

day 2 in 82/178 (46%) and day 7 in 128/164 (78%) patients with complete assessments to date. 131/181 (72%) of children had known SARS-CoV-2 positive contacts. We observed no cases of multisystem inflammatory syndrome in children.

**Table 1.** SARS-CoV-2 positive symptomatic and asymptomatic infants, children and adolescents from March 12-June 14, 2020 at a single academic medical center in the southeastern United States

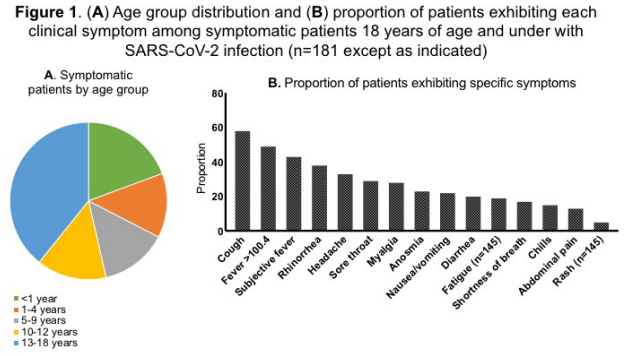
Indication for testing	Dates of testing	Number of patients with positive test/Number of patients tested
Symptomatic patients: any patient with new onset cough or fever in the prior 7 days with or without known contact with person with COVID-19 <sup>1</sup>	March 12 to June 14, 2020	181/2638 (6.8%)
Asymptomatic screening: Prior to any hospital admission, receiving cancer chemotherapy, stem cell, or solid organ transplantation, or prior to surgical or certain aerosol-generating medical procedures	May 4, to June 14, 2020	12/2768 (0.4%)
Neonates born to SARS-CoV-2 positive mothers	March 12 to June 14, 2020	0/9 at birth (1 infant became symptomatic with a positive test at 5 weeks of age, included in 'symptomatic patients' cohort, Table 2)

<sup>1</sup> Includes 4 patients with an indeterminate results

**Table 2.** Sociodemographic and clinical features of symptomatic SARS-CoV-2 positive children and adolescents 18 years of age and under (n=181<sup>1</sup> unless otherwise specified)

Characteristic or clinical variable	No. (%)
Age (y), median, IQR	10.7, 2.8-16.7
Gender, female (*n=180)	79 (44)
Race	
White	166 (92)
Black	11 (6)
Asian	10 (6)
Other or Unknown	5 (3)
Hispanic ethnicity	79 (44)
Middle Eastern ethnicity	36 (20)
Testing location	
Emergency department	66 (37)
Walk-in/after-hours clinic	60 (33)
COVID-19 assessment center	37 (20)
Primary care clinic	17 (9)
Hospital admission	1 (1)
Any comorbidity	41 (23)
Chronic lung disease	16 (39)
Diabetes mellitus	2 (5)
Cardiovascular disease	9 (22)
Chronic renal disease	1 (2)
Immunocompromising condition	3 (7)
Neurologic condition	7 (17)
Other chronic condition	17 (42)
Household smoke exposure (*n=171)	10 (6)
Current or prior history of vaping (*n=175)	6 (3)
SARS-CoV-2 exposure	
Known household contact with COVID-19	114 (63)
Known community contact with COVID-19	17 (9)
Antimicrobials received at time of diagnosis	21 (12)
Hospitalized (number of unique patients) <sup>2</sup>	9 (5)
Required ICU care	1 (1)
Required mechanical ventilation	0 (0)
Death <sup>3</sup>	1 (1)
Symptom resolution by day 2 (*n=178)	82 (47)
Symptom resolution by day 7 (*n=164)	128 (81)
Parent or child experienced mental/emotional trauma due to COVID-19 diagnosis (self-report) at 7-day follow-up (*n=72)	18 (17)
Excessive worry/anxiety	71 (99)
Depression	4 (6)
Distress from judgment	1 (1)

<sup>1</sup> Includes 4 patients with SARS-CoV-2 PCR test with indeterminate results, considered presumptive positive, and 1 infant who developed symptoms and positive SARS-CoV-2 test at 5 weeks of age after being born to mother who was SARS-CoV-2 positive at time of delivery  
<sup>2</sup> 9 patients hospitalized (one patient hospitalized for SARS-CoV-2 related symptoms was hospitalized twice); 2 hospitalizations were for indications unrelated to SARS-CoV-2 infection  
<sup>3</sup> Patient with multiple comorbidities; cause of death undetermined at this time; unclear if related to SARS-CoV-2 infection



**Conclusion:** In our community, pediatric SARS-CoV-2 prevalence was low, but was much higher among symptomatic than asymptomatic children. Symptoms were mild, and the duration of symptoms brief, in the majority of these patients captured within an integrated ambulatory and hospital-based healthcare system, capturing the full spectrum of the disease profile in this age group.

