347. SARS-CoV-2 and Acute Otitis Media in Children: A Case Series

Holly M. Frost, MD[1]; Thresia Sebastian, MD, MPH[2]; Amy Keith, MPH[2]; Melanie Kurtz, BS[2]; Samuel R. Dominguez, MD, PhD[3]; Samuel R. Dominguez, MD, PhD[3]; Sarah Parker, MD[4]; Timothy C. Jenkins, MD[5]; [1]Denver Health and Hospital Authority, University of Colorado School of Medicine, Denver, Colorado; [2]Denver Health and Hospital Authority, Denver, Colorado; [3]University of Colorado, School of Medicine, Aurora, CO; [4]Children's Hospital Colorado, Aurora, CO; [5]Denver Health Medical Center, University of Colorado School of Medicine, Denver, Colorado

Session: P-14. COVID-19 Complications, Co-infections, and Clinical Outcomes

Background. Reports in adults with COVID-19 and acute otitis media (AOM) show that severe symptoms and hearing loss may be more common than with the clinical presentation of typical AOM. However, the association of SARS-CoV-2 with AOM in children is poorly understood.

Methods. Cases were identified as a subpopulation enrolled in the NOTEARS prospective AOM study in Denver, CO from March-December 2020. Children enrolled were 6-35 months of age with uncomplicated AOM and prescribed amoxicillin. Children diagnosed with AOM and SARS-CoV-2, detected by polymerase chain reaction assay, were included in the case series. Data was obtained from electronic medical records and research case report forms. Patients completed surveys at enrollment and 5, 14 and 30 days after enrollment that included the Acute Otitis Media Severity of Symptoms (AOM-SOS©) scale. All patients had nasopharyngeal otopathogen testing completed.

Results. A total of 108 patients had been enrolled through December 2020 (all of whom were subsequently tested for SARS CoV-2). During the study period for this case series, 16 patients were enrolled, and 7 (43.6%) were identified with AOM/SARS-CoV-2 co-infection. Among these 7 patients, fever was present in 3 children (29%). Four children (57%) attended daycare. Only 2 children (29%) had testing for SARS CoV-2 as part of their clinical workup. Mean AOM-SOS© scores were similar among the SARS CoV-2 positive and negative patients with no statistical significance noted with two-sided t-tests: 13.6 (± 4.5) vs 14.2 (± 4.9) at enrollment, 1.4 (± 1.8) vs 4.2 (±4.9) on Day 5, and 0.6 (± 0.9) vs. 2.5 (±6.1) on Day 14 (Table 1). Among the 7 patients, no child had an AOM treatment failure or recurrence. Of the 6 patients in whom bacterial and viral testing have been completed, a bacterial otopathogen was identified in 6 (100%), and a viral pathogen in 3 (50%) children (Table 2).

Table 1. Clinical features of children with concurrent SARS-CoV-2 and AOM

Category	Characteristic	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7
Demographics	Age (*months*)	30	29	16	8	11	7	24
	Gender-Male	+		+		+	+	+
	Race other than white	+[a]				+[a]		
	Hispanic	+		+	+	+	+	
	Public Insurance	+		+	+	+	+	+
Medical History	Past medical problems					+[c]	+[d]	
	2+ doses PCV	+	+		+	+		+
	Smoke exposure	+			+			
	Breastfeeding	+	+	+		+		+
	Daycare attendance		+	+		+		+
Clinical Presentation	Ear pain/tugging	+	+	+	+		+	+
	Nasal congestion	+	+	+	+	+		+
	Fussiness/irritability	+	+	+	+	+		+
	Cough	+		+	+	+		+
	Reduced oral intake			+	+	+		+
	Eye redness/pain/discharge			+		+		
	Fever- subjective or over 100.4			+		+	+	
	Vomiting						+	
	Diarrhea					+		
	Reduced urine output				+			
	Bilateral infection					+		
Outcomes	AOM-SOS[©,a]							
	Diagnosis	10	6	10	18	15	18	18
	Day 5	0	0	0	4	4	0	2
	Day 14	0	0	2	2	0	0	0
	Treatment Failure	No	No	No	No	No	No	No
	Recurrence	No	No	No	No	No	No	No

