

## Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

**eTable 1. Medication Prescription Patterns**

	No./total No. (%)		
	Initial prescription <sup>a</sup>	Second prescription	Third prescription
<b>Hydroxychloroquine<sup>b</sup></b>			
<b>Dose</b>			
200mg	46/1,006 (4.6)	483/679 (71.1)	20/36 (55.6)
400mg	908/1,006 (90.3)	191/679 (28.1)	15/36 (41.7)
600mg	28/1,006 (2.8)	1/679 (0.2)	1/36 (2.8)
Other	15/1,006 (1.5)	3/679 (0.4)	0/36 (0.0)
Unknown	9/1,006 (0.9)	1/679 (0.2)	0/36 (0.0)
<b>Frequency</b>			
Once a day	247/1,006 (24.6)	167/680 (24.6)	9/36 (25.0)
Twice a day	708/1,006 (70.4)	497/680 (73.1)	26/36 (72.2)
Other	22/1,006 (2.2)	7/680 (1.0)	1/36 (2.8)
Unknown	29/1,006 (2.9)	9/680 (1.3)	0/36 (0.0)
<b>Azithromycin</b>			
<b>Dose</b>			
200mg	5/946 (0.5)	1/385 (0.3)	0/51 (0.0)
250mg	53/946 (5.6)	135/385 (35.1)	23/51 (45.1)
400mg	4/946 (0.4)	0/385 (0.0)	0/51 (0.0)
500mg	870/946 (92.0)	248/385 (64.4)	28/51 (54.9)
Other	2/946 (0.2)	1/385 (0.3)	0/51 (0.0)
Unknown	12/946 (1.3)	0/385 (0.0)	0/51 (0.0)
<b>Methods</b>			
Oral	454/946 (48.0)	308/386 (79.8)	44/51 (86.3)
IV	482/946 (50.9)	77/386 (20.0)	7/51 (13.7)
Unknown	10/946 (1.1)	1/386 (0.3)	0/51 (0.0)
<b>Frequency</b>			
Only once	145/946 (15.3)	11/385 (2.9)	0/51 (0.0)
Once a day	713/946 (75.4)	340/385 (88.3)	42/51 (82.4)
Twice a day	24/946 (2.5)	6/385 (1.6)	1/51 (2.0)
Other	38/946 (4.0)	20/385 (5.2)	8/51 (15.7)
Unknown	26/946 (2.8)	8/385 (2.1)	0/51 (0.0)

- Data represent the first 3 recorded prescriptions for each medication within each medical record, among patients receiving hydroxychloroquine and/or azithromycin
- Hydroxychloroquine is available only as an oral formulation. Oral method of administration was thus indicated for 98% (1,693/1,721) of prescriptions, with the remainder coded 'unknown' by abstractors.

**eTable 2. Other Medications Received by Patients Receiving Neither Hydroxychloroquine nor Azithromycin**

	<b>N=221<sup>a</sup></b>	
<b>Medication</b>	<b>n/N</b>	<b>(%)</b>
<b>Antibiotics</b>		
Clarithromycin	0/193	(0.0%)
Erythromycin	0/193	(0.0%)
<b>Angiotensin Receptor Blockers</b>		
Losartan	5/192	(2.6%)
Valsartan	1/193	(0.5%)
Azilsartan	0/193	(0.0%)
Candesartan	0/193	(0.0%)
Eprosartan	0/193	(0.0%)
Irbesartan	0/193	(0.0%)
Olmesartan	0/193	(0.0%)
Telmisartan	0/193	(0.0%)
<b>ACE Inhibitors</b>		
Lisinopril	13/193	(6.7%)
Benazepril	1/193	(0.5%)
Enalapril/Enalaprilat	1/193	(0.5%)
Quinapril	1/193	(0.5%)
Captopril	0/193	(0.0%)
Fosinopril	0/193	(0.0%)
Moexipril	0/193	(0.0%)
Perindopril	0/193	(0.0%)
Ramipril	0/193	(0.0%)
Trandolapril	0/193	(0.0%)
<b>Nonsteroidal anti-inflammatory drugs</b>		
Aspirin	38/192	(19.8%)
Ibuprofen	6/193	(3.1%)
Naproxen	1/193	(0.5%)
Celecoxib	0/193	(0.0%)
Diclofenac	0/193	(0.0%)
Indomethacin	0/193	(0.0%)
Oxaprozin	0/193	(0.0%)
Piroxicam	0/193	(0.0%)

