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Micah McGlaughlin

Children's Mercy Kansas City

Anjana Sasidharan

Children's Mercy Hospital

Dithi Banerjee

Children's Mercy Hospital

Mary Moffatt

Children's Mercy Hospital

Jennifer Schuster

Children's Mercy Hospital

See next page for additional authors

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Authors

Micah McGlaughlin, Anjana Sasidharan, Dithi Banerjee, Mary Moffatt, Jennifer Schuster, Gina Weddle, Kirsten Weltmer, and Rangaraj Selvarangan



Prevalence of COVID-19 Infections in Kansas City Children Enrolled in the New Vaccine Surveillance Network

Micah McGlaughlin, Anjana Sasidharan, Dithi Banerjee PhD, Mary E. Moffatt, MD, Jennifer Schuster, MD, Gina Weddle, MD, Kirsten Weltmer, MD, and Rangaraj Selvarangan, PhD*
Children's Mercy Hospital, Missouri, KC

ABSTRACT

Background:

Following the initial SARS-CoV-2 outbreak of 2020, the Omicron Variant spread and peaked throughout the United States from December 2021 to February 2022 (CDC, 2023). Hospitalization rates for children, particularly infants to 4 years, peaked during January 2022 with rates higher than in the initial outbreak in 2020 (CDC, 2023). The objective was to determine the prevalence of SARS-CoV-2 infection in children presenting with acute respiratory illness (ARI) enrolled prospectively in the Emergency Department (ED), Inpatient (IP), and Clinic during January 2022 to December 2022.

Methods:

Children up to 18 years with ARI symptoms were enrolled in the CDC New Vaccine Surveillance Network (NVSN) study. Respiratory specimens were obtained either as a mid-turbinate nasal swab collected by study staff or as a salvaged nasopharyngeal swab collected by providers during standard of care testing (SOC). EasyMag extraction was performed on all specimens; SOC obtained samples were tested by the clinical lab and study obtained specimens were tested by Hologic Panther or underwent PCR testing to retrieve the Ct value. Additionally, all COVID-19 positive specimens without a Ct value also underwent PCR testing to determine the viral load. Demographics, information, and date and location of visit were recorded for SARS-CoV-2 positive patients.

Results:

There were 2,182 total respiratory specimens tested; 161 (7%) were SARS-CoV-2 positive. The highest prevalence was in January 2022; 37% positivity rate [63/172]. Other months with higher prevalence of positive tests were July [14/109, 13%] and August [24/161, 15%]. Most COVID-19 infections were seen in the age group 0-1 year [40%], and in females [51%, 82/161]. The three most common symptoms reported for the 161 SARS-CoV-2 positive patients were fever [106], cough [101], and nasal congestion [50].