[a]Unknown/not reported [b]Black [c]Prenatal methadone exposure, wheezing [d]Prematurity [e]Acute otitis media severity of symptoms score (UPMC, Pittsburgh, PA); Minimum significant clinical different= 20%, scores of 4 and lower are considered equivalent to a normal state of health.

Table 2. Laboratory findings of children with concurrent SARS-CoV-2 and AOM.

Laboratory Test[a]	Specific Pathogen	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7
SARS-CoV-2 PCR	Clinical SARS CoV-2 PCR (Abbott)						+	+
	Research SARS-CoV-2 PCR (Quidel)	+	+	+	+	+	+	NYT[b]
Respiratory Viral PCR	Adenovirus					+		NYT
	Influenza A							NYT
	Influenza B							NYT
	Parainfluenza 1							NYT
	Parainfluenza 2							NYT
	Parainfluenza 3							NYT
	RSV							NYT
	Human Metapneumovirus				+			NYT
	Rhinovirus	+[c]				+		NYT
	Coronavirus spp. (not SARS-CoV-2 or MERS)							NYT
	MERS							NYT
	Enterovirus	+						NYT
Bacterial PCR	*S.pneumoniae*	+	+	+		+		NYT
	H. influenzae	+	+	+	+		+	NYT
	M. catarrhalis	+		+		+		NYT
	S. aureus				+		+	NYT
Culture	*S. pneumoniae*		+	+	+	+		-[d]
	H. influenzae	+	+	+	+	+		-
	M. catarrhalis			+				-
	S. aureus				+			-

[a]All testing completed using NP swabs collected at enrollment [b]NYT- not yet tested [c]Inconclusive [d]Culture completed after receiving 1 dose of antibiotics

Conclusion. SARS-CoV-2 can occur in children with AOM. It is important that providers maintain a high index of suspicion for COVID-19 even in patients with clinical evidence of AOM, particularly to ensure families are appropriately advised on isolation and quarantine requirements. AOM with SARS-CoV-2 does not appear to be more severe than AOM without SARS-CoV-2.

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348. Characteristics and Outcomes in Hospitalized Patients with Covid-19 Complicated by Fungemia: A Single Center Retrospective Study

Aleena Zahra, MD[1]; Bettina C. Fries, MD/FIDSA[2]; Bettina C. Fries, MD/FIDSA[2]; Sutthichai Sae-Tia, MD[1]; [1]SUNY Stony Brook University Hospital, Stony Brook, New York [2]Stony Brook University Hospital, Stony Brook, NY

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Background. Covid19 caused by SARS-CoV2 can lead to significant morbidity and mortality. Fungemia is a rare hospital-associated infection and there are limited data regarding its association with Covid19. We reviewed all cases of fungemia in our Covid19 cohort at Stony Brook University Hospital (SBUH).

Methods. We conducted a retrospective medical record review of patients admitted with Covid19 in a 3-month interval. We reviewed positive blood cultures for fungi and recorded co-morbidities, co-infections, length of stay, treatments, and outcomes (survival vs death). There were 60 positive blood cultures for fungi in 25 unique patients (Table 1); in prior years < 30 per year reported at SBUH.

