PROGRAM Standard Operating Procedure – Laboratory Services	
Title: MIC73200 – BIOFIRE Respiratory 2.1 (RP2.1) Panel	Policy Number:
Program Name: Laboratory Services	
Applicable Domain: Lab, DI and Pharmacy Services	
Additional Domain(s): NA	
Effective Date:	Next Review Date:
Issuing Authority: Director, Laboratory and Diagnostic Imaging Services	Date Approved:
Accreditation Canada Applicable Standard: NA	

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GUIDING PRINCIPLE:
The BIOFIRE Respiratory 2.1 (RP2.1) Panel is a real-time, nested multiplexed PCR test designed to simultaneously identify nucleic acids from 22 different viruses and bacteria associated with respiratory tract infection, including SARS-CoV-2.

PURPOSE/RATIONALE:
This standard operating procedure describes the BIOFIRE Respiratory 2.1 (RP2.1) Panel test using the BIOFIRE TORCH at Stanton Territorial Hospital.

SCOPE/APPLICABILITY:
This standard operating procedure applies to Medical Laboratory Technologists (MLTs) processing specimens for respiratory pathogens using the BIOFIRE TORCH.

SAMPLE INFORMATION:

Type	• Swab
Source	• Nasopharyngeal • Throat/oropharyngeal • Saline gargle rinse
Collection Container	• Viral transport media (VTM) • Universal transport media (UTM) • Saline gargle tube
Stability	VTM/UTM: • Room temperature up to 4 hours • Refrigerated up to 7 days
Storage Requirements	Room temperature or refrigerated

Criteria for rejection	1. Unlabeled/mislabeled samples 2. Sample container label does not match patient identification on requisition 3. Sample not in UTM/VTM 4. Sample not stored correctly

REAGENTS and/or MEDIA:

- BIOFIRE RP2.1 (RP2.1) Panel pouch
- Hydration Injection Vial (blue)
- Sample Injection Vial (red)
- Sample Buffer Ampoule
- Pouch loading station
- Accel TB 1 L bottle
- Accel TB wipes
- 70% isopropyl alcohol
- 10% sodium hypochlorite

SUPPLIES:

- Personal protective equipment
- Absorbent bench liner
- Sample racks
- Wet waste container
- Dry waste container
- Orange autoclave bag
- Spray bottles
- Transfer pipettes provided in kit
- Sharps container
- Pouch tray

EQUIPMENT:

- BIOFIRE TORCH
- Printer
- Class II biosafety cabinet
- Vortex mixer
- Refrigerator

ENVIRONMENTAL CONTROLS:

- Store the test kit, including reagent pouches and buffers, at room temperature (15°C to 25°C) **DO NOT REFRIGERATE**
- Avoid storage of any materials near heating or cooling vents or in direct sunlight
- All kit components should be stored and used together. Do not use components from one kit with those of another kit
- Once the pouch packaging has been opened, the pouch should be loaded with sample as soon as possible (within 30 minutes)
- Once a pouch has been loaded with sample, the test run should be started as soon as possible (within approximately 60 minutes)
- Discard used pouches after the run has completed, avoid excessive handling of pouches after test runs and avoid exposing pouches to sharp edges

SPECIAL SAFETY PRECAUTIONS:

- Patient samples should only be opened and prepared for testing in a contained environment (i.e., certified Class II BSC)
- Personal Protective Equipment (PPE) required when working with suspect respiratory virus samples includes:
  - Lab gown, nitrile gloves and Class II BSC
- The test operator and all personnel in the immediate vicinity should be wearing appropriate PPE at all times when working with suspect respiratory pathogen samples, in the event of a spill outside of the BSC
- All items in the BSC must be sprayed or wiped with 70% isopropyl alcohol or Accel TB and allowed to disinfect for 5 minutes prior to removal
- All personnel handing potential respiratory pathogen samples should be knowledgeable in their laboratory's biological spill clean-up protocol for infectious respiratory samples
- Handle all samples and waste materials as if they were capable of transmitting infectious agents