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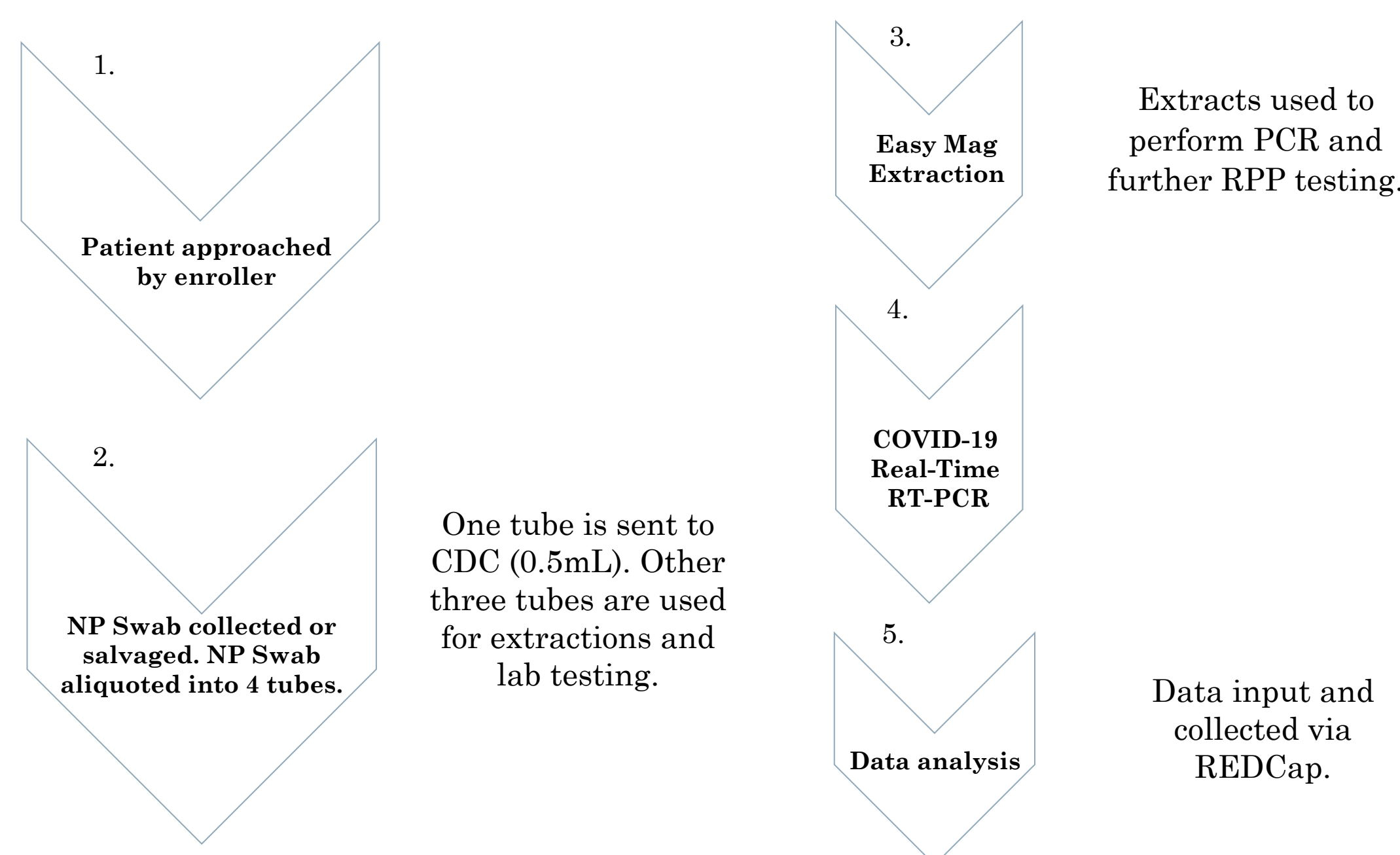
INTRODUCTION

- In January 2022, the United States saw the highest peak in COVID-19 cases since the first emerging information about a new and troubling form of pneumonia in Wuhan, China came to light (WHO, 2023) (Biancolella et al., 2022).
- In 2022, the B.1.1.529 (Omicron) variant dislodged the Delta variant as the dominant SARS-CoV-2 variant in the United States. For children ages 5-11 years, the Omicron variant resulted in hospitalizations rates 2.3 times higher than the Delta (Shi et al., 2022).
- Although children were less at risk to be hospitalized or experience a life-threatening complication with COVID-19 infection (Nikolopoulou et al., 2022), detection of Omicron variant in the U.S. in late December coincided with the drastic increase in hospitalizations due to COVID-19 infection for children of all age groups (Shi et al., 2022). In 2022, for U.S. children 5-11 years, rates of hospitalization were 2.1 times higher for unvaccinated children; 87% of the children hospitalized during this time were unvaccinated (Shi et al., 2022).

METHODS AND MATERIALS

NVSN. One study site: Children's Mercy Hospital, KCMO USA

Study Design: Selection criteria included samples from children 18 years old and younger collected in 2022 who are residents of Jackson county. Subjects were eligible if they present with ARI symptoms and were admitted to hospital within 48 hours prior to enrollment and/or visited the ED for medical evaluation. The duration of illness that led to hospitalization or ED visit must be less than 14 days. Symptoms, race, and gender were obtained by study staff and reported on REDCap via ARI Screening Log.