- a. Medications available for abstraction among the 193 of 221 patients receiving neither drug who were discharged or died and had available records. ACE=angiotensin-converting enzyme

**eTable 3. Associations Between In-Hospital Death and Patient Characteristics**

<b>Demographic Characteristics</b>	<b>No./total No. (%)</b>	<b>RR (95% CIs)</b>	<b>p-value</b>
Male	183/858 (21.3)	1.13 (0.92, 1.40)	.24
Female	109/580 (18.8)	---	
Race			.03
White	65/322 (20.2)	---	
Black	89/371 (24.0)	1.19 (0.90, 1.58)	
Hispanic	69/431 (16.0)	0.79 (0.59, 1.08)	
Not listed above <sup>a</sup>	56/243 (23.1)	1.15 (0.83, 1.57)	
Age			< .001
Under 18 years	2/25 (8.0)	0.19 (0.06, 0.56)	
18-30 years old	3/53 (5.7)	0.18 (0.10, 0.33)	
31-44 years old	11/197 (5.6)	0.49 (0.38, 0.62)	
45-64 years old	75/504 (14.9)	0.26 (0.07, 0.99)	
65 and older	201/660 (30.5)	----	
<b>Preexisting conditions</b>			
Smoking			.03
Current	10/45 (22.2)	1.30 (0.74, 2.29)	
Former	52/206 (25.2)	1.47 (1.11, 1.95)	
Never	141/823 (17.1)	----	
Obesity (BMI $\geq$ 30)			.74
Yes	88/438 (20.1)	0.96 (0.75, 1.22)	
No	124/592 (21.0)	----	
Cancer			
Yes	18/55 (32.7)	1.65 (1.11, 2.45)	.01
No	274/1,383 (19.8)	----	
Any renal disease			
Yes	60/187 (32.1)	1.73 (1.36, 2.20)	< .001
No	232/1,251 (18.6)	----	
Any chronic lung conditions			
Yes	59/259 (22.8)	1.15 (0.90, 1.48)	.27
No	233/1,179 (19.8)	----	
Diabetes			
Yes	134/504 (26.6)	1.57 (1.28, 1.93)	< .001
No	158/934 (16.9)	----	
Any cardiovascular disease			
Yes	136/438 (31.1)	1.99 (1.63, 2.43)	< .001
No	156/1,000 (15.6)	----	
Hypertension			
Yes	210/816 (25.7)	1.95 (1.55, 2.46)	< .001
No	82/622 (13.2)	----	
Coronary artery disease			
Yes	56/173 (32.4)	1.74 (1.36, 2.22)	< .001
No	18.7 (236/1,265)	----	
Congestive heart failure			
Yes	30/96 (31.3)	1.60 (1.17, 2.20)	.004
No	262/1,342 (19.5)	----	
Dementia			
Yes	39/93 (41.9)	2.23 (1.70, 2.90)	< .001
No	253/1,345 (18.8)	----	
<b>Clinical severity features within 24 hours of admission</b>			
Abnormal chest imaging <sup>b</sup>			
Yes	12/205 (5.9)	3.88 (2.22, 6.78)	< .001
No	280/1,233 (22.7)	----	

	No./total No. (%)	RR (95% CIs)	p-value
Respiratory rate > 22			
Yes	98/283 (34.6)	1.99 (1.62, 2.45)	< .001
No	186/1,071 (17.3)	----	
Systolic BP < 90 mm Hg or diastolic BP < 60 mmHg			
Yes	44/151 (29.1)	1.48 (1.13, 1.94)	.005
No	237/1,203 (19.7)	----	
O <sub>2</sub> Saturation			
< 90%	92/214 (43.0)	2.73 (2.20, 3.39)	< .001
90-93%	49/250 (19.6)	1.24 (0.93, 1.67)	.14
<93%	142/901 (15.8)	----	
Fever (Temperature > 38.0 C)			
Yes	98/481 (20.4)	0.97 (0.78, 1.21)	.79
No	184/877 (21.0)	----	
Elevated creatinine <sup>c</sup>			
Yes	148/395 (37.5)	2.67 (2.19, 3.26)	< .001
No	141/1,004 (14.0)	----	
AST > 40			
Yes	173/667 (25.9)	1.75 (1.40, 2.20)	< .001
No	94/638 (14.8)	----	
ALT > 40			
Yes	86/423 (20.3)	0.96 (0.77, 1.21)	.75
No	186/882 (21.0)	----	

AZM = azithromycin; BMI = body mass index; BP = blood pressure; AST = aspartate aminotransferase; ALT = alanine aminotransferase

<sup>a</sup> Not listed above included Asian/Pacific islanders, American Indian or Alaska Native, Multiracial, and Not Specified.