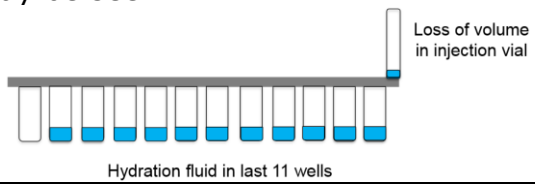
QUALITY CONTROL:

- Refer to MIC60110-BIOFIRE RP2.1 Quality Control for quality control procedure
- Record all results on MIC60111-QC Results Record-BIOFIRE RP2.1

PROCEDURE INSTRUCTIONS:

Step	Action
Preparing the BSC	
1	Order BIOFIRE RP2.1 testing in the LIS: • In SoftMic, accession the order using the test code **PCRES** • Place the sample barcode label and media barcode label in the pouch of the biohazard bag • Place samples in the bin labelled PCRES in the microbiology specimen fridge
2	Ensure the daily maintenance for the BIOFIRE TORCH has been completed and documented on MIC73110-Maintenance Record-BIOFIRE TORCH.
3	Set up the clean BSC with the following: • Absorbent pad on working surface • Sample racks • Wet waste container half full with Accel TB • Dry waste container containing an autoclave bag • Sharps container • Spray bottles with 70% isopropyl alcohol and with Accel TB • Accel TB wipes with top opened • Pouch tray • Pouch Loading Station • BIOFIRE Respiratory (RP2.1) Panel pouch, Sample Buffer Ampoule, Hydration Injection Vial, Sample Injection Vial, and transfer pipette

Step	Action
Preparing the Pouch	
1	In the BSC, open biohazard bag and discard in the dry waste container. Wipe or spray each sample with Accel TB and place in the sample rack. Once dry, label the sample with the sample label. Leave the media barcode label on the right-hand side of the working area.
2	Apply the media barcode label to the tab of the BIOFIRE Respiratory 2.1 (RP2.1) Panel pouch. **NOTE:** Do not cover the barcode label on the front of the pouch
3	Insert the pouch into the Pouch Loading Station, aligning the red and blue labels on the pouch with the red and blue arrows on the Pouch Loading Station.
4	Place a red-capped Sample Injection Vial into the red well of the Pouch Loading Station. Place a blue-capped Hydration Injection Vial into the blue well of the Pouch Loading Station.

Step	Action
Hydrating the Pouch	
1	Unscrew the Hydration Injection Vial from the blue cap.
2	Insert the Hydration Injection Vial's cannula tip into the Hydration Port located directly below the blue arrow of the Pouch Loading Station.
3	Forcefully push down in a firm and quick motion to puncture the seal until a faint "pop" is heard and there is an ease in resistance. Wait as the correct volume of hydration solution is pulled into the pouch by vacuum.
4	Verify that the pouch has been hydrated: • Flip the barcode label down and check to see that fluid has entered the reagent wells (located at the base of the rigid plastic part of the pouch). Small bubbles may be seen 

Step	Action
Preparing the Sample Mix	
1	Add Sample Buffer to the Sample Injection Vial: • Gently twist and remove the tab at the tip of the Sample Buffer ampoule  **NOTE:** Avoid touching the ampoule tip during handling

2	Invert the ampoule over the red-capped Sample Injection Vial and dispense the Sample Buffer using a slow forceful squeeze. **NOTE:** Avoid generating foam
3	Thoroughly mix the patient sample with the vortex mixer for 10 seconds.
4	Open the patient sample carefully to avoid touching droplets on the inner lid and place upright on the absorbent pad to avoid droplets falling on the work surface.
5	Use the transfer pipette provided to draw specimen to the third line (approximately 0.3 mL) on the transfer pipette.
6	Add the specimen to the Sample Injection Vial.
7	Rinse the pipette in the wet waste container with Accel TB and allow to soak for at least 30 minutes.
8	Recap the patient sample tube and move to the back of the rack.
9	Tightly close the lid of the Sample Injection Vial and invert the vial 5 times to mix.
10	Return the Sample Injection Vial to the red well of the loading station.

