad |
| Bacteria seen on gram stain | • Quantitate and report using the **STGM1** keypad<br>• Bacteria seen in the gram stain of sterile fluids are considered a critical result. Phone ordering location to give result<br>• Document call in the **"Call"** box<br>• If unable to reach ordering location, consult the hospital wide policy 15-10-V1-Laboratory Critical Results Procedure |
| Bacteria resembles: ***Staphylococcus* spp.**  | Report: **"Gram positive cocci suggestive of Staphylococci"**<br><br>**NOTE: Use caution. If doubt exists, report as Gram positive cocci.** |
| Bacteria resembles: ***Streptococcus* spp.**  | Report: **"Gram positive cocci suggestive of Streptococci"**<br><br>***If sample location is Stanton Territorial Hospital or Inuvik Regional Hospital, copy appropriate infection control (SIPAC or IIPAC)***<br><br>**NOTE: Use caution. If doubt exists, report as Gram positive cocci.** |

| Step | Action |
|---|---|
| **Complete reading of sterile fluid slides** | |
| **1** | • Finalize **STGM1**<br>• Preview instant report and save |
| **2** | Gently blot excess oil from slide using paper towel or gauze and save slides for further evaluation on the slide tray designated for day slides being read. |

**LIMITATIONS:**

1. If rare or no organisms are seen from a normally sterile site, but the specimen appears purulent, or the specimen looks suspicious, perform more extensive review of the slide.
2. Use results of gram stains in conjunction with other clinical and laboratory findings. Use additional procedures (e.g., inclusion of selective media, etc.) to confirm findings suggested by gram stained smears.
3. Carefully adherence to procedure and interpretive criteria is required for accurate results. Accuracy is highly dependent on the training and skill of microscopists.
4. Be wary of interpretations made from observing very few organisms (especially in the absence of inflammation or if the organisms are unevenly distributed), as collection tubes, slides and media may harbor nonviable bacteria. For sterile fluids, where the results will define an infectious process, prepare a second smear to confirm rare findings of microorganisms.
5. Gram stain positive, culture negative specimens may be the result of contamination of reagents and other supplies, presence of antimicrobial agents, or failure of organisms to grow under usual culture conditions (medium, atmosphere, etc.).
6. False gram stain results may be related to inadequately collected specimens or delays in transit.
7. Prior treatment with antimicrobial drugs may cause gram positive organisms to appear gram negative.

**CROSS-REFERENCES:**

- MIC10100-Microbiology Specimen Processing
- MIC60060-Microbiology Stain Quality Control
- 15-10-V1-Laboratory Critical Results Procedure

**REFERENCES:**

1. Leber, A. (2016). *Clinical microbiology procedures handbook.* (4th ed.) Washington, D.C.: ASM Press

**APPROVAL:**

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Date

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**REVISION HISTORY:**

| REVISION | DATE | Description of Change | REQUESTED BY |
|---|---|---|---|
| 1.0 | 07 Feb 19 | Initial Release | L. Steven |
| 2.0 | 31 Mar 22 | Procedure reviewed and added to NTHSSA policy template | L. Steven |
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