<sup>b</sup> Abnormal chest imaging was defined as having abnormal x-ray, MRI, and/or CT scan results at any point during hospitalization.

<sup>c</sup> Elevated creatine: >1.2 mg/dL for females, >1.4 mg/dL for males

**eTable 4. Associations Between Cardiac Arrest and Patient Characteristics**

	No./total No. (%)	RR (95% CIs)	p-value
<b>Demographic Characteristics</b>			
Male	112/858 (13.1)	1.13 (0.85, 1.50)	.40
Female	67/580 (11.6)	---	
Race			.25
White	41/322 (12.7)	---	
Black	53/371 (14.3)	1.12 (0.77, 1.64)	
Hispanic	43/430 (10.0)	0.80 (0.59, 1.08)	
Not listed above <sup>a</sup>	34/243 (14.0)	1.10 (0.72, 1.68)	
Age			< .001
Under 18 years	1/25 (4.0)	0.22 (0.03, 1.52)	
18-30 years old	1/53 (1.9)	0.10 (0.01, 0.73)	
31-44 years old	8/197 (4.1)	0.22 (0.11, 0.45)	
45-64 years old	50/504 (9.9)	0.55 (0.40, 0.75)	
65 and older	119/659 (18.1)	----	
<b>Preexisting conditions</b>			
Smoking			.34
Current	6/45 (13.3)	1.18 (0.55, 2.55)	
Former	31/206 (15.1)	1.33 (0.92, 1.94)	
Never	93/823 (11.3)		
Obesity (BMI $\geq$ 30)			
Yes	67/438 (15.3)	1.35 (0.98, 1.85)	.06
No	67/592 (11.3)	----	
Cancer			
Yes	11/55 (20.0)	1.65 (0.95, 2.85)	.07
No	168/1,383 (12.2)	----	
Any renal disease			
Yes	38/187 (20.3)	1.80 (1.30, 2.49)	< .001
No	141/1,251 (11.3)	----	
Any chronic lung conditions			
Yes	33/259 (12.7)	1.03 (0.72, 1.46)	.87
No	146/1,179 (12.4)	----	
Diabetes			
Yes	91/504 (18.1)	1.92 (1.46, 2.52)	< .001
No	88/934 (9.4)	----	
Any cardiovascular conditions			
Yes	83/438 (19.0)	1.97 (1.50, 2.59)	< .001
No	96/1,000 (9.6)	----	
Hypertension			
Yes	129/816 (15.8)	1.97 (1.44, 2.68)	< .001
No	50/622 (8.0)	----	
Coronary artery disease			
Yes	32/173 (18.5)	1.59 (1.12, 2.25)	.009
No	147/1,265 (11.6)	----	
Congestive heart failure			
Yes	18/96 (18.8)	1.56 (1.01, 2.43)	.04
No	161/1,342 (12.0)	----	
Dementia			
Yes	25/93 (26.9)	2.35 (1.63, 3.39)	< .001
No	154/1,345 (11.5)	----	
<b>Clinical severity features within 24 hours of admission</b>			
Abnormal chest imaging <sup>b</sup>			
Yes	173/1,233 (14.0)	4.80 (2.15, 10.67)	< .001
No	6/205 (2.9)	----	

	No./total No. (%)	RR (95% CIs)	p-value
Respiratory rate > 22			
Yes	63/283 (22.3)	2.15 (1.62, 2.84)	< .001
No	111/1,071 (10.4)	----	
Systolic BP < 90 mm Hg or diastolic BP < 60 mmHg			
Yes	32/151 (21.2)	1.82 (1.29, 2.57)	< .001
No	140/1,203 (11.6)	----	
O <sub>2</sub> Saturation			
< 90%	51/214 (23.8)	2.50 (1.83, 3.41)	< .001
90-93%	38/250 (15.2)	1.59 (1.12, 2.27)	.01
>93%	86/901 (9.5)	----	
Fever (Temperature > 38.0 C)			
Yes	65/481 (13.5)	1.09 (0.82, 1.45)	.57
No	109/877 (12.4)	----	
Elevated creatinine <sup>c</sup>			
Yes	91/395 (23.0)	2.69 (2.05, 3.53)	< .001
No	86/1,004 (8.6)	----	
AST > 40			
Yes	99/667 (14.8)	1.55 (1.15, 2.09)	.004
No	61/636 (9.6)	----	
ALT > 40			
Yes	41/423 (9.7)	0.69 (0.49, 0.96)	.03
No	124/882 (14.1)	----	

AZM = azithromycin; BMI = body mass index; BP = blood pressure; AST = aspartate aminotransferase; ALT = alanine aminotransferase

<sup>a</sup> Not listed above included Asian/Pacific islanders, American Indian or Alaska Native, Multiracial, and Not Specified.

