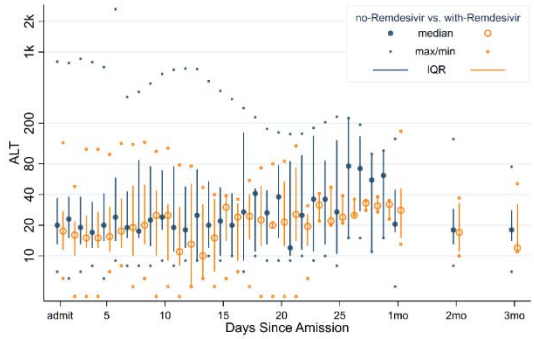
Supplementary Methods

outcome	exposure	method	model descriptions	report
binary	Era; inpatient vs outpatient; graft dysfunction; with or without remdesivir; with or without convalescent plasma; with or without dexamethasone	Fischer's Exact	n/a	proportion
continuous	same as above	Wilcoxon rank-sum	n/a	median, IQR
WHO severity scale at and during admission (continuous)	Era; graft dysfunction; with or without remdesivir; with or without convalescent plasma	Wilcoxon rank-sum	n/a	median, IQR
daily measures of WHO severity scale (longitudinal, ordinal)	graft dysfunction	multilevel ordinal logistic regression	includes patient-level random intercept, adjusting for severity at admission, interaction between graft dysfunction and days since admission (assuming proportional odds)	OR of interaction
daily measures of SCr, ALT, AST (if available, longitudinal, continuous)	with or without remdesivir; with or without convalescent plasma; with or without dexamethasone	mixed effects linear regression	includes patient-level random intercept, days admitted, a days-since-treatment indicator (0 denotes lab results drawn prior to or on the earliest date drug was administered, 1 or more how long was the data drawn since the earliest date same as the above); the coefficient of this days-since-treatment indicator would reflect the slope of lab values since treatment, aptly defined as interaction between the drug treatment and time. *Of note, the days-since-treatment indicator for lab values drawn from patients who were never treated with the drug would all be 0, and would be 0 for pre-treatment lab values for those who were treated in subsequent days.	mean change of days admitted for untreated; a linear combination of days-since-treatment plus days admitted for treated; p for interaction
daily measures proteinuria (if available, longitudinal, binary yes/no)	with or without remdesivir; with or without convalescent plasma	multilevel logistic regression	patient-level random intercept, days admitted, days-since-treatment indicator characterized as the above	linear combination of days-since-treatment plus days admitted
mortality	era	Fine and Gray competing-risks regression	unadjusted, with alive at discharge being the competing event, censored otherwise (i.e. still admitted)	sub-hazard ratio

length of stay (i.e. discharge rate)	era; graft dysfunction	Fine and Gray competing-risks regression	unadjusted, with death at discharge being the competing event, censored otherwise (i.e. still admitted)	sub-hazard ratio

Supplementary Figure 1: Trajectories of ALT For SOT Recipients Admitted to the Hospital For COVID-19, Stratified by Remdesivir Use. S1A: distribution of ALT by time since admission, stratified by use/nonuse of remdesivir. S1B: lowess plot of change over time in ALT for patients who received remdesivir, by days before/after initiation of treatment.

A



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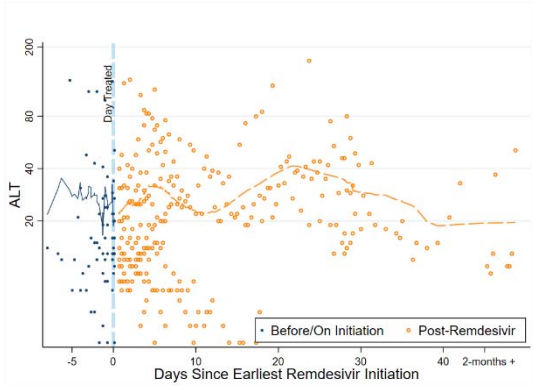
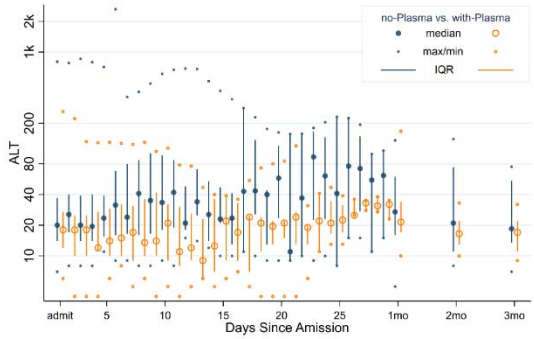