RESULTS

Figure 1. Total COVID-19 positive by age in ED, IP, Clinic in 2022 for CMH NVSN.

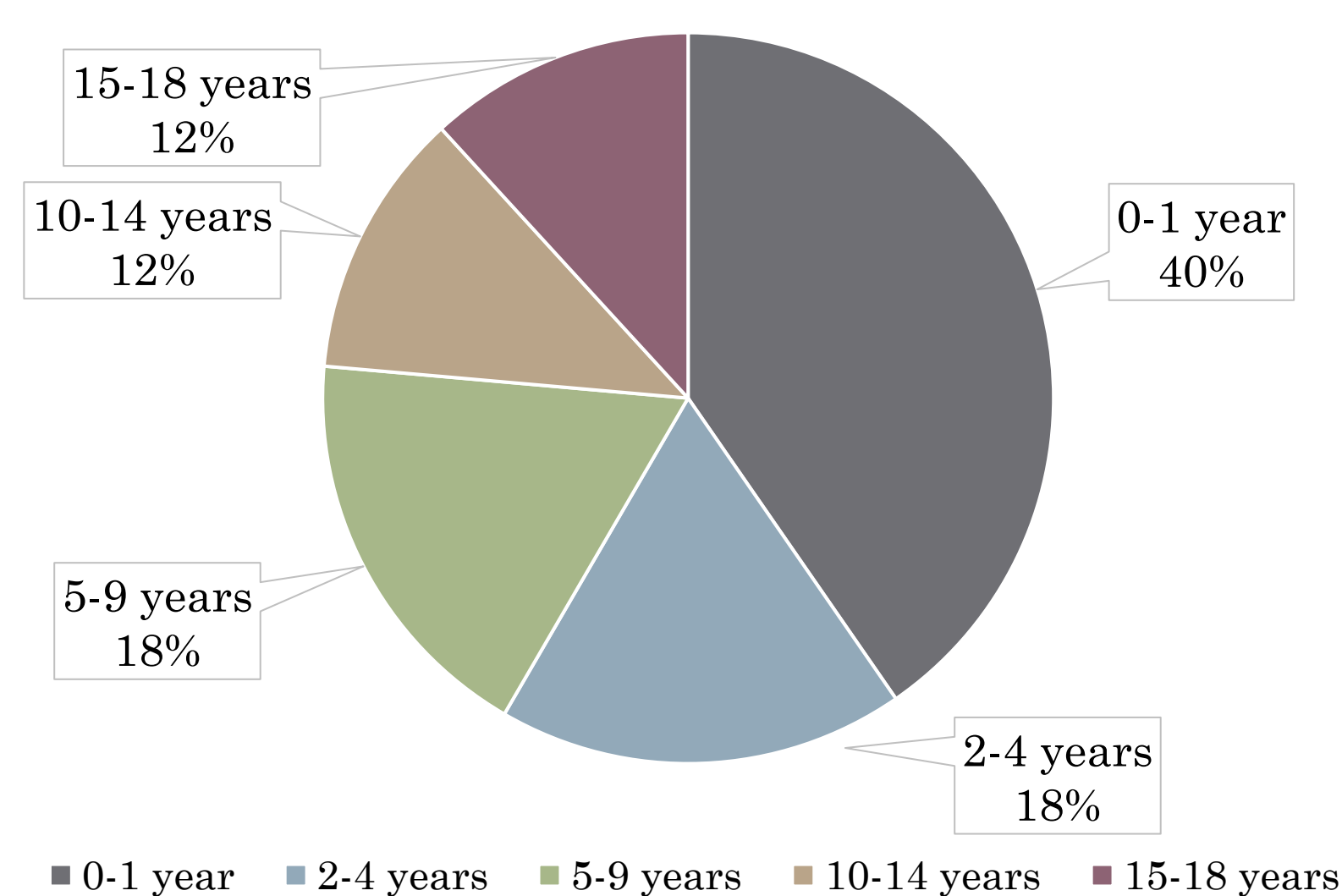


Figure 2. Total COVID-19 positive by gender enrolled in NVSN at CMH in 2022.

