Evaluation of self/parent collected oral nasal swabs for respiratory illness in symptomatic children

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Background

- Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is a pathogen of the COVID-19 global pandemic [1].
- Increased demand for respiratory testing globally [1].
- The current clinical standard is an invasive healthcare worker collected nasopharyngeal (NP) swab.
- For infants/children under the age of 4 who are unable to reliably gargle or spit, we wish to asses a combined oral/nasal (ON) swab collected by the parent/caregiver for respiratory viruses.

Objective

Determine the diagnostic yield, sensitivity, and acceptability of self-collected oral nasal (ON) swab samples compared to healthcare worker (HCW)-collected nasopharyngeal (NP) swabs for respiratory viruses, including severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), influenza, and respiratory syncytial virus (RSV) in children.

Methods

- Participants with acute respiratory infection symptoms (0-4 years old) were recruited from a pediatric Emergency Department (ED) where they were undergoing clinical testing with an NP swab during the 2022/2023 or 2023/2024 respiratory season.
- Participants provided an additional ON swab collected by a parent/caregiver using written self-collection instructions adapted from COVID-19 testing in Ottawa [2].
- Parent/caregivers were asked to rate acceptability of ON and NP swab collections on a 5-point Likert scale.
- Both samples collected with minitip flocked swabs and tested with the SARS-CoV-2/Influenza A+B/RSV GeneXpert® assay.
-The sensitivity for each pathogen target was calculated using the reference standard of the presence of the target in either sample.
- A McNemar test was used to compare sensitivities and was calculated using GraphPad Software© 2024.
- A portion of matched samples were also tested with the BioFire® RP2.1 respiratory panel.

Results

- Total 121 matched sample pairs tested with the GeneXpert® assay
- Median Ct values were higher for matched ON positives vs NP positives **(26.2 ON vs 23.9 NP)**
- 58 pairs were tested using the BioFire® RP2.1 assay and showed a similar yield for total respiratory viruses detected **(63 positive ON swabs vs 62 positive NP swabs).**
- Caregivers rated higher acceptability of self-collected ON swabs than HCW-collected NP swabs **(median acceptability 4 ON vs 2 NP)**.

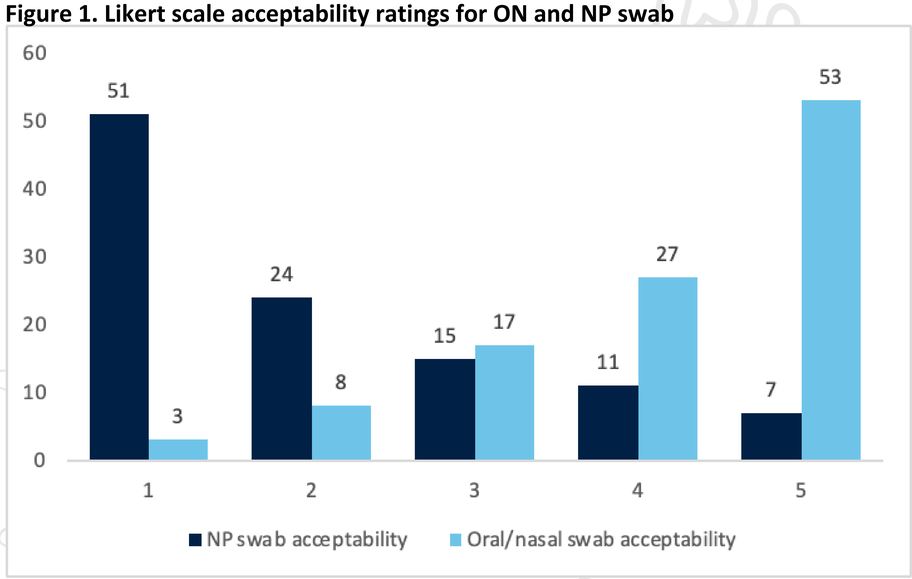
Table 1. Comparison of virus target detection using GeneExpert® Assay

	Either sample positive	Both Samples Positive	ON Swab Positive Only	NP Swab Positive Only	Both samples negative	**ON Swab Sensitivity (%)***	**NP Swab Sensitivity (%)***	McNemar *p*
SARS-CoV-2	10	8	0	2	111	80.0	100.0	0.48
Flu A	19	17	1	1	103	94.4	94.4	1.0
RSV	28	26	2	0	93	100.0	92.9	0.48
All other target viruses**	46	30	8	8	386	82.6	82.6	1

*Either sample positive is set as the reference for calculation of sensitivity.

** All other virus targets tested with the BioFire® RP2.1 assay, and excluding pathogen targets for which there was no positive result in either sample type

Figure 1. Likert scale acceptability ratings for ON and NP swab



*1= least acceptable, 5 = most acceptable, based on 108 matched rating.

Conclusion

- The performance of self-collected ON swabs was similar to HCW-collected NP swabs for the detection of a range of respiratory viruses across two commercial molecular assays.
- Given their significantly higher acceptability ratings, self-collected ON swabs should be considered as a potential less-invasive diagnostic option for children.

References

1. World Health Organization. Coronavirus disease (COVID-19). Accessed Feb 7 2024.
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