Hearing Screening Methods and Outcomes for Infants Born to COVID-Positive Mothers at a Large Academic Medical Center

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Introduction

COVID-19 disease has been associated with auditory system dysfunction (Mustafa, 2020; Celik et al., 2021). Yet, studies with small samples indicate maternal COVID-19 is not a risk factor for newborn hearing loss (Alan & Alan, 2021; Oskovi-Kaplan et al., 2022).

Purpose

- to evaluate risk of hearing screening failure among newborns born in a large academic medical center to mothers with COVID-19 infection at the time of birth;
- to evaluate the frequency of hearing screening failure when remote testing procedures were in place due to isolation precautions in the nursery

Methods

- Retrospective chart review of newborns discharged from Vanderbilt University Medical Center well baby nursery between April 2020 and September 2021 (n = 6022);
- Compared rates of initial inpatient automated ABR hearing screening failures:
  - for babies born to mothers with (n = 135) and without (n = 5887) positive COVID-19 test within 4 days of delivery;
  - for remote screen procedures (n = 62) that occurred early in the pandemic and in-room screen procedures (n = 73) later in the pandemic for babies born to mothers with positive COVID-19 test;
- Explored additional variables related to failing initial inpatient hearing screening;
- Compared final ABR screening outcomes for babies born to mothers with and without a positive COVID-19 test.

Maternal COVID-19 disease at the time of birth increases the risk of initial newborn hearing screening failure but does not affect the risk of hearing loss.
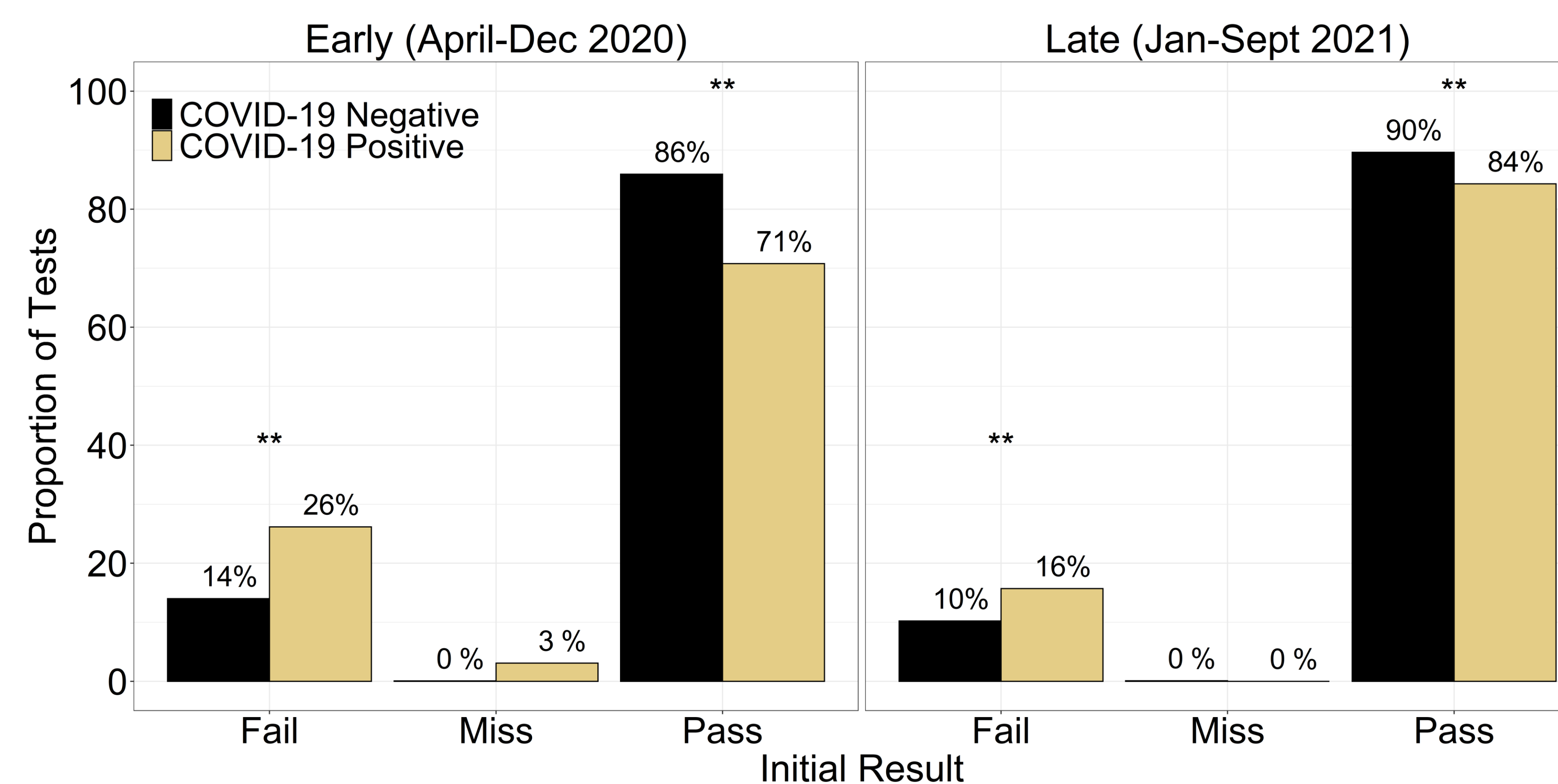

Figure 1. Initial inpatient hearing screening rates for each outcome early in the pandemic, when screeners were not in the hospital room for the positive group (April – December 2020) and late in the pandemic when screeners were in the hospital room for the positive group (January – September 2021).