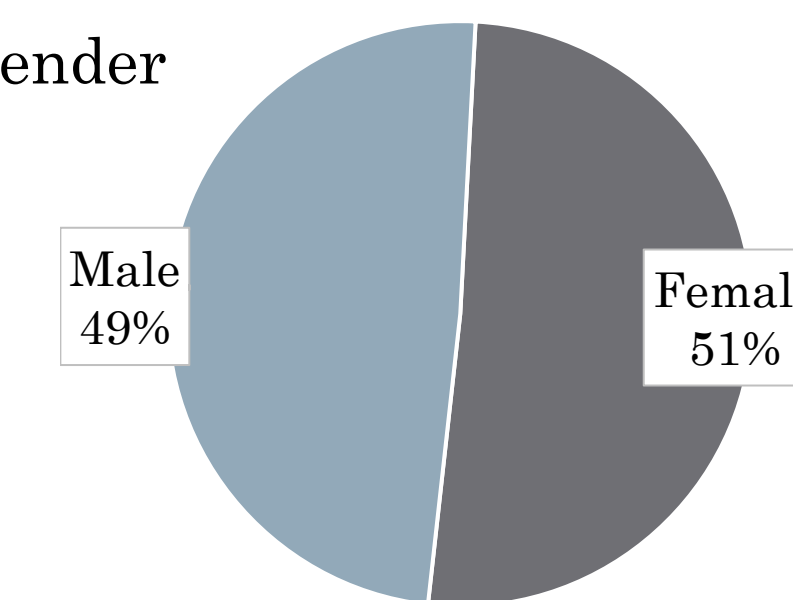


Table 1. Number of COVID-19 Positive NVSN Patients Who Identified As

American Indian/Alaskan Native/Pacific Islander	2
Asian	3
Black/African American	79
Hispanic	43
White	31
Unknown	7
Total Reported	165

Figure 3. COVID-19 Cases by Month in 2022 for CMH NVSN.