<sup>b</sup> Abnormal chest imaging was defined as having abnormal x-ray, MRI, and/or CT scan results at any point during hospitalization.

<sup>c</sup> Elevated creatinine: >1.2 mg/dL for females, >1.4 mg/dL for males

**eTable 5. Associations Between Abnormal ECG (Prolonged QT or Arrhythmia) and Patient Characteristics**

	No./total No. (%)	RR (95% CIs)	p-value
<b>Demographic Characteristics</b>			
Male	217/858 (25.3)	1.21 (0.99, 1.47)	.05
Female	121/580 (20.9)	----	
Race			.95
White	77/322 (23.9)	----	
Black	89/371 (24.0)	1.00 (0.77, 1.31)	
Hispanic	106/430 (24.7)	1.03 (0.80, 1.33)	
Not listed above <sup>a</sup>	55/243 (22.6)	0.95 (0.70, 1.28)	
Age			< .001
Under 18 years	0/25 (0.0)	0.00 (0.00, 0.00)	
18-30 years old	6/53 (11.3)	0.39 (0.18, 0.84)	
31-44 years old	30/197 (15.2)	0.53 (0.37, 0.75)	
45-64 years old	112/504 (22.2)	0.77 (0.63, 0.94)	
65 and older	190/659 (28.8)	----	
<b>Preexisting conditions</b>			
Smoking			.009
Current	16/45 (35.6)	1.71 (1.13, 2.59)	
Former	59/206 (28.6)	1.38 (1.07, 1.78)	
Never	171/823 (20.8)	----	
Obesity (BMI $\geq$ 30)			
Yes	113/438 (25.8)	1.09 (0.88, 1.35)	.43
No	140/592 (23.7)	----	
Cancer			
Yes	20/55 (36.4)	1.58 (1.10, 2.27)	.01
No	318/1,383 (23.0)	----	
Any renal disease			
Yes	66/187 (35.3)	1.62 (1.30, 2.02)	< .001
No	272/1,251 (21.7)	----	
Any chronic lung conditions			
Yes	73/259 (28.2)	1.25 (1.00, 1.56)	.04
No	265/1,179 (22.5)	----	
Diabetes			
Yes	149/504 (29.6)	1.46 (1.21, 1.76)	< .001
No	189/934 (20.2)	----	
Any cardiovascular conditions			
Yes	156/438 (35.6)	1.96 (1.63, 2.35)	< .001
No	182/1,000 (18.2)	----	
Hypertension			
Yes	217/816 (26.6)	1.37 (1.12, 1.66)	.002
No	121/622 (19.5)	----	
Coronary artery disease			
Yes	66/173 (38.2)	1.77 (1.43, 2.20)	< .001
No	272/1,265 (21.5)	----	
Congestive heart failure			
Yes	39/96 (40.6)	1.82 (1.40, 2.37)	< .001
No	299/1,342 (22.3)	----	
Dementia			
Yes	24/93 (25.8)	1.11 (0.77, 1.58)	.58
No	314/1,345 (23.4)	----	
<b>Clinical severity features within 24 hours of admission</b>			
Abnormal chest imaging <sup>b</sup>			
Yes	309/1,233 (25.1)	1.77 (1.25, 2.52)	.001
No	29/205 (14.2)	----	



