KIDNEY TRANSPLANTATION DURING COVID PANDEMIC

Enver Akalin, MD, FAST, FASN
Professor of Medicine and Surgery
Albert Einstein College of Medicine
Medical Director, Kidney Transplant Program
Montefiore Medical Center
Bronx, New York

EINSTEIN
Albert Einstein College of Medicine
OF YESHIVA UNIVERSITY

MONTEFIORE

Disclosure

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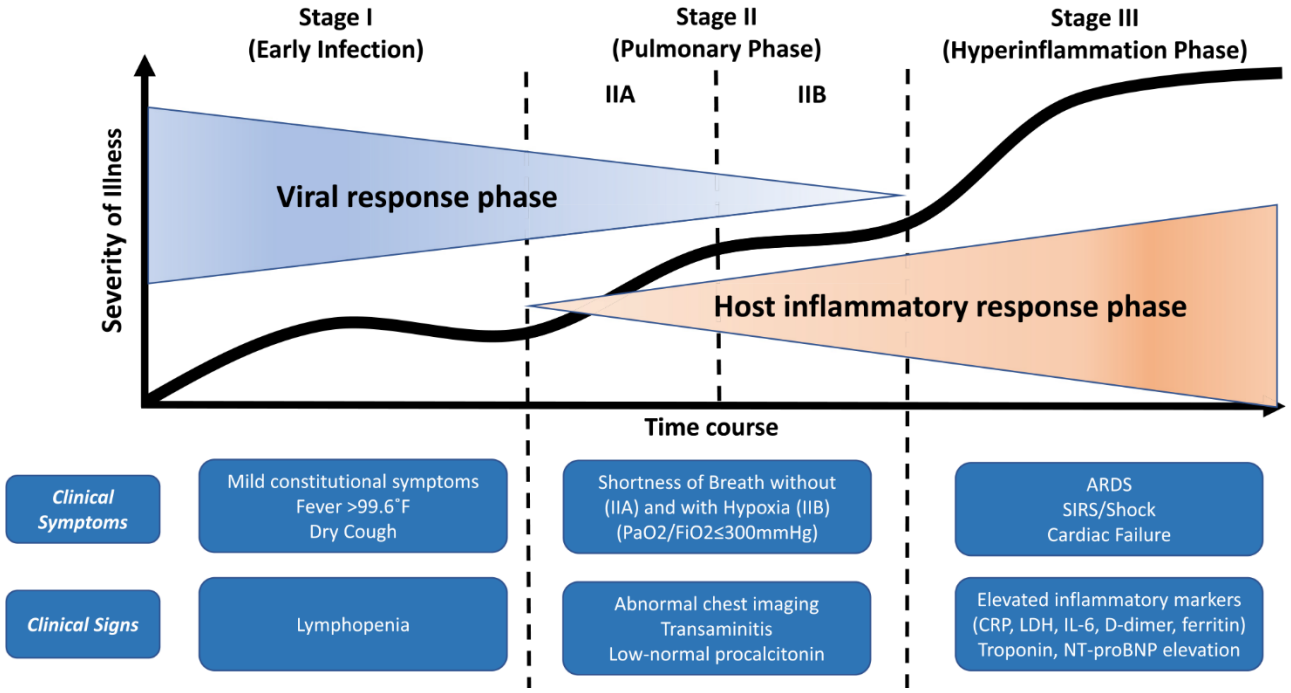
CLINICAL PICTURES OF COVID-19



Hasan K. Siddiqi and Mandeep R. Mehra, MD
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The overall reduction in deceased donor transplants during COVID-19 outbreak was 91% in France and 51% in the USA