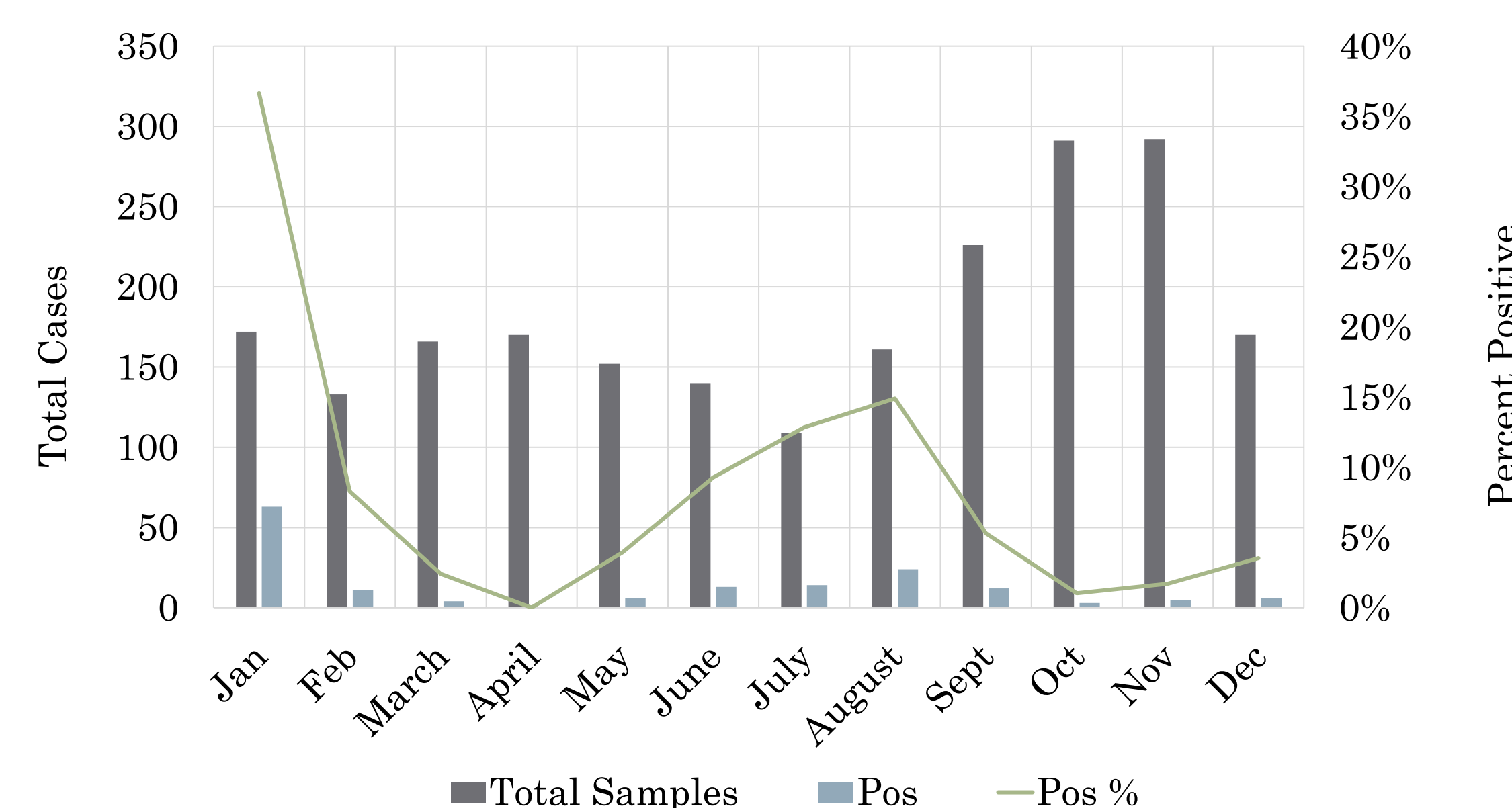


Table 2. Number of total single and co-detections for COVID-19 positives enrolled in NVSN and top four co-detections found using RPP in 2022.

Co-detection Types	Total
Rhino/Enterovirus	18
RSV A	7
Human Metapneumovirus	5
Influenza A	4
Samples with Other Viruses Co-Detected	11
Total Co-detections	45
Total Single Detections	116

Figure 4. Totals of symptoms of COVID-19 positive patients by month in 2022 when asked to identify their top three symptoms for NVSN study staff.