Supplementary Figure 2: Trajectories of ALT For SOT Recipients Admitted to the Hospital For COVID-19, Stratified by Use of Convalescent Plasma. S2A: distribution of ALT by time since admission, stratified by use/nonuse of convalescent plasma. S2B: lowess plot of change over time in ALT for patients who received convalescent plasma, by days before/after initiation of treatment.

A



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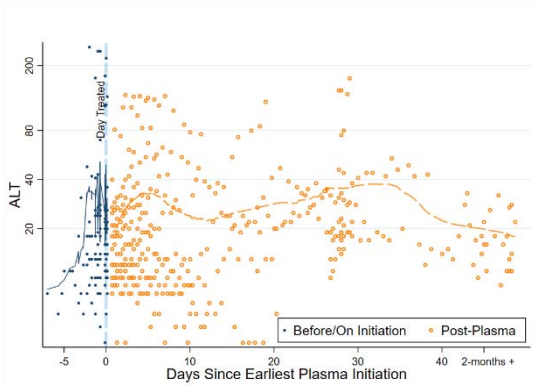
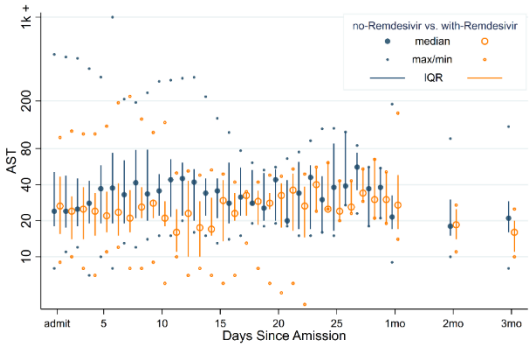


Supplementary Figure 3: Trajectories of AST For SOT Recipients Admitted to the Hospital For COVID-19, Stratified by Remdesivir Use. S3A: distribution of AST by time since admission, stratified by use/nonuse of remdesivir. S3B: lowess plot of change over time in AST for patients who received remdesivir, by days before/after initiation of treatment.

A



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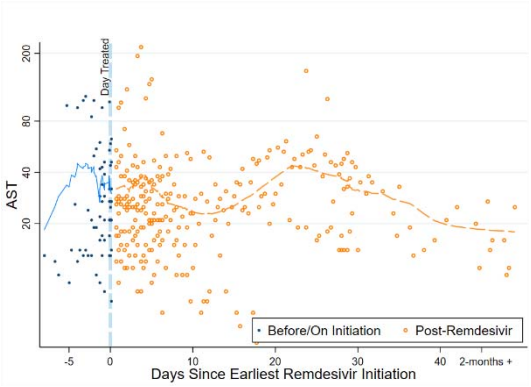
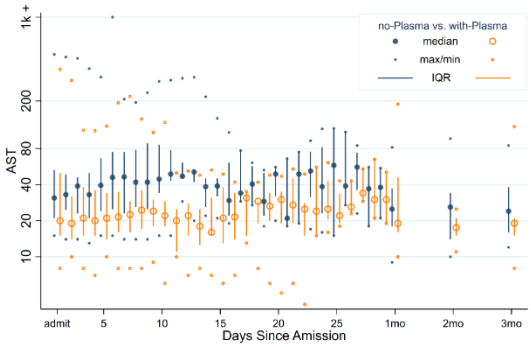


Supplementary Figure 4: Trajectories of AST For SOT Recipients Admitted to the Hospital For COVID-19, Stratified by Use of Convalescent Plasma. S4A: distribution of AST by time since admission, stratified by use/nonuse of convalescent plasma. S4B: lowess plot of change over time in AST for patients who received convalescent plasma, by days before/after initiation of treatment.