Step	Action
Loading the Sample Mix	
1	Unscrew the Sample Injection Vial from the red cap and wait for 5 seconds with the vial resting in the cap. **NOTE:** Waiting 5 seconds decreases the risk of dripping and contamination from the sample
2	Insert the Sample Injection Vial's cannula tip into the Sample Port located directly below the red arrow of the Pouch Loading Station.
3	Forcefully push down in a firm and quick motion to puncture seal until a faint "pop" is heard and sample is pulled into the pouch by vacuum.
4	Verify that the sample has been loaded: • Flip the barcode label down and check to see that fluid has entered the reagent well next to the sample loading port • If the pouch fails to pull sample from the Sample Injection Vial, the pouch should be discarded and begin again with a new pouch
5	Discard the Sample Injection Vial and the Hydration Injection Vial into the sharps container.
6	Remove the pouch from the Pouch Loading Station and place on the left-hand side on the pouch tray. **NOTE:** If any of the sample mix drips onto the Pouch Loading Station, remove from use and soak in 10% bleach for 15 minutes before being put into use again
7	Wipe Pouch Loading Station with Accel TB before beginning next sample.
8	Spray gloves thoroughly with 70% isopropyl alcohol, rub together and allow to air dry. **NOTE:** Always disinfect gloves between loading of each sample

Step	Action
Creating a Test Run	
1	Spray gloves with 70% isopropyl alcohol and remove. Replace with a new set of gloves and transfer the loaded pouches to the BIOFIRE TORCH bench.
2	On the BIOFIRE TORCH dashboard, select an available module.
3	Using the built-in scanner, scan the pouch barcode and the sample ID barcode. Insert the pouch into the module.
4	Enter the operator username: **micro** and the password: **micro**. Select **Next**. Review the entered information and select **START RUN**.

Step	Action
Cleaning the BSC	
1	Remove gloves and don a new pair.
2	In the BSC, spray samples with Accel TB and place on the cart.
3	Wipe the pouch tray and "clean" area of the BSC with an Accel TB wipe.
4	Remove gloves and don a new pair. Transfer samples to the fridge.

Step	Action
Generating a Test Report	
1	A report is generated automatically upon completion of a run.
2	To view runs or reprint: Select **Browse Runs** on the main screen. Select the sample → View report → Print.

INTERPRETATION OF RESULTS:

RESULT	INTERPRETATION
Not Detected	• The pouch controls were successful (Passed) • The assay for the organism was negative
Detected	• The pouch controls were successful (Passed) • The assay for the organism was positive
Equivocal	• The pouch controls were successful (Passed) • The combination of positive and negative assay results for Influenza A were inconclusive
Invalid	• The pouch controls or run were not successful • Run status is displayed as: Aborted, Incomplete, Instrument Error or Software Error

REPORTING INSTRUCTIONS:

BF Results: All targets **NOT DETECTED**	• Report: **NEGATIVE**

BF Results: SARS-CoV-2 **DETECTED**	• Report: **POSITIVE** ➢ Report will automatically print to OCPHO (HPU1) ➢ Report will automatically print to Stanton IPAC (SIPAC) and Inuvik IPAC (IIPAC) if ER or inpatient ➢ Check patients home address. If from Nunavut: o Copy results to the applicable Nunavut CPHO • Freeze sample and log into the stored isolates log

