Surveillance of Severe Viral Respiratory Infections among Children Presenting to Hôpital Saint Damien in Haiti

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BACKGROUND

Learning the burden and seasonality of respiratory viral infections in children in resource-limited settings is critical for hospital infection care and prevention and national public health programs.

We built a prospective surveillance program of severe acute respiratory illness (SARI) in hospitalized children at Hôpital Saint Damien - Nos Petits Frères et Soeurs to gather local evidence and support informed clinical and policy decision-making. The COVID-19 pandemic erupted as we were launching our project, requiring the use of available point-of-care diagnostics.

METHODS

Children < 18 years of age with cough, history of fever ≥ 38 C° , of < 10 days evolution, and requiring hospitalization were included in the study.

We obtained a nasopharyngeal swab and collected demographic and clinical data for eligible patients.

Samples were tested using antigen rapid tests on-site for influenza A (Flu A) and B (Flu B), respiratory syncytial virus (RSV), and SARS-CoV-2. Afterwards, all specimens (both negative and positive) were stored and shipped for molecular studies.

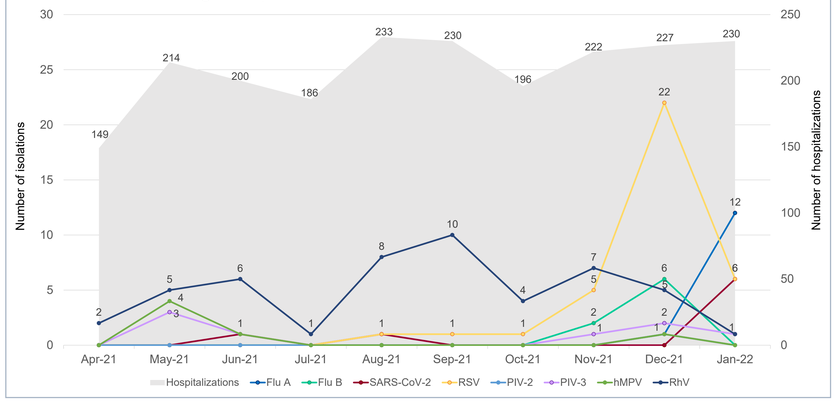
RESULTS

We obtained and tested 167 samples from patients since April 30, 2021, through January 31, 2022. Of these samples, we detected at least a single virus in 109 samples. Single isolates were detected in 89 samples (53%), multiple isolates in 20 samples (12%), and no isolates in 58 samples (35%) (Table 1). Positive cases for RSV, Flu A, and Flu B peaked between November and January (Figure 1). Rhinovirus 1A (RhV) was detected throughout the study period, with peaks around August-September and was the most often detected viral isolate (49, 38%), followed by RSV (37, 29%). Co-infections were seen with RSV, Flu A, RhV, and SARS-CoV-2 (Table 1).

Table 1. Viral isolates identified from nasopharyngeal swab (N=167)

	Number of samples n (%)
Single infections	**89 (53)**
Rhinovirus 1A	38 (43)
RSV	27 (30)
Influenza A	7 (8)
Influenza B	6 (7)
Parainfluenza	5 (6)
SARS-CoV-2	3 (3)
Human metapneumovirus	3 (3)
Co-infections	**20 (12)**
Influenza A / RSV	4 (20)
RSV / Rhinovirus 1A	4 (20)
Human metapneumovirus / Rhinovirus 1A	3 (15)
Influenza A / SARS-CoV-2	2 (10)
SARS-CoV-2 / Rhinovirus 1A	2 (10)
Parainfluenza / Rhinovirus 1A	2 (10)
Influenza B / RSV	1 (5)
Influenza B /	1 (5)
SARS-CoV-2 / Parainfluenza	1 (5)
No isolations	**58 (35)**

Figure 1. Isolation of Respiratory Viruses among Children with Severe Acute Respiratory Infections Presenting at Hôpital Saint Damien



RESULTS

Molecular studies detected 7 isolates of Flu A not detected by rapid test, 1 isolate of Flu B, and 1 isolate of SARS-CoV-2. However, it failed to detect 2 isolates of Flu A detected by rapid test, 1 isolate of Flu B, and 1 isolate of SARS-CoV-2 (Table 2). Molecular studies have also been done for PIV-1 and common cold human coronaviruses hCoV-OC43 and hCoV-229E, but were not detected among the samples. Testing for the presence of additional respiratory pathogens continues.

Table 2. Respiratory viruses identified from collected samples by detection method, n (%) (N=130)

	Total	Detected by antigen rapid test *only*	Detected by molecular studies *only*	Detected by both testing methods
Influenza A	**13 (100)**	2 (15)	7 (54)	4 (31)
H3	*11 (85)*			
Influenza B	**8 (100)**	1 (12.5)	1 (12.5)	6 (75)
B/Victoria	*5 (63)*			
RSV	**37 (100)**	37	*Not done*	*N/A*
SARS-CoV-2	**8 (100)**	1 (12.5)	1 (12.5)	6 (75)
P.1 - Japan/Brazil/VoC	*1 (13)*			
Omicron BA.1	*3 (38)*			
Rhinovirus 1A	**49 (100)**	*Not done*	49	*N/A*
Parainfluenza (PIV)	**9 (100)**	*Not done*	9	*N/A*
PIV-2	1 (11)			
PIV-3	8 (89)			
Human metapneumovirus	**6 (100)**	*Not done*	6	*N/A*

Note: Italics represent subtype/lineage of respiratory pathogens detected.

CONCLUSIONS

Our study captured circulating respiratory viruses in children with SARI in Haiti during the COVID-19 pandemic. Preliminary data suggest an increase in respiratory viruses between August and January. Improving point-of-care diagnostics can better inform providers of the local epidemiology of respiratory viruses and support clinical decision-making, such as good use of antibiotics. Collaborating to also conduct molecular testing on obtained samples of patients enhances our understanding of the local epidemiology and the ability to propose appropriate infection care and prevention measures.