A



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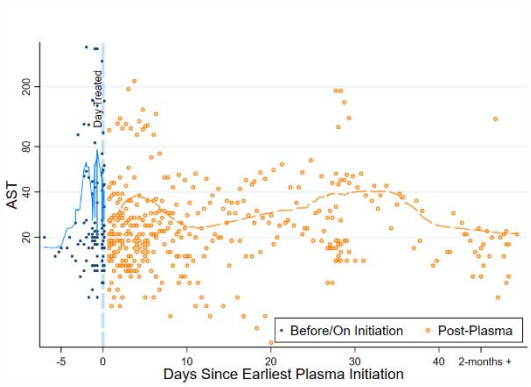

Supplementary Table 1: Complications, Laboratory Values, and Outcomes in Inpatients Who Received Remdesivir Versus Inpatients Who Did Not.

	did not receive remdesivir	received remdesivir	p-value
n	53	24	
highest WHO score achieved			**<0.001**
mild, no O2	**29 (54.7%)**	**0 (0.0%)**	
mild, mask or nasal	**18 (34.0%)**	**12 (50.0%)**	
severe, non-invasive	**3 (5.7%)**	**4 (16.7%)**	
severe, intubated or ventilated	**1 (1.9%)**	**3 (12.5%)**	
ventilated, plus IVP, ECMO or CRRT	**1 (1.9%)**	**2 (8.3%)**	
death	**1 (1.9%)**	**3 (12.5%)**	
highest WHO score achieved, median (IQR)	**3 (3, 4) (n=53)**	**5 (4, 6) (n=24)**	**<0.001**
highest WHO score achieved, mean (SD)	**3.7 (1.0) (n=53)**	**5.2 (1.5) (n=24)**	**<0.001**
ventilated or intubated	**3 (5.7%)**	**7 (29.2%)**	**0.008**
CMV PCR result			0.43
negative	35 (66.0%)	17 (70.8%)	
positive	4 (7.5%)	4 (16.7%)	
n/a	14 (26.4%)	3 (12.5%)	
beta-D glucan			0.20
normal	31 (58.5%)	19 (79.2%)	
intermediate	0 (0.0%)	1 (4.2%)	
elevated	1 (1.9%)	3 (12.5%)	
n/a	21 (39.6%)	1 (4.2%)	
galactomannan category			1.0
negative <0.5	31 (58.5%)	21 (87.5%)	
positive >=0.5	2 (3.8%)	2 (8.3%)	
n/a	20 (37.7%)	1 (4.2%)	
cryptococcal antigen			1.0
negative	23 (43.4%)	14 (58.3%)	
positive	1 (1.9%)	0 (0.0%)	
n/a	29 (54.7%)	10 (41.7%)	
Histoplasma antigen			1.0
1	22 (41.5%)	15 (62.5%)	
2	1 (1.9%)	0 (0.0%)	
n/a	30 (56.6%)	9 (37.5%)	
peak CRP, median (IQR)	5 (1, 10) (n=50)	7 (3, 10) (n=24)	0.24
peak IL-6 (before tocilizumab if given), median (IQR)	35 (11, 94) (n=40)	35 (19, 76) (n=21)	0.6
ALT (FU) elevation 2x ULN, new/persistent	3 (5.7%)	1 (4.2%)	1.0
ALT (FU) elevation 5x ULN, new/persistent	0 (0%)	0 (0%)	n/a
AST (FU) elevation 2x ULN, new/persistent	5 (9.4%)	2 (8.3%)	1.0
AST (FU) elevation 5x ULN, new/persistent	2 (3.8%)	0 (0.0%)	1.0
persistent AKI at follow up (>4wks)	3 (7.0%)	2 (11.8%)	0.6