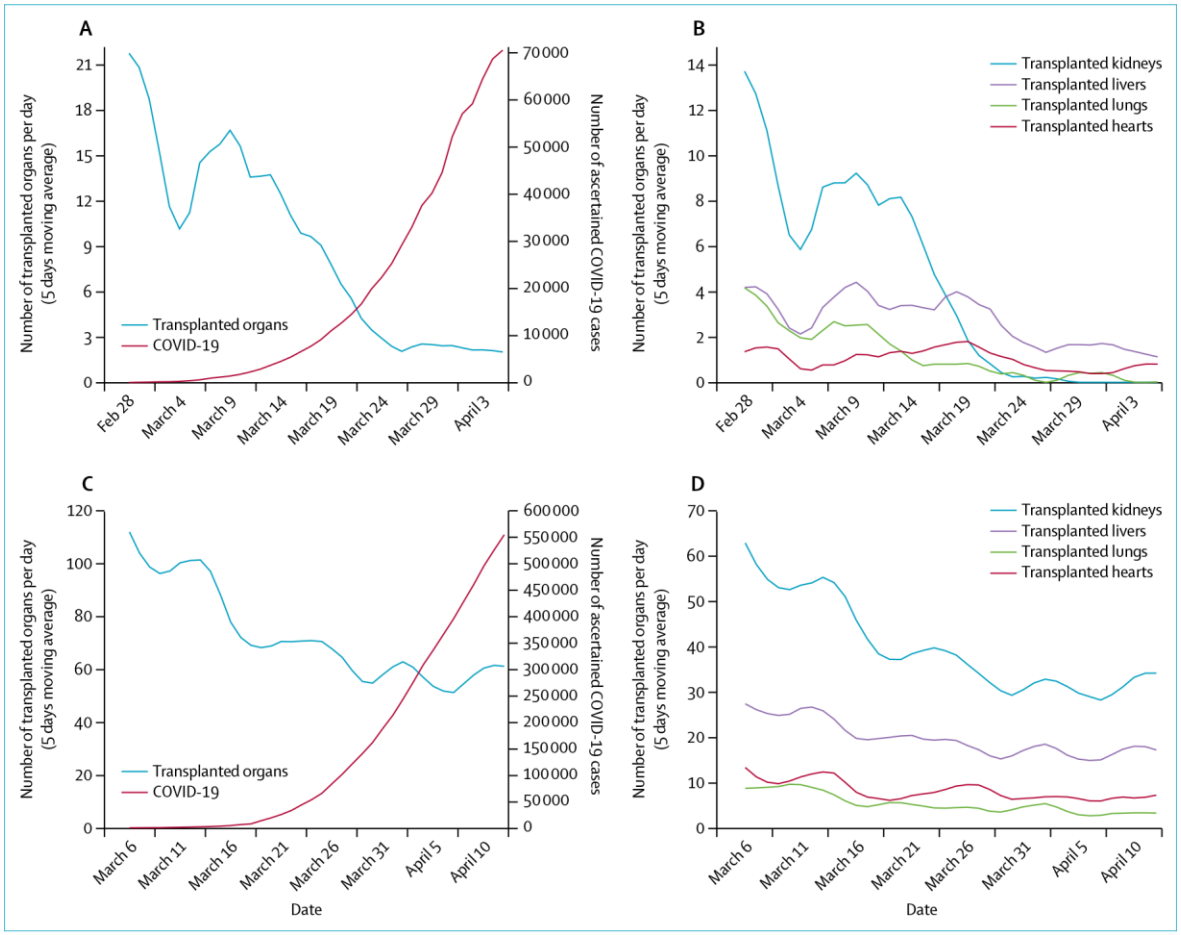

Figure: **Trends in COVID-19 spread over time in France and the USA and recovery of organs and solid-organ transplantation procedures from deceased donors** (A, C) Number of COVID-19 diagnoses and number of solid organs recovered for transplantation over time in France (A) and the USA (C). (B, D) Total number of transplants from deceased donors, with separate trend lines for kidney, liver, heart, and lung, over time in France (B) and the USA (D). Data were obtained from Public Health France (A), the National Organ Procurement Agency (B), Xu et al[3] (C), and the United Network for Organ Sharing (D). Data accessed April 11, 2020. COVID-19=coronavirus disease 2019.