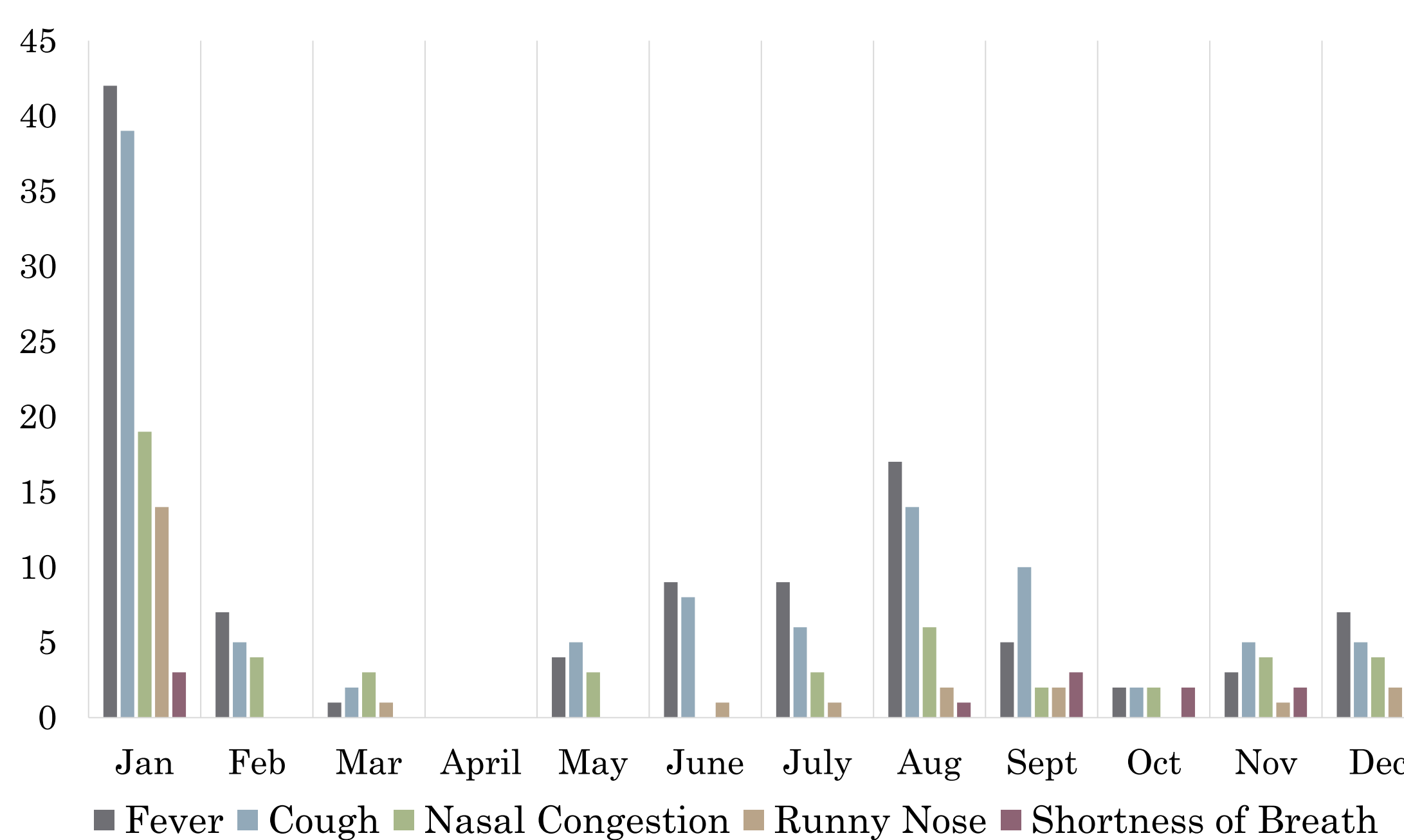
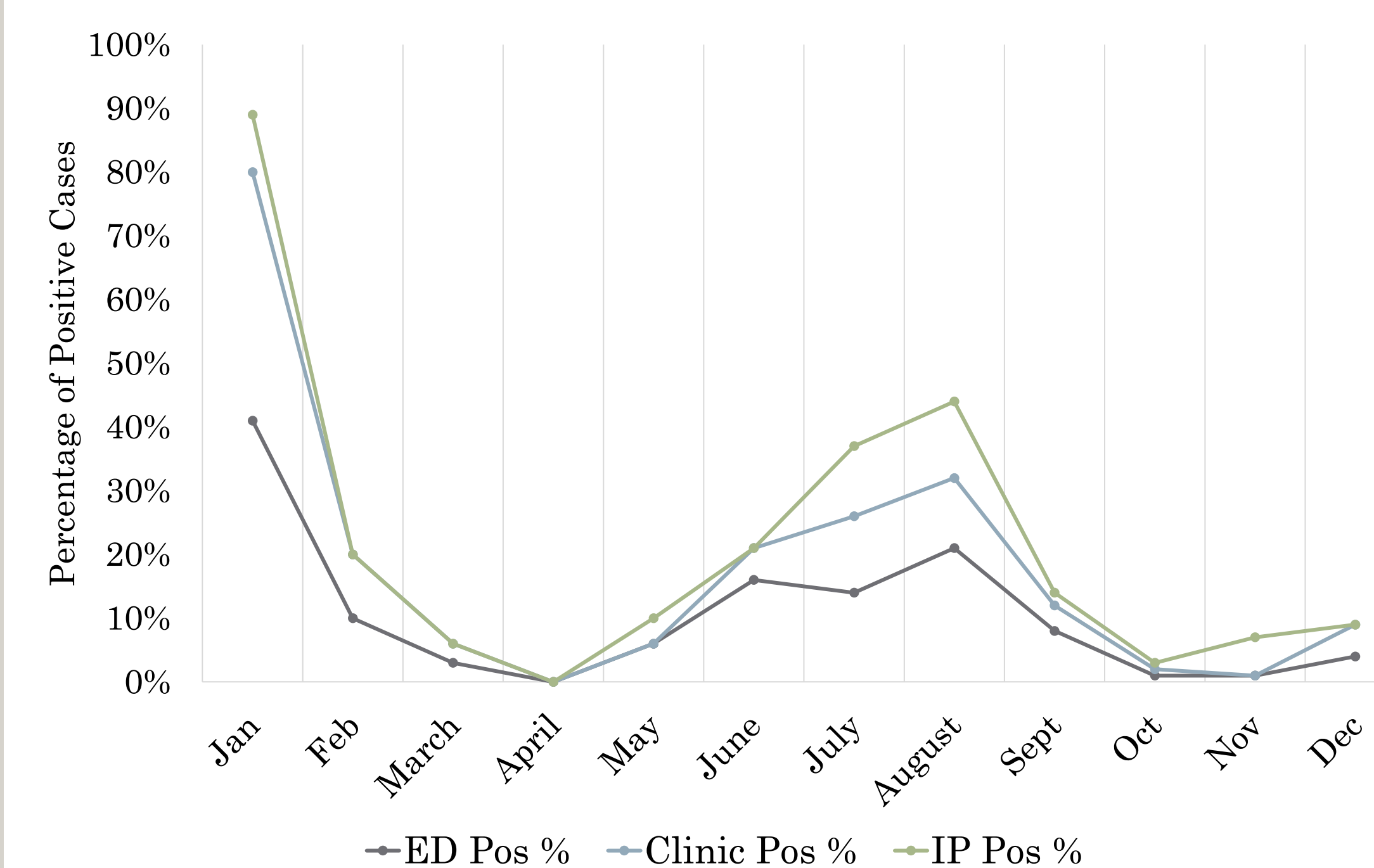