change of SCr: last and baseline, mean (SD)	-0.0 (0.2) (n=43)	-0.2 (1.4) (n=17)	0.51
change of SCr: last and baseline, median (IQR)	**0.1 (-0.1, 0.1) (n=43)**	**-0.1 (-0.3, -0.0) (n=17)**	**0.037**
baseline proteinuria	13 (29.5%) (n=44)	8 (40.0%) (n=20)	0.57
PCrR ever higher than 0.2	16 (30.2%)	10 (41.7%)	0.44
significant increase (>=0.3) in PCrR between last & first	3 (8.8%) (n=34)	3 (21.4%) (n=14)	0.34
acute cellular rejection at 90 days	1 (2.9%)	0 (0.0%)	1.0
antibody mediated rejection at 30 days	1 (1.9%)	0 (0.0%)	1.0
antibody mediated rejection at 60 days	1 (2.7%)	0 (0.0%)	1.0
antibody mediated rejection at 90 days	2 (5.9%)	0 (0.0%)	1.0
graft dysfunction	17 (32.1%)	8 (33.3%)	1.0
ICU	**7 (13.2%)**	**10 (41.7%)**	**0.008**
ARDS	**0 (0.0%)**	**3 (12.5%)**	**0.028**
septic shock	1 (1.9%)	2 (8.3%)	0.23
acute liver injury	4 (7.5%)	1 (4.2%)	1.00
myocarditis	0 (0.0%)	1 (4.2%)	0.31
encephalopathy	0 (0.0%)	1 (4.2%)	0.31
death	1 (1.9%)	3 (12.5%)	0.087

Supplementary Table 2: Complications, Laboratory Values, and Outcomes in Inpatients Who Received Convalescent Plasma Versus Inpatients Who Did Not.

	did not receive convalescent plasma	received convalescent plasma	p-value
n	33	44	
highest WHO score achieved			0.9
mild, no O2	12 (36.4%)	17 (38.6%)	
mild, mask or nasal	14 (42.4%)	16 (36.4%)	
severe, non-invasive	4 (12.1%)	3 (6.8%)	
severe, intubated or ventilated	1 (3.0%)	3 (6.8%)	
ventilated, plus IVP, ECMO or CRRT	1 (3.0%)	2 (4.5%)	
death	1 (3.0%)	3 (6.8%)	
highest WHO score achieved, median (IQR)	4 (3, 4) (n=33)	4 (3, 5) (n=44)	0.9
highest WHO score achieved, mean (SD)	4.0 (1.2) (n=33)	4.2 (1.5) (n=44)	0.53
ventilated or intubated	2 (6.1%)	7 (15.9%)	0.50
CMV result			1.0
negative	20 (60.6%)	32 (72.7%)	
positive	3 (9.1%)	5 (11.4%)	
n/a	10 (30.3%)	7 (15.9%)	
beta-D glucan			0.8
normal	21 (63.6%)	29 (65.9%)	
intermediate	0 (0.0%)	1 (2.3%)	
elevated	1 (3.0%)	3 (6.8%)	
n/a	11 (33.3%)	11 (25.0%)	
galactomannan category			0.29
negative <0.5	20 (60.6%)	32 (72.7%)	
positive >=0.5	3 (9.1%)	1 (2.3%)	
n/a	10 (30.3%)	11 (25.0%)	
cryptococcal antigen			0.47
negative	17 (51.5%)	20 (45.5%)	
positive	1 (3.0%)	0 (0.0%)	
n/a	15 (45.5%)	24 (54.5%)	
Histoplasma antigen			0.45
1	16 (48.5%)	21 (47.7%)	
2	1 (3.0%)	0 (0.0%)	
n/a	16 (48.5%)	23 (52.3%)	
peak CRP, median (IQR)	7 (2, 11) (n=32)	5 (2, 9) (n=42)	0.6
peak IL-6 (before tocilizumab if given), median (IQR)	50 (13, 162) (n=27)	27 (12, 65) (n=34)	0.099
ALT (FU) elevation 2x ULN, new/persistent	0 (0.0%)	4 (9.1%)	0.13
ALT (FU) elevation 5x ULN, new/persistent	0 (0%)	0 (0%)	n/a
AST (FU) elevation 2x ULN, new/persistent	1 (3.0%)	6 (13.6%)	0.23