BF Results: Influenza A-H1 Influenza A-H1-2009 Influenza A-H3 **DETECTED**	• Report: **POSITIVE** for Influenza A: ➢ From the FLUAT keypad, o Select Key + • Report the Influenza A subtype detected: ➢ From the FLUAT keypad o Select Key 1 for subtype H1-2009 o Select Key 2 for subtype H3 o Select Key 3 for subtype H1 ➢ Report will automatically print to OCPHO (HPU1) ➢ Report will automatically print to Stanton IPAC (SIPAC) and Inuvik IPAC (IIPAC) if ER or inpatient ➢ Check patients home address. If from Nunavut: o Copy results to the applicable Nunavut CPHO • Freeze sample and log into the stored isolates log

BF Results: Influenza A-H1 Influenza A-H1-2009 Influenza A-H3 **EQUIVOCAL**	• If any of the Influenza A targets are equivocal: ➢ Repeat testing on the BIOFIRE ➢ Add comment in TCOMM that testing was repeated • Repeat testing is equivocal for Influenza A • Report: **POSITIVE** for Influenza A: ➢ From the FLUAT keypad o Select Key + • Report the Influenza A subtype detected: ➢ From the FLUAT keypad o Select Key 1 for subtype H1-2009 o Select Key 2 for subtype H3 o Select Key 3 for subtype H1 ➢ Report will automatically print to OCPHO (HPU1) ➢ Report will automatically print to Stanton IPAC (SIPAC) and Inuvik IPAC (IIPAC) if ER or inpatient ➢ Check patients home address. If from Nunavut: o Copy results to the applicable Nunavut CPHO • Freeze sample and log into the stored isolates log

BF Results: Influenza A **DETECTED** No subtype detected	• If the Influenza A subtype is not detected: ➢ Repeat testing on the BIOFIRE ➢ Add comment in TCOMM that testing was repeated • Repeat testing is Influenza A subtype not detected • Report: **POSITIVE** for Influenza A and add the referred out comment: ➢ From the FLUAT keypad o Select Key + o Select Key V to add referred out comment • Refer sample to NML for subtype confirmation: ➢ In Order Entry, order new test **REFLU** o Add the source of the specimen o Add the collection date, received date and time and antibiotic therapy indicated on the original sample requisition o In Micro OE Comments, select Key 3 to add the "Submitting Lab Specimen ID:" o Add the PCRES accession number of the sample o Save the order o Re-label the UTM tube with the new REFLU LIS labels ➢ Report will automatically print to OCPHO (HPU1) ➢ Report will automatically print to Stanton IPAC (SIPAC) and Inuvik IPAC (IIPAC) if ER or inpatient ➢ Check patients home address. If from Nunavut: o Copy results to the applicable Nunavut CPHO • Refer to MIC36520-Referral of Category B PCR Specimens to NML for send out instructions

BF Results: Influenza B **DETECTED**	• Report: **POSITIVE** ➢ Report will automatically print to OCPHO (HPU1) ➢ Report will automatically print to Stanton IPAC (SIPAC) and Inuvik IPAC (IIPAC) if ER or inpatient ➢ Check patients home address. If from Nunavut: o Copy results to the applicable Nunavut CPHO

BF Results: RSV **DETECTED**	• Report: **POSITIVE** ➢ Phone result to the ordering location if patient is <2 years old ➢ Report will automatically print to OCPHO (HPU1) ➢ Report will automatically print to Stanton IPAC (SIPAC) and Inuvik IPAC (IIPAC) if ER or inpatient ➢ Check patients home address. If from Nunavut: o Copy results to the applicable Nunavut CPHO

BF Results: Entero/Rhino **DETECTED**	• Report: **POSITIVE** ➢ Report will automatically print to OCPHO (HPU1)

BF Results: Adenovirus **DETECTED**	• Report: **POSITIVE** ➢ Report will automatically print to OCPHO (HPU1)

BF Results: HMPV **DETECTED**	• Report: **POSITIVE** ➢ Report will automatically print to OCPHO (HPU1)