	No./total No. (%)	RR (95% CIs)	p-value
Respiratory rate > 22			
Yes	101/283 (35.7)	1.71 (1.41, 2.08)	< .001
No	223/1,071 (20.8)	----	
Systolic BP < 90 mm Hg or diastolic BP < 60 mmHg			
Yes	50/151 (33.1)	1.46 (1.14, 1.87)	.003
No	273/1,203 (22.7)	----	
O <sub>2</sub> Saturation			
< 90%	78/214 (36.5)	1.77 (1.42, 2.20)	< .001
90-93%	61/250 (24.4)	1.18 (0.92, 1.52)	.20
>93%	186/901 (20.6)	----	
Fever (Temperature > 38.0 C)			
Yes	112/481 (23.3)	0.97 (0.79, 1.18)	.75
No	211/877 (24.1)	----	
Elevated creatinine <sup>c</sup>			
Yes	132/395 (33.4)	1.65 (1.37, 1.99)	< .001
No	203/1,004 (20.2)	----	
AST > 40			
Yes	178/667 (26.7)	1.29 (1.06, 1.57)	.01
No	132/636 (20.8)	----	
ALT > 40			
Yes	100/423 (23.6)	0.97 (0.79, 1.20)	.81
No	214/882 (24.3)	----	

AZM = azithromycin; BMI = body mass index; BP = blood pressure; AST = aspartate aminotransferase; ALT = alanine aminotransferase

<sup>a</sup> Not listed above included Asian/Pacific islanders, American Indian or Alaska Native, Multiracial, and Not Specified.

<sup>b</sup> Abnormal chest imaging was defined as having an abnormal x-ray, MRI, and/or CT scan result at any point during hospitalization.

<sup>c</sup> Elevated creatinine: >1.2 mg/dL for females, >1.4 mg/dL for males

**eTable 6. Alternative Model Results for In-Hospital Death**

	Hydroxychloroquine + azithromycin vs. neither	Hydroxychloroquine alone vs. neither	Azithromycin alone vs. neither	Hydroxychloroquine alone vs. Azithromycin alone
Model type	Estimate (95% CI)	Estimate (95% CI)	Estimate (95% CI)	Estimate (95% CI)
Same as primary model, but hazard function stratified on facility.	1.32 (0.81, 2.18)	1.10 (0.65, 1.87)	0.65 (0.34, 1.23)	1.79 (0.93, 3.09)
Same as primary model, but with random effect for on facility.	1.33 (0.83, 2.15)	1.08 (0.63, 1.85)	0.58 (0.29, 1.13)	1.87 (1.02, 3.44)
Same as primary model, but with time-dependent treatment status	1.83 (1.02, 3.28)	1.46 (0.84, 2.55)	0.73 (0.33, 1.63)	1.99 (1.02 3.87)

**eTable 7. Model-Adjusted Risk of In-Hospital Death, Cardiac Arrest, Arrhythmia – Models Stratified by Receipt of Mechanical Ventilation**

Outcome	Model type <sup>a</sup>	Hydroxychloroquine + azithromycin vs. neither		Hydroxychloroquine - azithromycin vs. neither	Azithromycin vs. neither	Hydroxychloroquine alone vs. Azithromycin alone
			Est. (95% CI)	Est. (95% CI)	Est. (95% CI)	Est. (95% CI)
In-hospital death (Hazard Ratio)	Cox proportional hazards	Mech vent.	0.60 (0.21, 1.72)	0.53 (0.17, 1.69)	0.52 (0.10, 2.84)	1.01 (0.30, 3.44)
		No mech vent.	1.19 (0.50, 2.83)	1.32 (0.61, 2.83)	0.74 (0.32, 1.72)	1.78 (0.95, 3.35)
Cardiac arrest (Odds Ratio)	GEE logistic regression	Mech vent.	0.92 (0.19, 4.38)	0.78 (0.14, 4.36)	1.02 (0.13, 8.24)	0.76 (0.20, 2.88)
		No mech vent.	2.24 (0.86, 5.82)	2.63 (0.83, 8.31)	0.87 (0.30, 2.50)	3.01 (1.07, 8.51)
Abnormal ECG <sup>b</sup> (Odds Ratio)	GEE logistic regression	Mech vent.	0.93 (0.35, 2.46)	0.51 (0.20, 1.32)	1.33 (0.27, 6.65)	0.39 (0.07, 2.04)
		No mech vent.	1.33 (0.72, 2.49)	1.73 (0.94, 3.21)	0.97 (0.41, 2.25)	1.80 (0.82, 3.93)

- a. Models adjusted for sex, age category (below 65 years old vs. 65 and older), diabetes, any cardiovascular disease, abnormal chest imaging based on X-ray/MRI/CT scan, respiration rate > 22, O<sub>2</sub> saturation <90% elevated creatinine, and AST > 40 as fixed effects and repeated measures for hospital.
- b. Abnormal ECG included prolonged QT and arrhythmia.