

	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).

**Conclusion:** Our study suggests that PLWH do not have a worse prognosis than their matched controls for the most significant comorbid conditions affecting outcome in COVID-19 disease. Further studies with a larger sample size are urgently needed to confirm this finding.

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

### 362. A Modified Early Warning Score Predicts Decompensation in COVID-19 Patients

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

**Background:** The novel coronavirus disease (COVID-19) results in severe illness in a significant proportion of patients, necessitating a way to discern which patients will become critically ill and which will not. In one large case series, 5.0% of patients required an intensive care unit (ICU) and 1.4% died. Several models have been developed to assess decompensating patients. However, research examining their applicability to COVID-19 patients is limited. An accurate predictive model for patients at risk of decompensation is critical for health systems to optimally triage emergencies, care for patients, and allocate resources.

**Methods:** An early warning score (EWS) algorithm created within a large academic medical center, with methodology previously described, was applied to COVID-19 patients admitted to this institution. 122 COVID-19 patients were included. A decompensation event was defined as inpatient mortality or an unanticipated transfer to an ICU from an intermediate medical ward. The EWS was calculated at 12-hour and 24-hour intervals.

**Results:** Of 122 patients admitted with COVID-19, 28 had a decompensation event, yielding an event rate of 23.0%. 8 patients died, 13 transferred to the ICU, and 6 both transferred to the ICU and died. Decompensation within 12 and 24 hours were predicted with areas under the curve (AUC) of 0.850 and 0.817, respectively. Using a three-tiered risk model, use of the customized EWS score for patients identified as high risk of decompensation had a positive predictive value of 44.4% and 11.1% and specificity of 99.3% and 99.6% and 12- and 24-hour intervals. Amongst medium-risk patients, the score had a specificity of 85.0% and 85.4%, respectively.

**Conclusion:** This EWS allows for prediction of decompensation, defined as transfer to an ICU or death, in COVID-19 patients with excellent specificity and a high positive predictive value. Clinically, implementation of this score can help to identify patients before they decompensate in order to triage at time of presentation and allocate step-down beds, ICU beds, and treatments such as remdesivir.

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### 363. Acute Kidney Injury and Renal Replacement Therapy in Hospitalized COVID-19 Patients in the United States and Other Geographic Regions

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**CDC COVID-19 Clinical Team and COVID-NET Investigators**

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

**Background:** Acute kidney injury (AKI) is a complication that has been described among severely ill patients with COVID-19 and may be more common in those with underlying chronic kidney disease (CKD). Some patients with AKI require renal replacement therapy (RRT), including continuous RRT (CRRT). During the COVID-19 pandemic, some US areas experienced CRRT supply shortages. We sought to describe the percent of hospitalized COVID-19 patients who developed AKI or needed RRT to inform patient care and resource planning.

**Methods:** We searched for studies in the literature and public health investigations that described CKD, AKI, and/or RRT in COVID-19 patients from January 2020 onward. Studies were excluded if no CKD, AKI, or RRT information was provided. We abstracted counts of hospitalized COVID-19 patients, including those admitted to intensive care units (ICU) who developed AKI, underwent RRT, and/or had CKD. Data were pooled across cohorts by geographic region with available data (US, China, or United Kingdom [UK]). We compared proportions using Chi-square tests.

**Results:** A total of 311 studies were identified; 23 studies (US n=11; China n=11; UK n=1) that described kidney disease and/or kidney-related outcomes in hospitalized COVID-19 patients were included. Underlying CKD prevalence was higher in US cohorts (10.3%) compared with China (2.5%) or UK (1.5%) ( $p < 0.0001$ ). AKI was markedly higher among hospitalized (31.3% vs. 6.4%;  $p < 0.001$ ) and ICU patients (55.4% vs. 18.2%;  $p < 0.0001$ ) in the US compared to China. The percent of ICU patients requiring RRT in the US (16.8%) was significantly different from that reported in China (12.5%) and the UK (23.9%) ( $p < 0.0001$ ). Limitations include differences in CKD and RRT definitions across studies.