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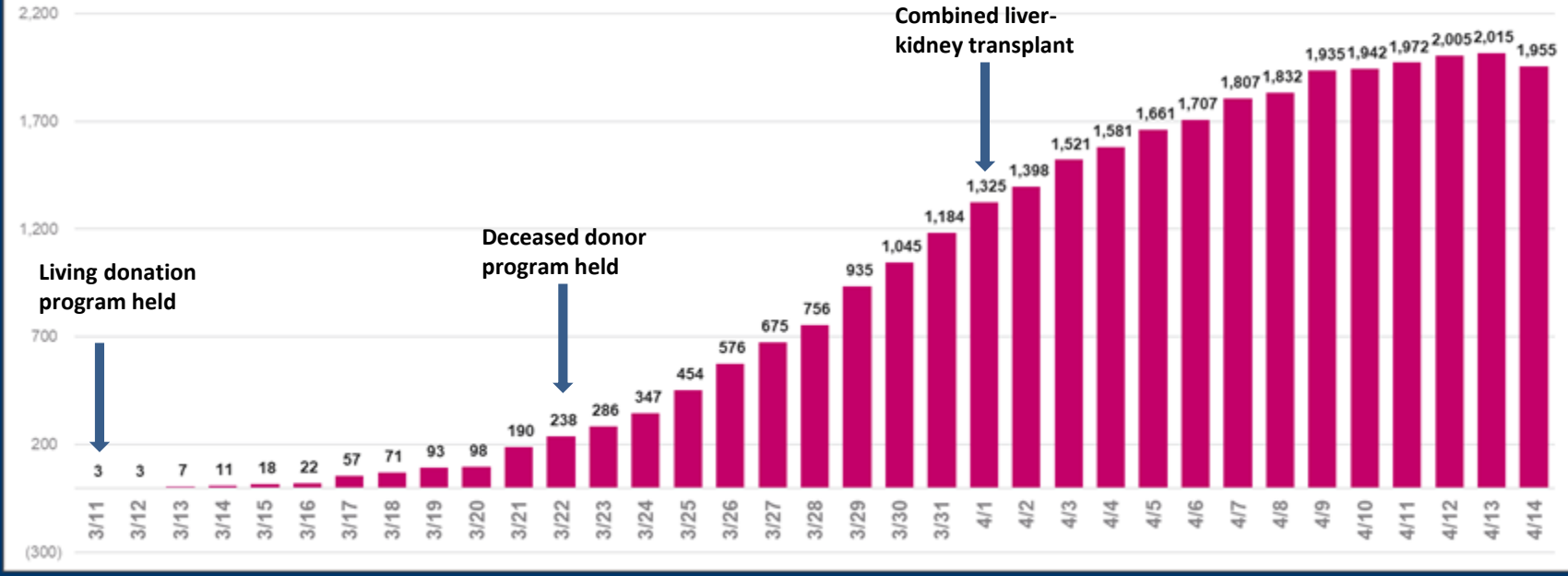
MHS Cases
1,955
3% ↓ from previous day

