

Impact of Asymptomatic Upper Respiratory Viral Shedding in Pediatric Cardiothoracic Surgical Patients

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Background

- Intraoperative and postoperative complications associated with symptomatic upper respiratory infections in young children are well-documented
- Asymptomatic upper respiratory viral shedding is frequent and may be prolonged
- Pediatric cardiac surgical procedures could be delayed with recognition of asymptomatic viral shedding
- This study aimed to:
 - assess if a positive preoperative respiratory viral panel (+ RVP) polymerase chain reaction (PCR) impacts postoperative length of stay in the pediatric intensive care unit (PICU) or hospital
 - assess for an association among + RVP and adverse clinical events

Methods

- Patients < 3 years old presenting to Children's Hospital & Medical Center in Omaha, NE for cardiothoracic surgery from March 2018-March 2020 were enrolled
- Within 24 hours before surgery, an RVP via nasopharyngeal swab for PCR was collected from subjects
- Chart review was completed after hospital discharge
- Mean difference between RVP status and length of stay for PICU and hospital was assessed with an independent, two group, sample t-test.
- Logistic regression was used to test association between RVP status and adverse clinical events (ventilator associated pneumonia (VAP), surgical site infection, prolonged fever, ventilator use, or antibiotics)
 - adjusted by complexity of surgical procedure using the Risk Adjustment in Congenital Heart Surgery-1 (RACHS-1) score

Results

- There were 95 subjects included, approximately 50% female, 75% Caucasian; 39% had + RVP (Table 1)
- There was no statistical association between RVP status and length of PICU (p=0.35) or hospital stay (p=0.28) (Table 2)
- Odds ratio for extubation in the operating room was significantly associated with +RVP, though small sample size and wide confidence intervals limit generalizability of this observation (Table 3)
- No clinically significant associations between RVP status and adverse events

Table 1. Subject Demographics

Category	Frequency (N=95)
Race	n (%)
African American	2 (2.11)
Native American	1 (1.05)
Asian	2 (2.11)
Caucasian	71 (74.74)
Hispanic	13 (13.68)
Indian	1 (1.05)
Two or more races	5 (5.26)
Sex	n (%)
Female	47 (49.47)
Male	48 (50.53)
Age	Mean (SD)
Months	7.44 (7.58)
RVP status	n (%)
Positive	37 (38.95)
Negative	58 (61.05)
Length of stay (days)	Mean (SD)
Hospital	12.08 (22.71)
PICU	6.28 (11.97)

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Table 2. Mean Difference in Length of Stay by RVP Status

RVP Status	Hospital Length of Stay (days)		Pr > t
	LSMEAN	Standard Error	
Positive	8.92	3.73	0.28
Negative	14.10	2.98	
RVP Status	PICU Length of Stay (days)		Pr > t
	LSMEAN	Standard Error	
Positive	4.84	1.97	0.35
Negative	7.21	1.57	

Table 3. Odds Ratios of Clinical Adverse Events by RVP status*

Outcome variable	RVP Status	Adjusted OR	95% Wald Confidence Intervals	
Extubation in Operating Room	+RVP vs. -RVP	21.2	2.493	180.252
Postoperative Reintubation	+RVP vs. -RVP	0.240	0.028	2.083
Postoperative Noninvasive Positive Pressure Ventilation	+RVP vs. -RVP	0.792	0.321	1.955
Surgical Site Infection	+RVP vs. -RVP	14.954	0.707	316.503
Postoperative Fever	+RVP vs. -RVP	0.703	0.306	1.618

*No VAP events were recorded in the sample population.

Conclusions

- This limited, single-center study found that preoperative RVPs identified asymptomatic viral shedding in 39% of pediatric cardiac surgery patients, though provided no detectable clinical benefit
- Larger studies are needed to fully explore specific adverse clinical events and individual viral pathogen impacts
- Institutional policies requiring preoperative RVP screening for pediatric cardiac surgery should be discouraged