Factor	Coefficient	Odds Ratio	95% CI Odds Ratio	p value
Age (in hours)	-0.02	.975	.94 to 1.01	.194
Estimated gestational age	0.005	1.01	.95 to 1.06	.859
Gender (male)	0.55	1.73	.69 to 4.47	.250
Birth weight (kg)	**-1.18**	**0.31**	**.09 to .93**	**.047**

Table 1. Risk factors for failing an initial hearing screening among babies born to mothers with COVID-19.
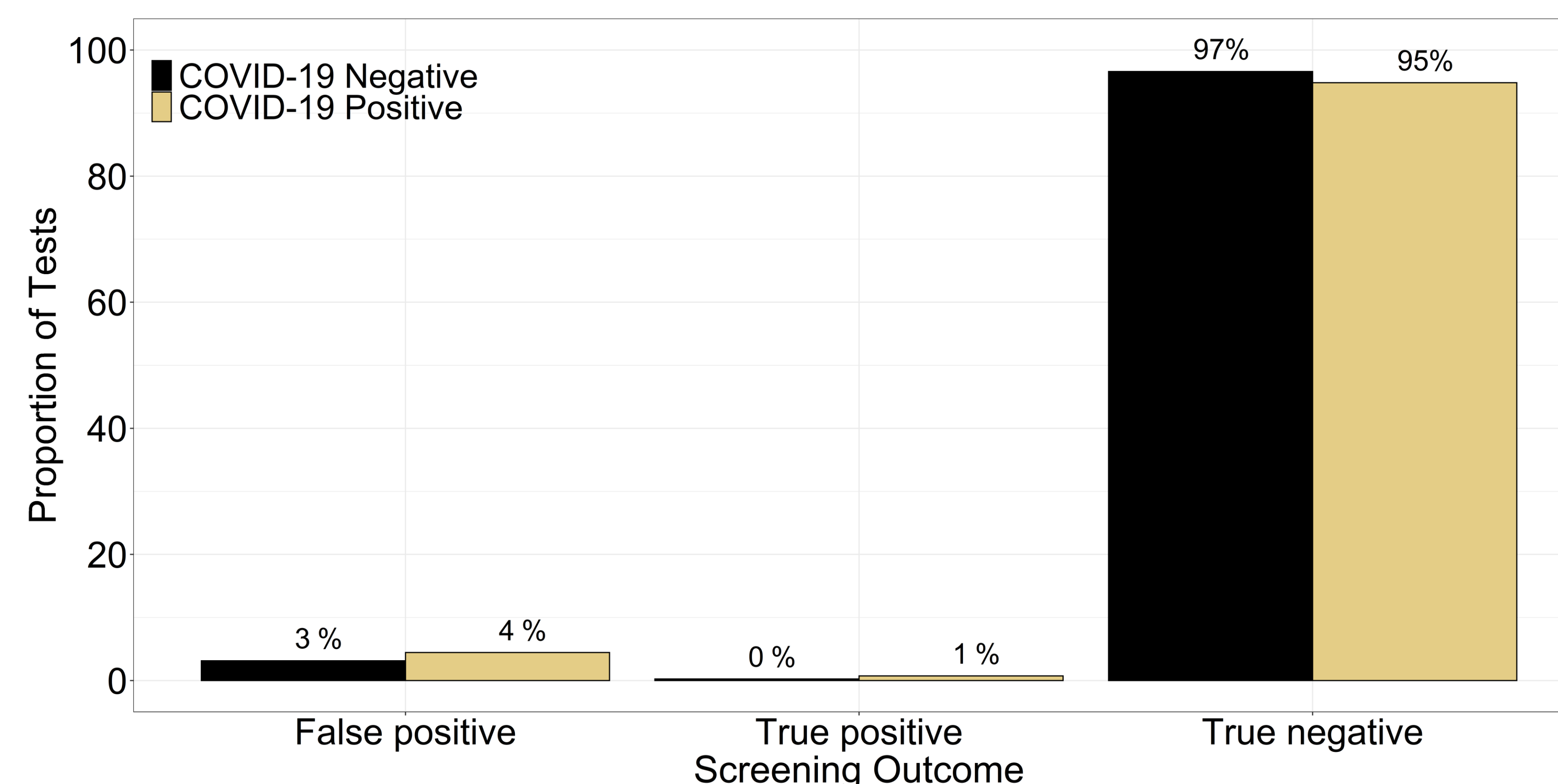

Figure 2. Final screening outcomes (final result for an inpatient and/or outpatient hearing screening) for all babies born between April 2020 and September 2021.

Results

- *Figure 1* shows initial hearing screening failure rates were highest in 2020 ($p < 0.001$) and for the babies born to mothers with COVID-19 ($p < 0.0001$), regardless of screening type.
- Binomial regression analysis (*Table 1*) shows a significant effect of birthweight on hearing screen failure for babies of COVID positive mothers.
  - Babies who passed: M = 3.26 kg
  - Babies who did not pass: M = 3.08 kg
  - Note: babies born to mothers without COVID-19 were generally larger (3.3 kg) and weight did not differ by initial test result.
- False positive rates were calculated based on outpatient hearing tests (*Figure 2*).
  - Only 1 baby born to a mother with COVID-19 has confirmed hearing loss.
  - False positive rates were similar for babies born to mothers with and without COVID-19.

Conclusions

- Relative to babies born to COVID negative mothers, babies born to COVID positive mothers at birth:
  - are more likely to fail the initial hearing screening, regardless of screening method.
  - are not more likely to have a final screening outcome of fail.
- Although a higher fail rate was found in babies screened with remote screening early in the pandemic, 97% of these babies born to COVID positive mothers received a screening and 89% ultimately passed prior to hospital discharge, thus saving families an outpatient clinic visit during the pandemic and maintaining compliance with state screening laws and JCIH 1-3-6 benchmarks.

References

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