Prolonged SARS-CoV-2 shedding in saliva; implications for late-stage diagnosis and infectious duration

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Background

- PCR testing of saliva has been shown to have comparable (1-3) and even higher sensitivity (4) and stability (5) than PCR testing of nasopharyngeal (NP) at identifying COVID-19
- Dynamics of early viral shedding from saliva can differ from nasal specimens (6), guiding preferences for testing strategies at different stages of infection
- Viral shedding in saliva may be more stable than nasal swabs during the late post-symptomatic period
- We conducted a sub-study within a longitudinal observational study to compare the longevity of viral shedding from the mouth versus nasal swabs

Methods

- ***Study population***: patients with moderate to severe COVID-19 at University Hospital from June 2020 – August 2021
- ***Data collection:*** Saliva, anterior nasal swabs, and nasopharyngeal swabs collected and tested with Cepheid Xpert Xpress SARS-CoV-2 RT-PCR assay to determine cycle threshold (Ct)
- **Inclusion Criteria:** ≥18 years, COVID-19 PCR positive
- ***Exclusion criteria:*** prisoners, unknown time from symptom onset, unable to provide both saliva and *nasal specimens*
- ***Statistical Analysis:***
  - Median Ct bias-corrected and accelerated 95% confidence intervals via bootstrapping and compared using Wilcoxon signed-rank
  - Patient characteristic differences via ANOVA for continuous and chi-square test for categorical measures

Results

Table 1. Patients' characteristics

Symptom duration prior to baseline collection Mean (range)	**7.0 days (-1 – 21)**	**8.6 days (2 – 21)**
Days between in-hospital NP swab PCR and baseline collection: **mean (range)**	1.8 days (-4 – 7)	1.7 days (0 – 6)
Number of follow-up time-points per participant: **mean (range)**	0.5 timepoints (0 - 7)	1.8 timepoints (1 - 7)
# Male (%)	51 (53%)	18 (64%)
# Female (%)	45 (47%)	10 (36%)
Ethnicity (%)		
Hispanic	53 (55%)	17 (61%)
Black	36 (38%)	7 (25%)
White	4 (4%)	2 (7%)
More than one race/Other	3 (3%)	2 (7%)
Comorbidities		
Hypertension	51 (53%)	14 (50%)
Obesity	48 (50%)	12 (46%)
Diabetes Mellitus	33 (34%)	10 (36%)
Lung Disease (eg, COPD)	12 (13%)	5 (18%)
Chronic Heart Disease	10 (10%)	4 (14%)
Other	41 (43%)	9 (32%)
No chronic disease	18 (19%)	3 (11%)

Figure 1. Nasal VTM vs Saliva

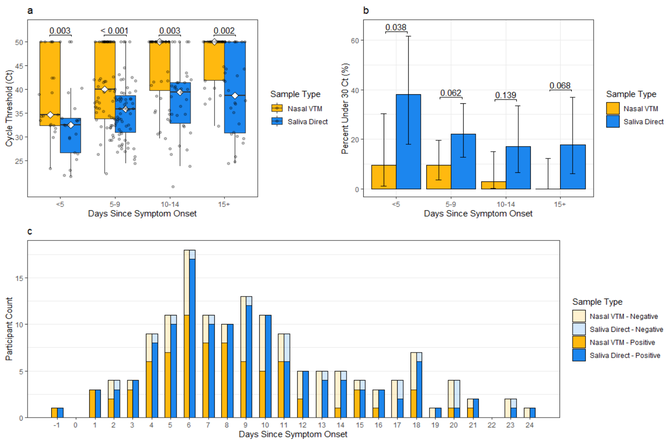
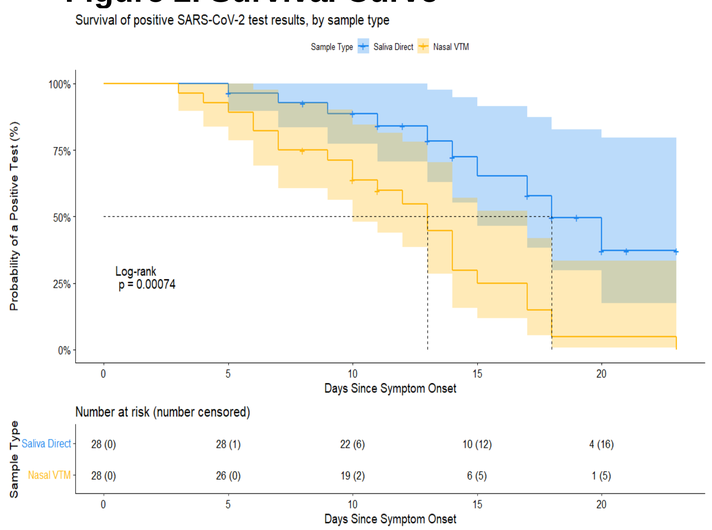


Figure 2. Survival Curve



- Saliva detected significantly more cases of SARS-CoV-2 **beyond 5 days** of symptom onset (n = 115, 86.1% saliva vs 48.7% nasal, p-value < 0.001), **beyond 9 days** (n = 63, 79.4% saliva vs 36.5% nasal, p-value < 0.001) and **beyond 14 days** of (n = 28, 71.4% saliva vs 32.1% nasal, p-value = 0.003)

Conclusion

- ***Study limitations:***
  - Conducted prior to the emergence of the Omicron variant (dynamics of viral shedding may vary with variants of concern)
  - Small sample size
  - Limited longitudinal data
- ***Key Findings:***
  - SARS-CoV-2 RNA shedding persists longer and in higher abundance in saliva than in nasal swabs, even beyond 14 days
  - PCR testing of saliva may be more sensitive than nasal swabs in diagnosing COVID in patients who present during a later disease stage
  - Public health implications include potential prolonged oral infectious period in guidance for masking and follow-up saliva-based testing for known COVID-19
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