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**359. Ventilator-associated pneumonia in patients with SARS-CoV-2-associated acute respiratory failure requiring mechanical ventilation: a retrospective cohort study**

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**Session:** P-12. COVID-19 Complications, Co-infections, and Clinical Outcomes

**Background:** Data on incidence, clinical presentation and outcomes of ventilator-associated pneumonia (VAP) in patients with severe coronavirus disease 2019 (COVID-19) pneumonia requiring mechanical ventilation (MV) are limited.

**Methods:** Case series of patients with COVID-19 pneumonia admitted to a single ICU in France. All consecutive patients requiring MV with RT-PCR-confirmed SARS-CoV-2 infection between March 12th and April 24<sup>th</sup>, 2020 were included. Frequency, clinical characteristics, responsible pathogens and outcomes of VAP were assessed, and compared to an historical cohort of patients with severe influenza-associated pneumonia requiring MV admitted to the same ICU during the preceding three winter seasons.

**Results:** Fifty-four consecutive patients with COVID-19-associated respiratory failure requiring MV were included (median (IQR) age 48 (42-58) years; 74% male; 93% requiring veno-venous ECMO). VAP occurred in 46 (85%) of them (median (IQR) prior MV duration before the first episode, 11 (8-16) days) (Table 1). Pathogens responsible for VAP were predominantly Enterobacteriaceae (72%), and particularly inducible AmpC-cephalosporinase producers (41%), followed by *Pseudomonas aeruginosa* (35%) (Table 2). Pulmonary infection recurrence and death were observed in 46 (85%) and 17 (31%) patients, respectively. Details on recurrent episodes and pathogens responsible for recurrences are given in Table 3. Most recurrences were relapse (i.e. infection with the same pathogen), with a high proportion occurring during antimicrobial treatment despite its adequacy. Despite a high rate of *P. aeruginosa* VAP in patients with influenza-associated ARDS, pulmonary infection recurrence rate was significantly lower than in patients with COVID-19. Overall mortality was similar in the two groups.

**Baseline characteristics of patients**

	Covid-19 patients N = 54	Influenza patients N = 51
Age, yrs <sup>*</sup>	48 (42-58)	58 (48-64)
Male sex	40 (74)	31 (63)
Time between symptom onset and ICU admission, days <sup>*</sup>	11 (7-13)	7 (6-11)
Admission SAPS II score <sup>*</sup>	53 (45-65)	70 (58-79)
Admission SOFA score <sup>*</sup>	12 (9-14)	14 (9-17)
Immunosuppressed	1 (2)	6 (12)
Documented bacterial co-infection at ICU admission <sup>*</sup>	10 (19)	21 (41)
Antimicrobial treatment at ICU admission	54 (100)	51 (100)
Duration of antimicrobial treatment, days	5 (4-6)	4 (2-7)
Antiviral agents		
Remdesivir	6 (11)	0
Lopinavir/ritonavir	12 (22)	0
Hydroxychloroquine	22 (41)	0
Oseltamivir	2 (4)	51 (100)
ARDS	54 (100)	51 (100)
ECMO	50 (93)	45 (88)
Patients with at least one VAP episode <sup>*</sup>	46 (85)	31 (61)
Number of VAP episode per patient <sup>*</sup>		
1	46 (85)	31 (61)
2	35 (65)	18 (35)
3	21 (39)	9 (18)
≥4	11 (20)	4 (8)
Duration of ECMO support, days	21 (10-31)	18 (8-31)
Duration of MV, days <sup>*</sup>	42 (24-53)	24 (13-38)
ICU length of stay, days <sup>*</sup>	43 (28-58)	29 (18-46)
ICU mortality rate, days	19 (35)	20 (39)