Table 1. Fungal Blood Cultures

Fungal Species Name	Number of Unique Patients with Positive Fungal Blood Cultures
CANDIDA ALBICANS	8
CANDIDA PARAPSILOSIS	7
CANDIDA TROPICALIS	3
CANDIDA LUSITANIAE	3
CANDIDA GLABRATA	2
CANDIDA DUBLINIENSIS	1
CRYPTOCOCCUS NEOFORMANS	1
Total Positive Cultures	25

Collation of each unique identified fungal species from fungal blood cultures in patients hospitalized with Covid-19

Results. During a 3 month interval at the local peak of the pandemic 1398 patients hospitalized with Covid19 at SBUH, 25 cases of fungemia were detected; *C. albicans* (CA) n=8,32%, non *C albicans* species (nCA) n=16,64%, and *C. neoformans* n=1,4%, 17/25 (68%) also with bacteremia during same hospitalization. In same 3 months there were 264 cases of bacteremia and Covid19 co-infection. Demographics and medical co-morbidities of fungemic patients are in Table 2. Majority were men (76%). No difference between fungaemic (FC) and total cohort (TC) in median age (62 vs 62), DM p=0.31, HTN p=1.0, COPD p=0.12. Within FC, DM was higher in nCA group (58.8%) vs CA group (37%). Mortality was 40% in FC vs 15% in TC, p< 0.001. Within FC mortality was 56% in nCA and 25% in CA group. *C. parapsilosis* was the most common nCA species isolated with 43% mortality. FC more likely to require ICU and mechanical ventilation (88% vs 15%, p< 0.0001) and had longer median length of stay 42 days vs 22 days. The median time from admission to fungaemia was 21d, from central line placement 19d, Table 3. Of FC 21 (84%) were treated with steroids/Tocilizumab concurrently. Of note, no mortality was recorded in the 4 patients that did not receive steroids/Tocilizumab.

PCT and WBC were significantly higher at time of fungemia as compared to admission, Table 3.

Table 2, Patient co-morbidities and hospitalization stay characteristics

	Total Cohort, N=1325	Fungemic Cohort, N=25	p-value
Hypertension	464	15	1.0
Diabetes mellitus (DM)	324	13	0.31
Coronary Artery Disease (CAD)	254	8	0.12
Chronic Kidney Disease (CKD)	194	1	0.24
COPD/Asthma	256	6	0.12
Malignancy	188	2	0.56
Intensive Care Unit (ICU) admission	198	22	<0.0001
Mechanical Ventilation	198	22	<0.0001
Age	62 (49-75)	62 (53-75)	1.0
Male	755	19	0.06
Female	570	6	0.06
Caucasian	739	8	0.02
Hispanic	343	11	0.06
Black or African American	92	2	0.69
Asian	47	4	0.01

Co-morbidities and requirement for ICU stay, mechanical ventilation for total cohort Covid-19 and fungemic cohort

Table 3, Patient Characteristics and Laboratory Parameters

Patient Characteristics	Median	IQR	Laboratory Parameters	Mean Difference Day Fungemia-Day Hospitalization	SEM, p value
BMI kg/m²	26.12	22.9—32.73	Procalcitonin ng/mL	1.81	+/- 1.05 p<0.05
SARS-CoV2 PCR positive from hospitalization (day)	1	-1 – 1	C-Reactive Protein mg/dL	-7.68	+/- 2.09 p<0.0006
Temperature (C) on day of fungemia	38.1	37.3-38.6	WBC K/uL	6.58	+/- 1.75 P<0.0005
Time Fungemia from hospitalization (day)	21	14-37			
Time Fungemia from central line placement (day)	19	8.5-25			
Total Number Antibiotics (1+dose/antibiotic)	6	5-7			

Relevant patient characteristics and laboratory parameters in patients hospitalized with Covid19 and fungemia

Conclusion. Fungemia in hospitalized patients with COVID-19 is associated with higher mortality. We observed higher fatality in non *C. albicans* infections. Prolonged use of central line catheters and concurrent treatment with steroids/tociluzimab are likely high-risk factors for development of fungemia.