NYS Cases
196,146
3% ↑ from previous day

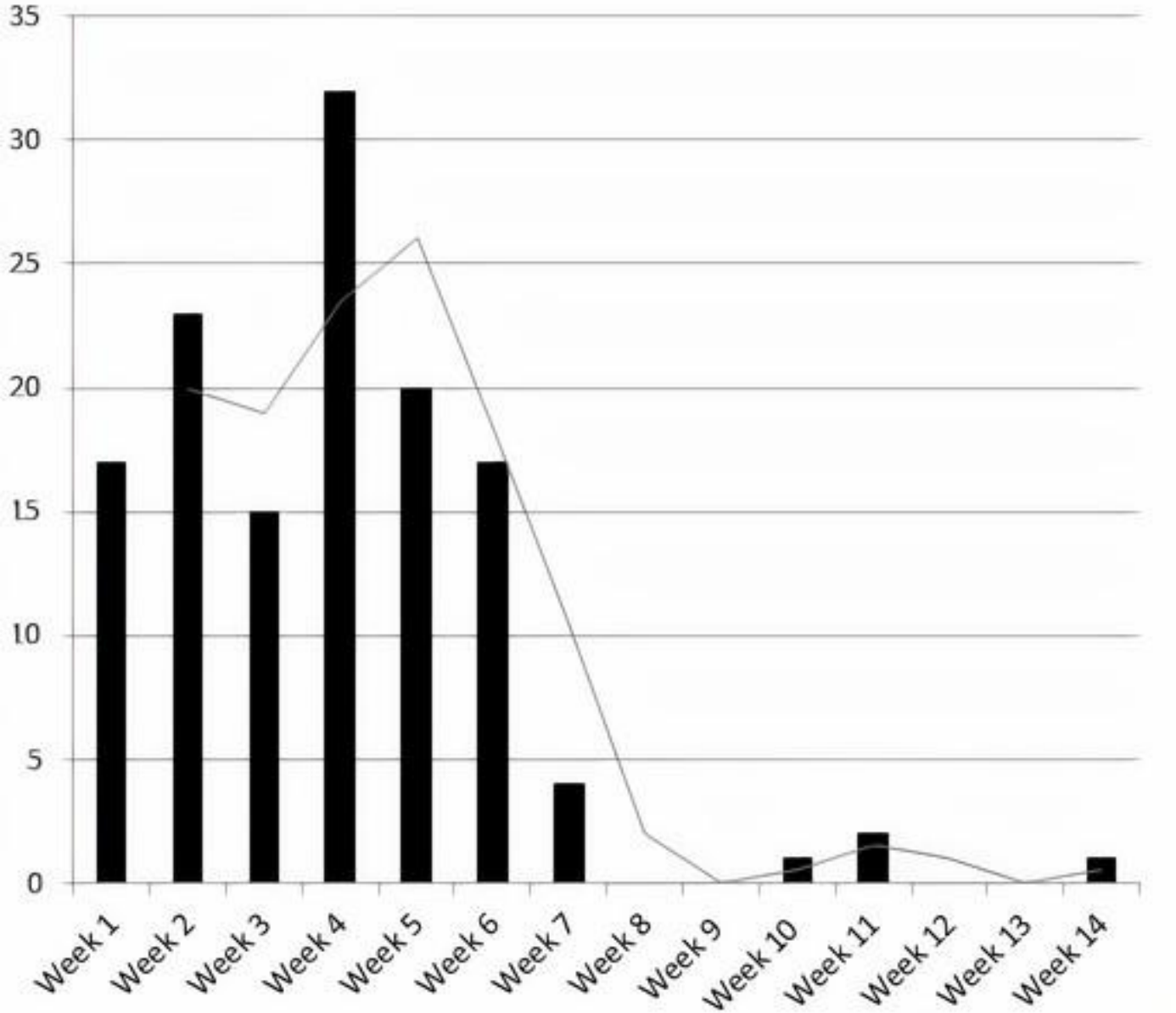
US Cases
582,594
4% ↑ from previous day

Global Cases
1,934,583
4% ↑ from previous day

Total MHS COVID+ Cases (Currently Admitted as of 4/14)



SARS-CoV-2 RT-PCR positive



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REVIEW ARTICLE

Clinical TRANSPLANTATION
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The COVID-19 pandemic: A community approach

Paolo Cravedi[1] | Jesse D. Schold[2] | Kassem Safa[3] | Olivia S. Kates[4] | Nissreen Elfadawy[5] | Roslyn B. Mannon[6] | Malay B. Shah[7] | Sarah P. Hammond[8] | Robin Avery[9] | Cesar Guerrero Miranda[10] | Leonardo V. Riella[11] | Sheila Jowsey-Gregoire[12] | Enver Akalin[13] | Geoffrey Camirand[14] | Maria-Luisa Alegre[15] | Jamil Azzi[11]

5.4.2 | Living donor transplant

As a general rule, most agree that living donor transplant should not place unnecessary and additional risk to the donor. Early in the outbreak period, The Transplantation Society made the following recommendations[42]:

1. In communities with widespread transmission, temporary suspension of the living donor kidney and liver programs should be considered.
2. Donors should not be utilized if they have fevers or respiratory symptoms, and SARS-CoV-2 should be ruled out.
3. Living donation should not be performed on either the donor or recipient who has returned from places with a high incidence of infection or has been exposed to another individual with confirmed or suspected COVID-19 within 14 days.