AST (FU) elevation 5x ULN, new/persistent	0 (0.0%)	2 (4.5%)	0.50
persistent AKI at follow up (>4wks)	2 (8.0%)	3 (8.6%)	1.0
change of SCr: last and baseline, mean (SD)	-0.0 (0.2) (n=25)	-0.1 (1.0) (n=35)	0.9
change of SCr: last and baseline, median (IQR)	0 (-0, 0) (n=25)	0 (-0, 0) (n=35)	0.7
baseline proteinuria	11 (42.3%) (n=26)	10 (26.3%) (n=38)	0.28
PCrR ever higher than 0.2	14 (42.4%)	12 (27.3%)	0.22
significant increase (>=0.3) in PCrR between last & first	1 (4.8%) (n=21)	5 (18.5%) (n=27)	0.21
acute cellular rejection at 90 days	0 (0.0%)	1 (5.9%)	0.41
antibody mediated rejection at 30 days	0 (0.0%)	1 (2.3%)	1.0
antibody mediated rejection at 60 days	0 (0.0%)	1 (4.8%)	0.47
antibody mediated rejection at 90 days	1 (4.2%)	1 (5.9%)	1.0
graft dysfunction as outcome (regardless of baseline)	8 (24.2%)	17 (38.6%)	0.22
ICU	7 (21.2%)	10 (22.7%)	1.0
complication, ARDS	0 (0.0%)	3 (6.8%)	0.26
septic shock	1 (3.0%)	2 (4.5%)	1.0
acute liver injury	2 (6.1%)	3 (6.8%)	1.0
myocarditis	1 (3.0%)	0 (0.0%)	0.43
encephalopathy	0 (0.0%)	1 (2.3%)	1.0
death	1 (3.0%)	3 (6.8%)	0.6

Supplementary Table 3: Complications, Laboratory Values, and Outcomes in Inpatients With Or Without Pre-Existing Graft Dysfunction Prior To Admission.

	without graft dysfunction	with pre-existing graft dysfunction	p-value
n	40	37	
highest WHO score achieved			0.12
mild, no O2	17 (42.5%)	12 (32.4%)	
mild, mask or nasal	18 (45.0%)	12 (32.4%)	
severe, non-invasive	2 (5.0%)	5 (13.5%)	
severe, intubated or ventilated	1 (2.5%)	3 (8.1%)	
ventilated, plus IVP, ECMO or CRRT	2 (5.0%)	1 (2.7%)	
death	0 (0.0%)	4 (10.8%)	
highest WHO score achieved, median (IQR)	4 (3, 4) (n=40)	4 (3, 5) (n=37)	0.073
highest WHO score achieved, mean (SD)	**3.8 (1.0) (n=40)**	**4.5 (1.6) (n=37)**	**0.033**
ever ventilated	3 (7.5%)	7 (18.9%)	0.18
CMV PCR			1.0
negative	27 (67.5%)	24 (67.6%)	
positive	4 (10.0%)	4 (10.8%)	
n/a	9 (22.5%)	8 (21.6%)	
beta-D glucan			0.22
normal	27 (67.5%)	23 (62.2%)	
intermediate	0 (0.0%)	1 (2.7%)	
elevated	1 (2.5%)	3 (8.1%)	
n/a	12 (30.0%)	10 (27.0%)	
galactomannan category			0.11
negative <0.5	28 (70.0%)	24 (64.9%)	
positive >=0.5	0 (0.0%)	4 (10.8%)	
n/a	12 (30.0%)	9 (24.3%)	
cryptococcal antigen			1.0
negative	19 (47.5%)	18 (48.6%)	
positive	0 (0.0%)	0 (0.0%)	
n/a	21 (52.5%)	19 (51.4%)	
Histoplasma antigen			1.0
negative	19 (47.5%)	18 (48.6%)	
positive	0 (0.0%)	1 (2.7%)	
n/a	21 (52.5%)	18 (48.6%)	
peak CRP, median (IQR)	6 (3, 10) (n=37)	5 (2, 10) (n=37)	0.7
peak IL-6 (before tocilizumab if given), median (IQR)	36 (16, 96) (n=30)	33 (10, 78) (n=31)	0.7
ALT (FU) elevation 2x ULN, new/persistent	1 (2.5%)	3 (8.1%)	0.35
ALT (FU) elevation 5x ULN, new/persistent	0 (0%)	0 (0%)	n/a
AST (FU) elevation 2x ULN, new/persistent	2 (5.0%)	5 (13.5%)	0.25
AST (FU) elevation 5x ULN, new/persistent	0 (0.0%)	2 (5.4%)	0.23