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349. Diagnostic Testing and Antibiotic Utilization in Patients with COVID-19

Lauren Groft, PharmD[1]; Iulia Opran, PharmD Candidate[2]; Yeabsera Tadesse, PharmD candidate[2]; Hang Vo, PharmD Candidate[2]; Emily Heil, PharmD, MS, BCIDP[3]; Emily Heil, PharmD, MS, BCIDP[3]; Gregory Schrank, MD, MPH [4]; Kimberly C. Claeys, PharmD[2]; [1]The Johns Hopkins Hospital, Baltimore, MD; [2]University of Maryland School of Pharmacy, Baltimore, MD; [3]University of Maryland School of Pharmacy; University of Maryland Medical Center, Baltimore, MD; [4]R Adams Cowley Shock Trauma Center, Baltimore, MD

Session: P-14. COVID-19 Complications, Co-infections, and Clinical Outcomes

Background. Patients with COVID-19 receive high rates of antibiotic therapy, despite viral origin of infection. Reports of bacterial coinfection range from 3.5 to 8% in the early phase of infection. This study aimed to evaluate the relationship between diagnostic tests and antibiotic utilization in patients admitted with COVID-19 at the University of Maryland Medical Center to better inform future prescribing practices.

Methods. Retrospective cohort study of adult patients with a positive SARS-CoV-2 PCR on admission from March 2020 through June 2020. Associations between diagnostic tests employed and antibiotic initiation and duration were explored using bivariate analysis (SPSS®).

Results. Baseline characteristics of 224 included patients are reported in Table 1. Excluding SARS-CoV-2 PCRs, most frequently performed diagnostic tests included blood cultures (65.6%), MRSA nasal surveillance (45.1%), respiratory cultures (36.2%), respiratory viral panel (RVP) (33.0%), and Legionella (28.6%) and pneumococcal (26.3%) urine antigens. Positivity of RVP, Legionella, pneumococcus, blood, and respiratory tests were low (1.3%, 0.4%, 0.9%, 1.8%, and 6.7%, respectively). A total of 62% of patients were initiated on antibacterial therapy with a median cumulative antibiotic duration of 77.9 hours (IQR 41.4, 111.8). History of chronic respiratory disease (76% vs. 58.6%; *P*=0.025), any degree of oxygen requirement on admission (72% vs. 42.6%; *P*=0.006), and performance of blood cultures (70.7% vs. 46.8%, *P*< 0.0001) were associated with antibiotic initiation. Positive bacterial diagnostic respiratory culture (median duration 72.8h [IQR 46.7, 96.6] vs. 97.3h [IQR 79.8, 194.1]; *P*=0.027) and positive blood culture (median duration 80.1h [IQR 42.1, 111.7] vs. 97.5h [IQR 71.8, 164.8]; *P*=0.046) were associated with longer antibiotic duration. Patients who did not have respiratory cultures performed had similar antibiotic durations as those with negative respiratory cultures.

Table 1. Baseline Characteristics

Age; mean (SD), years	54 (17.3)
Male; n (%)	142 (63.4)
Race; n (%)	
Black or African American	126 (56.3)
Hispanic or Latino	51 (22.8)
White	28 (12.5)
Asian	6 (2.7)
American Indian or Alaska Native	2 (0.9)
Comorbidities; n (%)	
Body mass index ≥ 30 kg/m^2	136 (60.7)
Chronic cardiac disease	12- (54.0)
Diabetes mellitus	74 (33.0)
Chronic respiratory disease	50 (22.3)
Chronic kidney disease	29 (12.9)
Level of care on admission; n (%)	
Floor	94 (42.0)
ICU	90 (40.2)
IMC	40 (17.9)
Oxygenation status on admission; n (%)	
Invasive mechanical ventilation/ECMO	89 (39.7)
Room air	54 (24.1)
Low-flow nasal canula	50 (22.3)
Non-invasive ventilation or high-flow nasal canula	31 (13.8)

Conclusion. Despite low coinfection rates, negative diagnostic tests did not result in shorter empiric antibacterial duration. These findings highlight the ongoing need for both diagnostic and antimicrobial stewardship in COVID-19.