Table. Kidney-related outcomes and underlying disease among COVID-19 patient cohorts by region, January to May 2020

Outcomes and Treatments	U.S. (n=11)	China (n=11)	U.K. (n=1)	P value
AKI in hospitalized patients, n/N (%)	4747/15134 (31.3%)	180/2802 (6.4%)	NR	<0.001
Range across cohorts	18.5%-49.0%	0%-27.3%		
AKI in ICU patients, n/N (%)	2352/4244 (55.4%)	38/799 (4.7%)	NR	<0.0001
Range across cohorts	31.4%-100%	0%-29.0%		
RRT in hospitalized patients, n/N (%)	907/3548 (25.6%)	32/760 (4.1%)	NR	0.05
Range across cohorts	4.8%-35.4%	1.5%-9.1%		
RRT in ICU patients, n/N (%)	386/2304 (16.8%)	11/38 (28.9%)	3442/6027 (57.1%)	<0.0001
Range across cohorts	11.3%-51.4%	5.6%-17.0%	23.9%	
Underlying condition				
CKD in hospitalized patients, n/N (%)	1558/15131 (10.3%)	49/1943 (2.5%)	126/8259 (1.5%)	<0.0001
Range across cohorts	5.0%-38.0%	1.0%-5.9%	1.5%	

U.S. = United States of America; U.K. = United Kingdom  
AKI = Acute Kidney Injury; RRT = Renal Replacement Therapy  
NR = not reported; ICU = intensive care unit

**Conclusion:** AKI is a frequent outcome among US COVID-19 patients, affecting almost one third of hospitalized and more than half of ICU patients. AKI was reported more frequently in the US than China. The percent of ICU patients who received RRT was higher in the US and UK than in China. Understanding the occurrence of kidney-related outcomes among patients with COVID-19 including the impact of underlying CKD and regional practice variations is essential for healthcare systems to successfully plan for RRT needs during the pandemic.

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### 364. Baseline characteristics, comorbidities, and outcomes of COVID-19 patients hospitalized in Southwest Georgia, U.S. – an interim analysis of an early hot spot

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

**Background:** Understanding the spectrum of disease severity and death are critical for identifying unrecognized risk factors associated with morbidity and mortality from coronavirus disease 19 (COVID-19). The purpose of this study was to describe the baseline characteristics, clinical presentation, and outcomes among patients hospitalized with COVID-19 in a major hotspot in the U.S. Southeast.

**Methods:** This multicenter retrospective chart review included adult patients hospitalized with COVID-19, defined by laboratory-detected severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, in Southwest Georgia. The primary outcome was mortality, which was assessed through discharge or June 14, 2020, whichever occurred first. Secondary outcomes included comorbidities, laboratory and radiographic findings, as well as clinical course.

**Results:** A total of 120 patients were included with a median age of 61 years (IQR 50–72). The majority were African American (73%) and female (56%). Comorbidities on admission were present in 88% of patients; most prevalent were hypertension (76%), diabetes mellitus (55%), and chronic pulmonary disease (27%). Median Charlson comorbidity index was 4 (IQR 2–6) and BMI was 32.8 kg/m<sup>2</sup> (IQR 26.2–39.5). On presentation, patients most often complained of dyspnea (69%), fever (63%), and cough (53%), with a median SOFA score of 2 (IQR 2–4). Most patients were admitted to the general ward (71%), of which 17% were subsequently transferred to ICU. During hospitalization, 27% were mechanically ventilated for a median 11 days (IQR 5–13.5), 18% developed ARDS, and 43% developed AKI. Median length of stay was 9.5 days (IQR 3.75–14). Overall mortality was 20%, which was significantly higher among patients with comorbidities ( $p = 0.047$ ), as well as those who developed ARDS ( $p < 0.001$ ) or AKI ( $p = 0.027$ ).

**Conclusion:** Most reports of COVID-19 have focused on large urban settings. However, early during the pandemic, we identified a large cluster of cases with a high-case fatality rate in a semirural setting in Southwest Georgia in the U.S.

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### 365. Characteristics and outcomes of COVID-19 patients admitted to a regional health system in the southeast

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

**Background:** COVID-19, first described in Wuhan, China, is now a global pandemic. We describe a cohort of patients (pts) admitted to our academic health system (HS) in the southeast, where demographics and comorbidities differ significantly from other regions in the U.S.

**Methods:** This was a retrospective review of 161 consecutive pts admitted with COVID-19 from 3/12/20 to 6/1/20. We assessed demographics, comorbidities, presenting symptoms, treatments and outcomes and compared pts who died during hospitalization to those who survived to discharge (EpiInfo 7.2, Atlanta, GA).