BF Results: Any target **INVALID**	• Repeat testing on the BIOFIRE: ➢ Add comment in TCOMM that testing was repeated • Repeat results are invalid • Report: **INVALID** for each target ➢ From each targets keypad ○ Select Key R to add repeat sample collection comment

Step	Action
Completing the Run	
1	Check the Resulting Worklist-Torch to ensure all ordered samples are complete.
2	In the BSC, with gloved hands, remove the used pipettes from the wet waste container and place into the dry waste container.
3	Remove the autoclave bag from the dry waste container. Tie and wipe outside with an Accel TB wipe. Place in the biohazard waste.
4	Ensure supplies in the BSC are stocked up and the sharps container is not full.
5	Wipe the BSC with an Accel TB wipe. Turn off the blower and lower the sash. Remove gloves and don a fresh pair.
6	Ensure all used pouches from the BIOFIRE TORCH are discarded in the biohazard waste.
7	When all testing of patient samples and disinfection of surfaces is complete, remove PPE and place in the biohazard waste. Retrieve samples from the refrigerator and place in correct storage location.

LIMITATIONS:

1. The BIOFIRE Respiratory 2.1 (RP2.1) Panel pouch is a qualitative test and does not provide a quantitative value for the organism(s) in the specimen.
2. The performance of BIOFIRE Respiratory 2.1 (RP2.1) Panel pouch has not been validated for specimens collected from individuals without signs or symptoms of respiratory infection.
3. The detection of viral and bacterial nucleic acid is dependent upon proper specimen collection, handling, transportation, storage, and preparation.

4. A negative BIOFIRE Respiratory 2.1 (RP2.1) Panel pouch result does not exclude the possibility of viral or bacterial infection.
5. If four or more organisms are detected in a specimen, retesting is recommended to confirm the polymicrobial result.
6. Recent administration of nasal influenza vaccines could lead to accurate virus detection by the BIOFIRE Respiratory 2.1 (RP2.1) Panel pouch of the viruses contained in the vaccine, but would not represent infection by those agents.

CROSS-REFERENCES:

- MIC60110-BIOFIRE RP2.1 Quality Control
- MIC60111-Quality Control Results Record-BIOFIRE RP2.1
- MIC73110-Maintenance Record-BIOFIRE TORCH

REFERENCES:

1. BIOFIRE *Respiratory Panel 2.1 (RP2.1)* Instructions for Use. BFR0001-7709-03 September 2023
2. BIOFIRE FILMARRAY TORCH Operator's Manual, HTFA-PRT-0001-08 June 2023
3. Canadian Laboratory Response Network Training: COVID-19 Point of Care Diagnostics. *BioFire FilmArray Torch and the FilmArray Respiratory Panel 2.1 (RP2.1)*.
4. Biosafety Advisory Committee. *STHA Biosafety Program Manual*. January 2016

APPROVAL:

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Date

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Director, Laboratory and Diagnostic Imaging Services

REVISION HISTORY:

REVISION	DATE	Description of Change	REQUESTED BY
1.0	10 Aug 20	Initial Release	L. Steven
2.0	02 Oct 20	Updated to remove "presumptive" from reporting	L. Steven
3.0	05 Feb 21	Updated to include the reporting of Influenza A, Influenza B, RSV and Enterovirus/Rhinovirus	L. Steven
4.0	09 Aug 21	Updated to reflect saline gargle samples	L. Steven
5.0	17 Oct 22	Procedure reviewed and updated to reflect notification of Nunavut patients to Nunavut CPHO and sending positive Flu A samples to APL	L. Steven
6.0	19 Apr 23	Procedure reviewed and updated to reflect no longer calling positive results to OCPHO or ordering location	L. Steven
7.0	07 Nov 23	Procedure updated to include new targets Adenovirus and Human Metapneumovirus	L. Steven
8.0	01 Oct 24	Procedure updated to reflect no longer sending positive samples for variant screening	L. Steven