

Coronavirus Disease 2019 in Children Cared for at Texas Children's Hospital: Implications of Repeat Testing on Infection Control Strategies

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ABSTRACT

Background: Accurate diagnosis of coronavirus disease 2019 (COVID-19) is key for source control and interrupting disease transmission. To better understand the length of viral shedding in children and potential infection control implications, we describe 51 children with COVID-19 who underwent repeat testing for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) at Texas Children's Hospital (TCH).

Methods: We performed a retrospective chart review of all pediatric patients (<21 years of age) with ≥ 2 nasopharyngeal specimens tested for SARS-CoV-2 by reverse transcription-polymerase chain reaction (RT-PCR) and at least one positive result between 3/13/2020 and 6/7/2020 through the TCH Molecular Microbiology Laboratory.

Results: Fifty-one patients met inclusion criteria. The median age was 8.6 years (0.02-19.2 years). Sixteen (31%) children were hospitalized. Fourteen (27%) patients underwent testing for surveillance purposes (including 3 admitted patients). Two SARS-CoV-2 tests were performed in 25 (49%) children; while 12 (24%) children had 3 tests, 4 (8%) children had 4 tests, and 10 (20%) children had ≥ 5 tests (including 1 patient with underlying malignancy who had 9 SARS-CoV-2 PCRs performed). SARS-CoV-2 testing timeline for 9 hospitalized children is shown (Fig 1). The median time between collection of tests 1 and 2 was 14 days (n=51, range 1, 53 days). For children with conversion (first detected to first not-detected sample), the median time was 15 days (n=31, range 1, 45 days). For patients with consecutive positive SARS-CoV-2 PCRs, the median time of positivity was 10 days (n=19, range 2, 31). One patient with malignancy had 5 tests over 6 weeks in the outpatient setting and each time alternated between detected and not-detected. Following diagnosis with COVID-19, one patient with sickle cell disease likely had re-infection and had a positive test after having 2 consecutive negative tests; his last SARS-CoV-2 RT-PCR was positive 68 days after initial positive.

Conclusion: We observed variation in the duration of SARS-CoV-2 RT-PCR positivity in children with COVID-19. For children with COVID-19, a single negative molecular assay for SARS-CoV-2 may not be predictive of sustained negativity.

OBJECTIVES

- To better understand the length of viral shedding in children with SARS-CoV-2 infection and the potential infection control implications.

INTRODUCTION

- Accurate diagnosis of coronavirus disease 2019 (COVID-19) is key for source control and interrupting disease transmission.
- We describe 51 children with COVID-19 who underwent repeat testing for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) at Texas Children's Hospital (TCH).

