

# Comparison of Performance of Nasopharyngeal and Anterior Nare Swabs for PCR Detection of Respiratory Viruses

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## ABSTRACT

**Background:** Respiratory viral infections are the most common reason for medical visits in children. Although standard of care, nasopharyngeal (NP) sampling is invasive, uncomfortable, and may be a barrier to testing young children, especially in outpatient settings. Swabs from the anterior nares (AN) are more easily obtained and comfortable, however, the diagnostic yield and accuracy has not been tested. The objective of this study was to compare the performance of swabs for respiratory viral PCR collected from the NP and AN of young children with respiratory illness.

**Methods:** Febrile or afebrile children < 5 years with signs and symptoms of respiratory infection including one or more of nasal congestion, nasal discharge, cough, sore throat, or wheezing were eligible for enrollment between November 2011-June 2012. Children had both NP and AN sampling performed simultaneously by physicians. Testing for respiratory viral nucleic acid for 17 viruses was performed using the multiplex PCR FilmArray system (BioFire Diagnostics, Inc.).

**Results:** Fifty-eight children were enrolled. Respiratory viral nucleic acid was detected in 54/58 children (93%). Viruses detected and concordance between NP and AN samples are shown in the Table. There were 986 opportunities for viral detection (58 children X 17 viruses for each swab). There were no detections of coronavirus (CoV) 229E or HKU1, influenza (Flu) A (H1, H3, H1-2009), or parainfluenzavirus (PIV) 2, 3, or 4 in either NP or AN samples. NP and AN swabs produced concordant results for 982/986 (99.6%). For discordant results, NP was positive and AN negative in one episode of rhinovirus/enterovirus (RV/EV) detection. AN was positive and NP was negative in two episodes of bocavirus and one episode of RV/EV detection.

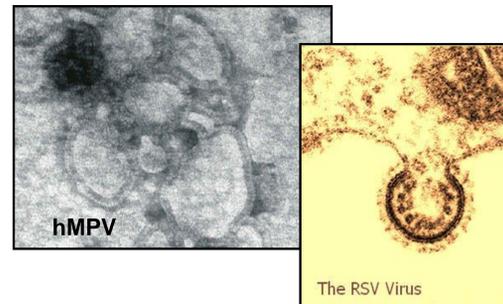
**Conclusion:** Non-invasive sampling of the anterior nares for respiratory viral PCR performs well when compared with nasopharyngeal sampling and may provide a more acceptable alternative for respiratory viral testing in children.

## BACKGROUND

- Respiratory viral infections are the most common reason for medical visits in children.
- Nasopharyngeal (NP) sampling is the standard of care, but has several disadvantages:
  - ❖ invasive,
  - ❖ uncomfortable, and
  - ❖ may be a barrier to testing young children, especially in outpatient settings.
- Swabs from the anterior nares (AN) are more easily obtained and comfortable.
- The diagnostic yield and accuracy has not been tested.

## OBJECTIVE

The objective of this study was to compare the performance of swabs for respiratory viral PCR collected from the NP with those collected from the AN of young children with respiratory illness.



## METHODS

### Human Subjects Protection

- The institutional review board of the University of Utah approved this study.

- Parents of all child participants provided informed consent.

### Study Design

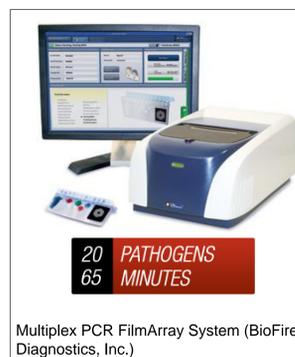
- Febrile or afebrile children < 5 years with one or more signs and symptoms of respiratory infection were eligible for enrollment between November 2011-June 2012.

- Signs and symptoms were assessed by general pediatricians and included:

- ❖ nasal congestion
- ❖ nasal discharge
- ❖ cough
- ❖ sore throat
- ❖ wheezing

- Children had both NP and AN sampling performed simultaneously by physicians.

- Testing for respiratory viral nucleic acid for 17 viruses was performed using the multiplex PCR FilmArray system (BioFire Diagnostics, Inc.).



## Enrollment

- Fifty-eight children were enrolled.
- Children were aged birth to 5 years.

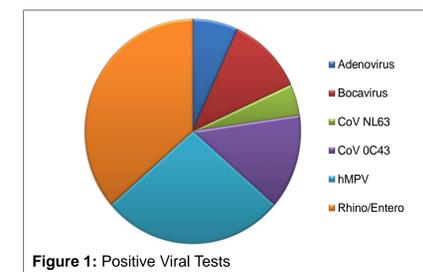


Figure 1: Positive Viral Tests

## Concordance of NP and AP Samples

- There were 986 opportunities for viral detection (58 children X 17 viruses for each swab).
  - ❖ NP and AN swabs produced concordant results for 982/986 (99.6%).
  - ❖ Discordant results are shown in **Table 2**.

## CONCLUSIONS

- Non-invasive sampling of the anterior nares for respiratory viral PCR performs well when compared with nasopharyngeal sampling.
- Clinicians can consider using AN swabs for respiratory testing in young children, especially in outpatient settings.

## ACKNOWLEDGEMENTS

- NIH/NIAID 5U01AI082482
- NIH/NIAID 8UL1TR000105
- BioFire Diagnostics, Inc. for technical support.

## RESULTS

**Table 1:** Diagnostic Test Results for NP and AP Samples from Children with Respiratory Signs and Symptoms

Children	Adeno	Boca	CoV NL63	CoV OC43	hMPV	RV/EV	Flu B	PIV 1	RSV
NP/AN +	3	3	2	6	12	14	1	2	7
NP/AN -	55	53	56	52	46	42	57	56	51
<b>Discordant</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>

## Viral Diagnostic Test Results

- Respiratory viral nucleic acid was detected in 54/58 children (93%).
- There were no detections of coronavirus (CoV) 229E or HKU1, influenza (Flu) A (H1, H3, H1-2009), or parainfluenzavirus (PIV) 2, 3, or 4 in either NP or AN samples.
- Viruses detected are shown in **Table 1** and **Figure 1**.
  - ❖ The most commonly detected viruses were human rhinovirus and human metapneumovirus (**Figure 1**).

**Table 2:** Discordant Results

Discordant Result	Virus Detected
NP Positive / AN Negative	Rhinovirus / Enterovirus
NP Negative / AP Positive	Bocavirus (2 specimens) Rhinovirus / Enterovirus