5.4.3 | Deceased donor transplant

While the true prevalence of disease is still not known, the majority of organ procurement organizations are performing COVID-19 screens on all donors. Recognizing that current COVID-19 screens continue to have a high false-negative rate,[44] most experts recommend caution when proceeding with acceptance of organs when the donor has as follows:

1. Died from respiratory causes of unknown etiology
2. Unexplained and abnormal chest imaging findings, and
3. Had recent contact with individuals with known or suspected COVID-19 infection.

CORRESPONDENCE

N ENGL J MED 382;25 NEJM.ORG JUNE 18, 2020

Covid-19 and Kidney Transplantation

	Patient Number (%) n= 36
Sex, male, n %	26 (72)
Age in years, median [range]	60 [32-77]
Race, African-American, %	14 (39)
Ethnicity, Hispanic %	15 (42)
Type of renal transplant, deceased donor, %	27 (75)
Anti-thymocyte globulin induction, %	15 (42)
Maintenance immunosuppression, %	
Tacrolimus	34 (97)
Mycophenolate 2g/day	11 (31)
Mycophenolate 1 g/day	16 (44)
Mycophenolate < 1 g/day	4 (11)
Prednisone	34 (94)
Causes of renal disease, %	
Diabetic nephropathy	19 (53)
Glomerulonephritis	8 (22)
Hypertensive nephroangiosclerosis	5 (14)
Others	3 (8)
Comorbidities, %	
Hypertension	34 (94)
Diabetes mellitus	25 (69)
Heart disease	6 (17)
Lung disease	4 (11)
Cancer	2 (6)
Smoking history, %	13 (36)
Influenza vaccination, %	21 (58)
Body mass index (median [range]) kg/m2	29.3 [21.2-43.6]
Use of Angiotensin-II Receptor Blocker, %	8 (22)
Baseline Creatinine (median [range]) mg/dL	1.4 [0.8-6.3]

Enver Akalin, M.D.
Yorg Azzi, M.D.
Rachel Bartash, M.D.
Harish Seethamraju, M.D.
Michael Parides, Ph.D.
Vagish Hemmige, M.D.
Michael Ross, M.D.
Stefanie Forest, M.D., Ph.D.
Yitz D. Goldstein, M.D.
Maria Ajaimy, M.D.
Luz Liriano-Ward, M.D.
Cindy Pynadath, M.D.
Pablo Loarte-Campos, M.D.
Purna B. Nandigam, M.D.
Jay Graham, M.D.
Marie Le, M.D.
Juan Rocca, M.D.
Milan Kinkhabwala, M.D.
Montefiore Medical Center
Bronx, NY

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Table 1. Clinical Features and Outcomes in the Kidney-Transplant Recipients.

Variable	Value
Presenting symptom — no./total no. (%)	
Fever	21/36 (58)
Cough	19/36 (53)
Dyspnea	16/36 (44)
Myalgias	13/36 (36)
Diarrhea	8/36 (22)
Hospitalization — no./total no. (%)	28/36 (78)
Chest radiographic findings consistent with viral pneumonia — no./total no. (%)	27/28 (96)
Treatment — no./total no. (%)	
Withdrawal of antimetabolite	24/28 (86)
Withdrawal of tacrolimus	6/28 (21)
Hydroxychloroquine	24/28 (86)
Azithromycin	13/28 (46)
Leronlimab	6/28 (21)
Tocilizumab	2/28 (7)
High-dose glucocorticoids	2/28 (7)