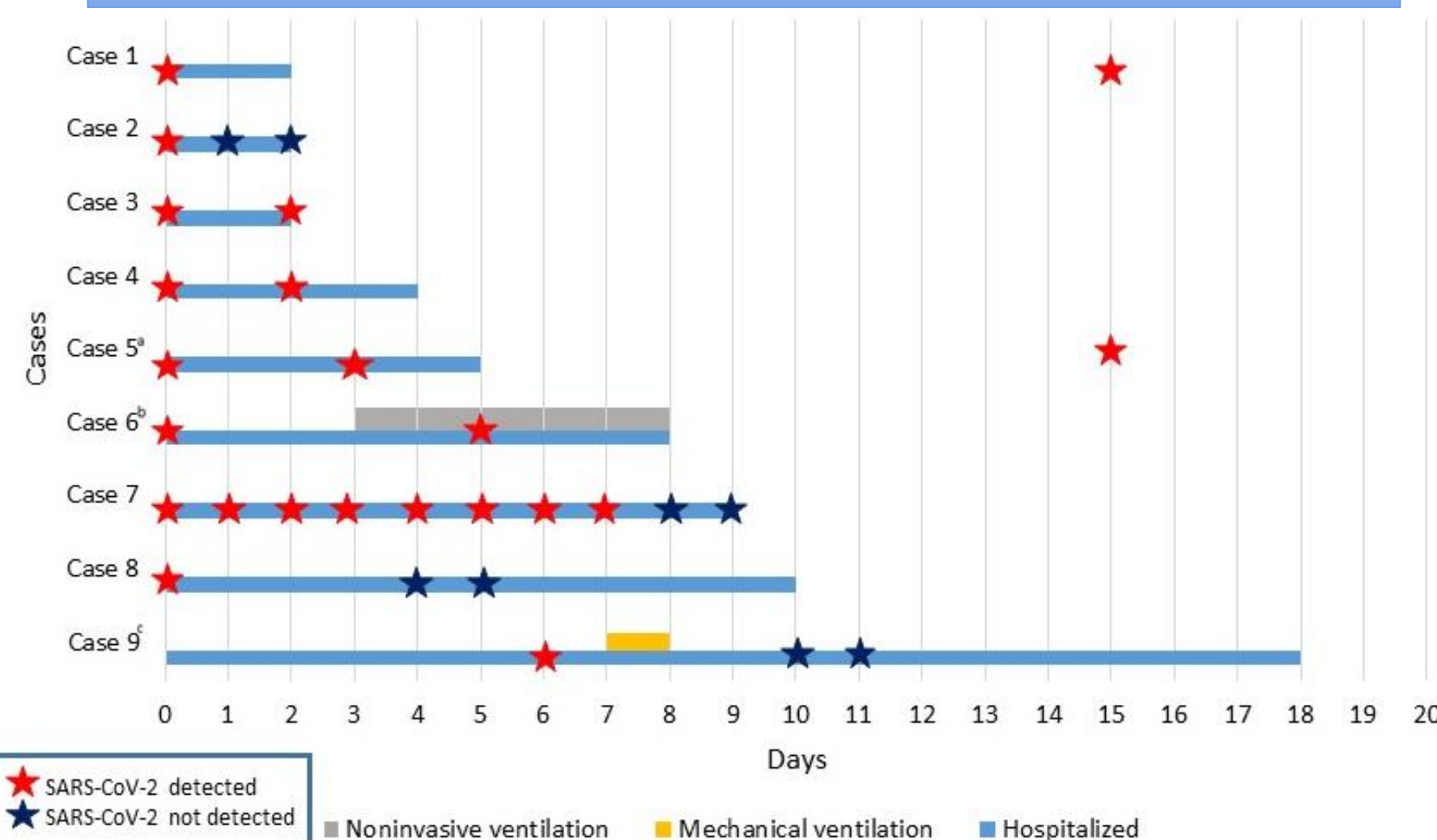
METHODS

- We performed a retrospective chart review of all pediatric patients (<21 years of age) with ≥ 2 nasopharyngeal specimens tested for SARS-CoV-2 by reverse transcription-polymerase chain reaction (RT-PCR) and at least one positive result between 3/13/2020 and 6/7/2020 through the TCH Molecular Microbiology Laboratory.
- This study was approved by the Baylor College of Medicine IRB.

RESULTS

- Fifty-one patients met inclusion criteria. The median age was 8.6 years (0.02-19.2 years) and sixteen (31%) children were hospitalized.
- Fourteen (27%) patients underwent testing for surveillance purposes (including 3 admitted patients).
- Two SARS-CoV-2 tests were performed in 25 (49%) children; while 12 (24%) children had 3 tests, 4 (8%) children had 4 tests, and 10 (20%) children had ≥ 5 tests (including 1 patient with underlying malignancy who had 9 SARS-CoV-2 PCRs performed).
- SARS-CoV-2 testing timeline for 9 hospitalized children is shown (Figure 1).
- The median time between collection of tests 1 and 2 was 14 days (n=51, range 1, 53 days).

Figure 1. Timing of Repeat SARS-CoV-2 PCRs in Select Hospitalized Children with COVID-19



Footnote: Figure depicts 9 of 16 patients who were hospitalized (not shown are 5 patients with multiple admissions during the study period and 2 patients who remain hospitalized)

^a Patient had SARS-CoV-2 detected on Day 30 ^b Patient expired on Day 8 ^c Patient had SARS-CoV-2 not detected on Days 26 and 38

RESULTS (cont'd)

- For children with conversion (first detected to first not-detected sample), the median time was 15 days (n=31, range 1, 45 days).
- For patients with consecutive positive SARS-CoV-2 PCRs, the median time of positivity was 10 days (n=19, range 2, 31).
- One patient with malignancy had 5 tests over 6 weeks in the outpatient setting and each time alternated between detected and not-detected.
- Following diagnosis with COVID-19, one patient with sickle cell disease likely had re-infection and had a positive test after having 2 consecutive negative tests; his last SARS-CoV-2 RT-PCR was positive 68 days after initial positive.

UPDATED GUIDANCE

- Our findings early in the pandemic corroborate published reports of prolonged SARS-CoV-2 RNA detection in patients hospitalized with COVID-19.¹⁻²
¹Midgley et al. Nat Med 2020 Jun;26(6):861-868; ²Woefel et al. Nature 2020 May;581(7809):465-469.
- Thus, recommendations for the discontinuation of transmission-based precautions for patients with SARS-CoV-2 infection have evolved.
- Currently, based on CDC guidance, a symptom-based strategy is preferred over a test-based strategy as the test-based strategy could lead to prolonged isolation of patients who continue to shed the virus but are no longer infectious.³
³<https://www.cdc.gov/coronavirus/2019-ncov/hcp/disposition-hospitalized-patients.html>

CONCLUSIONS

- We observed variation in the duration of SARS-CoV-2 RT-PCR positivity in children with COVID-19.
- For children with COVID-19, a single negative molecular assay for SARS-CoV-2 may not be predictive of sustained negativity.
- Reinfection with COVID-19 is rare and needs further investigation.
- Discontinuation of transmission-based precautions is now symptom and time-based rather than test-based.