persistent AKI at follow up (>4wks)	2 (5.9%)	3 (11.5%)	0.6
change of SCr: last and baseline, mean (SD)	-0.1 (0.7) (n=34)	0.1 (0.8) (n=26)	0.34
change of SCr: last and baseline, median (IQR)	0.0 (-0.2, 0.1) (n=34)	-0.0 (-0.3, 0.1) (n=26)	0.8
baseline proteinuria	9 (25.0%) (n=36)	12 (42.9%) (n=28)	0.18
PCrR ever higher than 0.2	10 (25.0%) (n=40)	16 (43.2%) (n=37)	0.1
significant increase (>=0.3) in PCrR between last & first	**0 (0.0%) (n=23)**	**6 (24.0%) (n=25)**	**0.023**
acute cellular rejection at 90 days	0 (0.0%)	1 (2.8%) (n=36)	0.47
antibody mediated rejection at 30 days	0 (0.0%)	1 (2.7%) (n=37)	0.48
antibody mediated rejection at 60 days	0 (0.0%)	1 (2.8%) (n=36)	0.47
antibody mediated rejection at 90 days	0 (0.0%)	2 (5.6%) (n=36)	0.22
graft dysfunction	**1 (2.5%)**	**24 (64.9%)**	**<0.001**
ICU	**4 (10.0%)**	**13 (35.1%)**	**0.012**
complication, ARDS	1 (2.5%)	2 (5.4%)	0.6
septic shock	1 (2.5%)	2 (5.4%)	0.6
acute liver injury	4 (10.0%)	1 (2.7%)	0.36
myocarditis	0 (0.0%)	1 (2.7%)	0.48
encephalopathy	0 (0.0%)	1 (2.7%)	0.48
death	**0 (0.0%)**	**5 (13.5%)**	**0.022**

Supplementary Table 4: Infections at 0 – 7 Days, 8 – 30 Days, 31 - 60 Days, 61 - 90 Days After Inpatient Admission

	Era 1 (3/1 – 5/31)	Era 2 (6/1 – 11/30)	p-value
n	21	56	
co-infection, Days 0 – 7 after admission	4 (19.0%)	18 (32.1%)	0.40
bacterial	4 (19.0%)	11 (19.6%)	
viral	0 (0.0%)	7 (12.5%)	
fungal	1 (4.8%)	5 (8.9%)	
infection type, Days 0 – 7 after admission			
bloodstream infection	0 (0.0%)	1 (1.8%)	
Clostridium difficile diarrhea	0 (0.0%)	1 (1.8%)	
CMV viremia	0 (0.0%)	3 (5.4%)	
CNS infection	0 (0.0%)	0 (0.0%)	
EBV viremia	0 (0.0%)	3 (5.4%)	
intra-abdominal abscess	0 (0.0%)	1 (1.8%)	
invasive fungal infection	1 (4.8%)	4 (7.1%)	
osteomyelitis	0 (0.0%)	1 (1.8%)	
respiratory/lung	2 (9.5%)	6 (10.7%)	
skin/soft tissue infection	1 (4.8%)	0 (0.0%)	
UTI	2 (9.5%)	4 (7.1%)	
Zoster	0 (0.0%)	1 (1.8%)	