Characteristics of first ventilator-associated pneumonia episode

	Covid-19 patients N = 46	Influenza patients N = 31
Duration of MV prior to VAP	11 (8–16)	13 (6–19)
Previous use of glucocorticoids	4 (9)	2 (6)
Previous use of immunomodulatory drugs	3 (7)	0
White blood cells count at VAP onset, G/L	13 (10–18)	13 (9–16)
mCPIS at VAP onset	4 (3–5)	4 (3–5)
SOFA at VAP onset	11 (9–13)	9 (5–11)
Pathogen responsible for VAP		
Gram negative pathogens		
Enterobacteriaceae	33 (72)	11 (35)
Inducible AmpC Enterobacteriaceae	19 (41)	7 (23)
<i>Klebsiella aerogenes</i>	12	2
<i>Enterobacter cloacae</i>	3	3
<i>Hafnia alvei</i>	2	1
<i>Serratia marcescens</i>	1	0
<i>Citrobacter freundii</i>	1	1
ESBL-producing Enterobacteriaceae	2 (6)	0
Non-fermenting Gram negative bacteria	18 (39)	22 (71)
<i>Pseudomonas aeruginosa</i>	16 (35)	18 (58)
<i>Acinetobacter</i> spp.	0	1 (3)
<i>Stenotrophomonas maltophilia</i>	2 (4)	3 (10)
Gram positive pathogens		
<i>Staphylococcus aureus</i>	3 (7)	2 (6)
Methicillin-susceptible	1 (2)	2 (6)
Methicillin-resistant	2 (4)	0
<i>Enterococcus</i> spp.	3 (7)	2 (6)
<i>Streptococcus</i> spp.	3 (7)	1 (3)
Polymicrobial VAP	14 (30)	7 (23)
Antimicrobial treatment of VAP		
Appropriate empiric treatment	38 (82)	22 (71)
Duration of antimicrobial treatment	7 (7–8)	7 (7–7)
SOFA at the end of antimicrobial treatment	10 (9–13)	8 (4–13)
mCPIS at the end of antimicrobial treatment	3 (2–4)	3 (2–4)
Delta mCPIS	0 (-1–1)	2 (0–2)
PCT at the end of antimicrobial treatment	0.54 (0.34–1.05)	0.7 (0.23–1.36)

Characteristics of recurrent VAP episodes in Covid-19 and influenza patients.

	Episode 2		Episode 3		Episode 4	
	Covid-19	Influenza	Covid-19	Influenza	Covid-19	Influenza
Number of patients	35	18	21	9	11	4
Relapse	26 (74)	11 (61)	16 (76)	7 (78)	11 (100)	4 (100)
Time between end of treatment and relapse	2 (1–3)	2 (0–4)	2 (0–4)	3 (1–5)	2 (0–4)	8 (6–9)
Relapse before end of treatment	7 (27)	4 (22)	7 (44)	2 (22)	6 (55)	0
Superinfection	9 (25)	7 (39)	5 (24)	2 (22)	0	0
Time between end of treatment and superinfection	3 (0–8)	8 (7–11)	0 (0–0)	35 (23–48)	-	-
Superinfection before end of treatment	3 (33)	0	4 (100)	0	-	-
Pathogen responsible for VAP recurrence						
<i>Pseudomonas aeruginosa</i>	19 (54)	12 (67)	12 (57)	7 (87)	8 (73)	4 (100)
Enterobacteriaceae	16 (46)	5 (28)	11 (52)	1 (13)	7 (64)	0
Inducible AmpC Enterobacteriaceae	11 (31)	2 (10)	10 (48)	0	6 (55)	0
ESBL-producing Enterobacteriaceae	2 (6)	0	0	1 (13)	0	0
<i>Stenotrophomonas maltophilia</i>	2 (6)	0	1 (5)	0	1 (9)	0
<i>Acinetobacter baumannii</i>	0	1 (6)	0	0	0	0
Methicillin-resistant <i>Staphylococcus aureus</i>	1 (3)	0	0	0	0	0
Methicillin-susceptible <i>Staphylococcus aureus</i>	1 (3)	0	1 (5)	0	0	0
<i>Enterococcus faecalis</i>	2 (6)	0	4 (19)	0	0	0

**Conclusion:** Patients with severe COVID-19-associated respiratory failure requiring MV had a very high late-onset VAP rate. Inducible AmpC cephalosporinase-producing Enterobacteriaceae and *Pseudomonas aeruginosa* appeared to be frequently responsible for VAP, with multiple subsequent episodes and difficulties to eradicate the pathogen from the lung.