Table 3. Total NVSN samples positive for COVID-19 collected across CMH's Clinic, ED, and IP in 2022.

Location	Sample Type	Clinical samples from each site
CMH Clinic	NP Swab	36
CMH ED	NP Swab	109
CMH IP	NP Swab	16
Total Collected	NP Swab	161

Figure 5. Positivity Rate of COVID-19 Cases ED, Clinic, IP by Month in 2022.



DISCUSSION

Prevalence of COVID-19 in Kansas City, USA:

- The overall prevalence of COVID-19 infections in 2022 for CMH NVSN was 7% (161/2182).
- COVID-19 cases were highest in January at 37% (63/172), July at 13% (14/109), and August at 15% (24/161) for infections tracked at CMH for the NVSN.
- There were no COVID-19 positive cases in April 2022 enrolled in NVSN at CMH.
- Majority of COVID-19 positive cases were seen in the ED at 68% (109/161).
- Out of the total races/ethnicities reported by children who were positive for COVID-19, 48% of the patients reported their race as Black/African American (79/165).
- The leading co-detection for COVID-19 positives in the NVSN study was Rhino/Enterovirus (18 co-detections/161 specimens).
- When each patient was able to report their top three symptoms experienced during their illness, the three highest were fever (106/292; 36%), cough (101/292; 35%), and nasal congestion (50/292; 17%).

CONCLUSIONS

- Prospective surveillance data from respiratory specimens collected at different CM KC locations furthers understanding of viruses causing acute respiratory illness in children.
- Tracking the number of COVID-19 cases among symptomatic children may help healthcare systems prepare for surges in hospitalized children.
- CM KC's participation in the 7 site NVASN is an important contribution to CDC data on pediatric ARI.