	Era 1 (3/1 – 5/31)	Era 2 (6/1 – 11/30)	p-value
n	21	56	
infections, Days 8 – 30 after admission	0 (0.0%)	8 (14.3%)	0.10
bacterial	0 (0.0%)	6 (10.7%)	
viral	0 (0.0%)	2 (3.6%)	
fungal	0 (0.0%)	1 (1.8%)	
infection type, Days 8 – 30 after admission			
bloodstream infection	0 (0.0%)	1 (1.8%)	
Clostridium difficile diarrhea	0 (0.0%)	0 (0.0%)	
CMV viremia	0 (0.0%)	2 (3.6%)	
CNS infection	0 (0.0%)	1 (1.8%)	
EBV viremia	0 (0.0%)	0 (0.0%)	
intra-abdominal abscess	0 (0.0%)	0 (0.0%)	
invasive fungal infection	0 (0.0%)	1 (1.8%)	
osteomyelitis	0 (0.0%)	0 (0.0%)	
respiratory	0 (0.0%)	3 (5.4%)	
UTI	0 (0.0%)	3 (5.4%)	
Zoster	0 (0.0%)	0 (0.0%)	

	Era 1 (3/1/20 – 5/31/20)	Era 2 (6/1/20 – 11/30/20)	p-value
n	21	56	
infections, Days 31 – 60 after admission	0 (0.0%)	3 (5.5%)	0.56
bacterial	0 (0.0%)	1 (1.8%) (n=55)	
viral	0 (0.0%)	2 (5.5%) (n=55)	
fungal	0 (0.0%)	0 (0.0%) (n=55)	

infection type, Days 31 – 60 after admission		
bloodstream infection	0 (0.0%)	0 (0.0%)
Clostridium difficile diarrhea	0 (0.0%)	0 (0.0%)
CMV viremia	0 (0.0%)	2 (5.5%)
CNS Infection	0 (0.0%)	0 (0.0%)
EBV viremia	0 (0.0%)	0 (0.0%)
intra-abdominal abscess	0 (0.0%)	0 (0.0%)
invasive fungal infection	0 (0.0%)	0 (0.0%)
osteomyelitis	0 (0.0%)	0 (0.0%)
respiratory	0 (0.0%)	0 (0.0%)
skin/soft tissue infection	0 (0.0%)	0 (0.0%)
UTI	0 (0.0%)	1 (1.8%)
Zoster	0 (0.0%)	0 (0.0%)

	Era 1 (3/1/20 – 5/31/20)	Era 2 (6/1 – 11/30/20)	p-value
n	21	56	
infections, Days 61 – 90 after admission	1 (4.8%)	1 (1.8%) (n=55)	0.48
bacterial	1 (4.8%)	1 (1.8%) (n=55)	
viral	0 (0.0%)	0 (0.0%) (n=55)	
fungal	0 (0.0%)	1 (1.8%) (n=55)	

infection type, Days 61 – 90 after admission		
bloodstream infection	0 (0.0%)	0 (0.0%)
Clostridium difficile diarrhea	0 (0.0%)	0 (0.0%)
CMV viremia	0 (0.0%)	0 (0.0%)
CNS infection	0 (0.0%)	0 (0.0%)
EBV viremia	0 (0.0%)	0 (0.0%)
intra-abdominal abscess	0 (0.0%)	0 (0.0%)
invasive fungal infection	0 (0.0%)	1 (1.8%)
osteomyelitis	0 (0.0%)	0 (0.0%)
respiratory	0 (0.0%)	1 (1.8%)
skin/soft tissue infection	0 (0.0%)	0 (0.0%)
UTI	1 (4.8%)	0 (0.0%)
Zoster	0 (0.0%)	0 (0.0%)