Laboratory values	
White-cell count	
Median (range) — per mm³	5300 (2100–14,700)
Patients with count <400 per mm³ — no./total no. (%)	6/28 (21)
Lymphocyte count	
Median (range) — per mm³	600 (100–1900)
Patients with count <1000 per mm³ — no./total no. (%)	22/28 (79)
Platelet count	
Median (range) — per mm³	146,000 (78,000–450,000)
Patients with count <150,000 per mm³ — no./total no. (%)	12/28 (43)
CD3 cell count	
Median (range) — per mm³	319 (34–1049)
Patients with count <706 per mm³ — no./total no. (%)	19/28 (68)
CD4 cell count	
Median (range) — per mm³	173 (6–507)
Patients with count <344 per mm³ — no./total no. (%)	20/28 (71)
CD8 cell count	
Median (range) — per mm³	132 (39–654)
Patients with count <104 per mm³ — no./total no. (%)	8/28 (29)
Ferritin	
Median (range) — ng/ml	1230 (191–9259)
Patients with level >900 ng/ml — no./total no. (%)	10/28 (36)
D-dimer	
Median (range) — μg/ml	1.02 (0.32–5.19)
Patients with level >0.5 μg/ml — no./total no. (%)	16/28 (57)
Patients with level >3 μg/ml — no./total no. (%)	3/28 (11)
C-reactive protein	
Median (range) — mg/dl	7.9 (0.5–48.7)
Patients with level >5 mg/dl — no./total no. (%)	13/28 (46)
Procalcitonin	
Median (range) — ng/ml	0.2 (0.1–5.1)
Patients with level >0.2 ng/ml — no./total no. (%)	12/28 (43)
Lactate dehydrogenase	
Median (range) — U/liter	336 (158–309)
Patients with level >1.5 times upper limit of normal range — no./total no. (%)	10/28 (36)
Creatine kinase	
Median (range) — U/liter	145 (48–815)
Patients with level >200 U/liter — no./total no. (%)	9/28 (32)

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Covid-19 and Kidney Transplantation

Outcomes at a median of 21 days (range, 14–28) — no./total no. (%)	
Death	10/36 (28)
Intubation	11/28 (39)
Death after intubation	7/11 (64)
Renal replacement therapy	6/28 (21)
Remained hospitalized	12/28 (43)
Discharged from hospital	10/28 (36)

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BRIEF COMMUNICATION

AJT

COVID-19 and kidney transplantation: Results from the TANGO International Transplant Consortium

Paolo Cravedi[1] | Suraj S. Mothi[2] | Yorg Azzi[3] | Meredith Haverly[1] | Samira S. Farouk[4] | María J. Pérez-Sáez[5] | Maria D. Redondo-Pachón[5] | Barbara Murphy[1] | Sander Florman[4] | Laura G. Cyrino[2] | Monica Grafals[6] | Sandheep Venkataraman[6] | Xingxing S. Cheng[7] | Aileen X. Wang[7] | Gianluigi Zaza[8] | Andrea Ranghino[9] | Lucrezia Furian[10] | Joaquin Manrique[11] | Umberto Maggiore[12] | Ilaria Gandolfini[12] | Nikhil Agrawal[13] | Het Patel[13] | Enver Akalin[3] | Leonardo V. Riella[14,15]

[1]Division of Nephrology, Department of Medicine, Icahn School of Medicine at Mount Sinai, New York, New York

[2]Schuster Transplantation Research Center, Brigham & Women's Hospital, Harvard Medical School, Boston, Massachusetts

[3]Division of Nephrology, Montefiore Medical Center Transplant Center, Albert Einstein College of Medicine, Bronx, New York

[4]Recanati-Miller Transplantation Institute, Mount Sinai Hospital, New York, New York

[5]Servicio de Nefrología, Hospital del Mar, Barcelona, Spain

[6]Department of Medicine, University of Colorado School of Medicine, Aurora, Colorado