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### 360. A Case Control Study of COVID-19 in Patients with End Stage Renal Disease (ESRD)

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**Session:** P-12. COVID-19 Complications, Co-infections, and Clinical Outcomes

**Background:** COVID-19 is a major global pandemic. Since the first case reported in Wuhan, China, COVID-19 has spread across the globe with more than 7.6 million individuals affected worldwide. Several studies have tried to investigate the risk factors for mortality but there has not been a definitive study in patients with ESRD. Herein, we aimed to investigate whether ESRD is associated with mortality as compared to age, gender and comorbidities matched cohorts.

**Methods:** A retrospective case control study was performed on patients 18-year-old with confirmed SARS-CoV-2 admitted to our hospital during the study period (03/15/2020 to 05/15/2020). Demographic, characteristics and clinical outcome were retrieved and reviewed. We found 39 ESRD patients, we matched them for 5 variables: Age, gender, diabetes mellitus (DM), hypertension (HTN), and body mass index (BMI). Age was stratified into 3 groups (< 30, 30 to 60, >60), history of DM and HTN were defined by reviewing the admission medications, and BMI was divided into 2 categories (< 30 and 30 kg/m<sup>2</sup>). The primary endpoint was percentage of inpatient mortality.

**Results:** We had 39 ESRD patients with COVID-19 out of the 400 patients admitted during the study period with known clinical outcome. Nineteen patients (49%) were between 30 to 60 years old while the rest (51%) were older than 60 years old. As for gender, 25 (64%) were males and 14 (36%) females. Additional comorbidities were present in 38 patients with hypertension (92%) being the most common, followed by DM (64%) and BMI >30 kg/m<sup>2</sup> (49%). With the 5 variables, we were able to match with 177 controls.

Nineteen individuals expired out of the 39 ESRD patients (49%), as compared to 46 patients from the 177 matched cohort (26%) (z-score 2.80, p=0.0051; odds ratio [OR], 2.71; 95% confidence interval [CI], 1.28–5.41).

**Conclusion:** Our results suggest that ESRD patients is an independent risk factor for increased mortality in patients with COVID-19 disease. Larger prospective studies will need to confirm this finding and try to find ways to mitigate this very high mortality in this vulnerable population.

**Disclosures:** Jihad Slim, MD, Abbvie (Speaker's Bureau) Gilead (Speaker's Bureau) Jansen (Speaker's Bureau) Merck (Speaker's Bureau) Viiv (Speaker's Bureau)

### 361. A Case Control Study of COVID-19 Outcome in Patients with HIV

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**Session:** P-12. COVID-19 Complications, Co-infections, and Clinical Outcomes

**Background:** Little is known regarding outcome of patients living with HIV (PLWH) when they get admitted to a hospital for Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection. We decided to conduct a case-controlled study to try to answer the question if PLWH are at higher risk of mortality compared to individuals without HIV infection but with the same risk factors that affects outcome in COVID-19 disease.

**Methods:** A retrospective case matched control study was performed from 03/15/2020 to 05/15/2020. We reviewed all confirmed SARS-CoV-2 infected patients who were admitted to our hospital during the study period and retrieved 7 variables: Age, gender, diabetes mellitus (DM), hypertension (HTN), body mass index (BMI), chronic kidney disease (CKD), HIV status. We divided the age in 3 groups (< 30, 30 to 60, > 60), we defined the presence of DM and HTN by reviewing the admission medications, BMI > 30 defined obesity, and CKD was present if eGFR < 45 ml/min prior to the current admission. We found 12 PLWH, we matched them for the 6 variables, we found 94 controls. The primary endpoint was percentage of inpatient mortality.

**Results:** Of the 436 confirmed SARS-CoV-2 infection admitted between 03/15/20 and 05/15/20, 36 were still hospitalized. Twelve were PLWH out of the 400 patients with known outcome; 7 patients (58%) have the age range between 30 to 60 years old while the rest (42%) have age > 60 years old. Male to female ratio was 1:1 (6 patients each). Comorbidities were present in 10 patients (83%) with HTN (83%) being the most common, followed by CKD (58%), obesity (33%), and DM (33%).

Only 1 patient expired out of the 12 PLWH (8%) admitted with COVID-19, as compared to 26 patients from the 98 matched cohort (27%) (z-score 1.38, p=0.17; odds ratio [OR], 3.972; 95% confidence interval [CI], 0.62–44.37).