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350. Joint Modeling of EHR and CXR Data to Predict COVID-19 Deterioration

Emily Mu[1]; Sarah Jabbour, PhD Candidate[2]; Michael Sjoding, Physician[2]; John Guttag, Professor[3]; Jenna Wiens, PhD[2]; Adrian Dalca, PhD[4]; [1]Massachusetts Institute of Technology, Naperville, IL; [2]University of Michigan, Ann Arbor, Michigan; [3]MIT, Cambridge, Massachusetts; [4]MIT, Harvard MGH, Cambridge, Massachusetts

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Background. Infectious respiratory-track pathogens are a common trigger of healthcare capacity strain, e.g. the COVID19 pandemic. Patient risk stratification models to identify low-risk patients can help improve patient care processes and allocate limited resources. Many existing deterioration indices are based entirely on structured data from the Electronic Health Record (EHR) and ignore important information from other data sources. However, chest radiographs have been demonstrated to be helpful in predicting the progress of respiratory diseases. We developed a joint EHR and chest x-ray (CXR) model method and applied it to identify low-risk COVID19+ patients within the first 48 hours of hospital admission.

Methods. All COVID19+ patients admitted to a large urban hospital between March 2020 and February 2021 were included. We trained an image model using large public chest radiograph datasets and fine-tuned this model to predict acute dyspnea using a cohort from the same hospital. We then combined this image model with two existing EHR deterioration indices to predict the risk of a COVID19+ patient being intubated, receiving a nasal cannula, or being treated with a vasopressor. We evaluated models' ability to identify low-risk patients by using the positive predictive value (PPV).

Results. The image-augmented deterioration index was able to identify 12% of 716 COVID-19+ patients as low risk with 0.95 positive predictive value in the first 48 hours of admission. In contrast, when used individually, the EHR and CXR models each identified roughly 3% of the patients with a PPV of 0.95.

Predicting Low Risk Patients

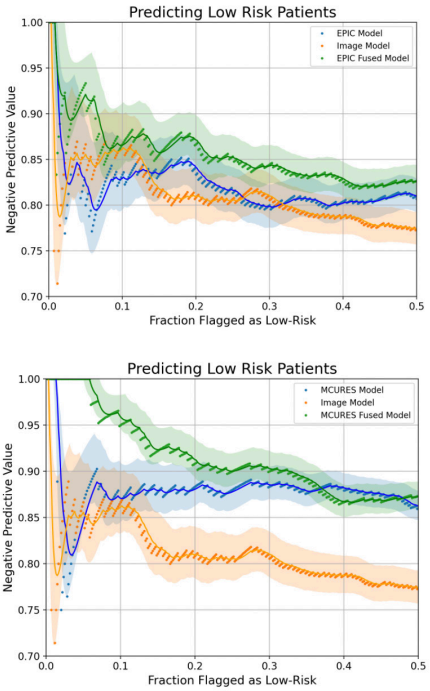

Figure 1. Aggregated predictions for COVID19 positive patients within the first 48 hours of admission, shown with exponential weight moving average and 95% CIs. Each plot shows the number of patients flagged as low-risk by lowest aggregated prediction and the resulting accuracy for that fraction of patients. The bottom plot compares the MCURES fused model to the MCURES model. The top plot compares the EDI fused model to the EDI model.

Aggregated predictions for COVID19 positive patients within the first 48 hours of admission, shown with exponential weight moving average and 95% CIs. Each plot shows the number of patients flagged as low-risk by lowest aggregated prediction and the resulting accuracy for that fraction of patients. The bottom plot compares the MCURES fused model to the MCURES model. The top plot compares the EDI fused model to the EDI model.

Conclusion. Our multi-modal models were able to identify far more patients at low-risk of COVID19 deterioration than models trained on either modality alone. This indicates the importance of combining structured data with chest X-rays when creating a deterioration index performance for infectious respiratory-track diseases.

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