[7]Department of Medicine, Division of Nephrology, Stanford University School of Medicine, Stanford, Massachusetts

[8]Renal Unit, Department of Medicine, University Hospital of Verona, Verona, Italy

[9]SOD Nefrologia, Dialisi e Trapianto Rene, AOU Ospedali Riuniti, Ancona, Italy

[10]Kidney and Pancreas Transplantation Unit, Department of Surgical, Oncological and Gastroenterological Sciences, University of Padova, Padova, Italy

[11]Nephrology Service, Complejo Hospitalario de Navarra, Pamplona, Spain

[12]Dipartimento di Medicina e Chirurgia, Università di Parma, UO Nefrologia, Azienda Ospedaliera-Universitaria Parma, Parma, Italy

[13]Division of Nephrology, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, Massachusetts

[14]Division of Nephrology, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts

[15]Center for Transplantation Sciences, Department of Surgery, Massachusetts General Hospital, Boston, Massachusetts

COVID-19 and kidney transplantation: Results from the TANGO International Transplant Consortium

- 144 hospitalized kidney transplant recipients with COVID-19 at 12 transplant centers in the US, Italy and Spain
- 65% were male with a mean age of 60 (±12) years, 40% Hispanic and 25% African-American
- Acute kidney injury occurred in 52%
- Respiratory failure requiring intubation in 29%
- Mortality was 32% during a median follow-up period of 52 days (IQR: 16-66 days)

Variable	Univariable odds ratio (95% CI)	*P* value	Multivariable odds ratio (95% CI)	*P* value
Age	1.07 (1.03-1.11)	**<.001**	1.07 (1.02-1.14)	**.022**
≤60 y	1 (ref)		–	–
>60 y	2.64 (1.27-5.77)	**.012**	–	–
Diarrhea	0.38 (0.17-0.87)	**.017**	–	–
Dyspnea	3.06 (1.34-7.7)	**.011**	–	–
Respiratory rate, breaths/min				
<20	1 (ref)	–	1 (ref)	
≥20	7.38 (2.68-26.18)	**<.001**	6.88 (1.63-41.98)	**.017**
Lactate dehydrogenase, U/L				
≤325	1 (ref)	–	1 (ref)	
>325	3.48 (1.62-7.83)	**.002**	2.74 (0.8-10.11)	.114
IL-6, ng/mL	1.01 (1-1.01)	**.013**	1 (1-1.01)	**.04**
Procalcitonin, ng/mL				
<0.5	1 (ref)	–	–	–
≥0.5	3.04 (1.37-6.89)	**.007**	–	–
Aspartate transaminase, U/L	1.02 (1.01-1.04)	**.007**	–	–
eGFR	0.97 (0.95-0.99)	**.002**	0.96 (0.93-0.99)	**.029**

COVID-19 infection in kidney transplant recipients at the epicenter of pandemics

see commentary on page 1404

Yorg Azzi[1,2], Michael Parides[3], Omar Alani[2], Pablo Loarte-Campos[1,2], Rachel Bartash[4], Stefanie Forest[5], Adriana Colovai[2], Maria Ajaimy[1,2], Luz Liriano-Ward[1,2], Cindy Pynadath[1,2], Jay Graham[2,3], Marie Le[2,3], Stuart Greenstein[2,3], Juan Rocca[2,3], Milan Kinkhabwala[2,3] and Enver Akalin[1,2]

[1]Division of Nephrology, Montefiore Medical Center Transplant Center, Albert Einstein College of Medicine, Bronx, New York, USA; [2]Einstein-Montefiore Abdominal Transplant Center, Bronx, New York, USA; [3]Department of Surgery, Montefiore Medical Center Transplant Center, Albert Einstein College of Medicine, Bronx, New York, USA; [4]Division of infectious Disease, Montefiore Medical Center Transplant Center, Albert Einstein College of Medicine, Bronx, New York, USA; and [5]Department of Pathology, Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, New York, USA

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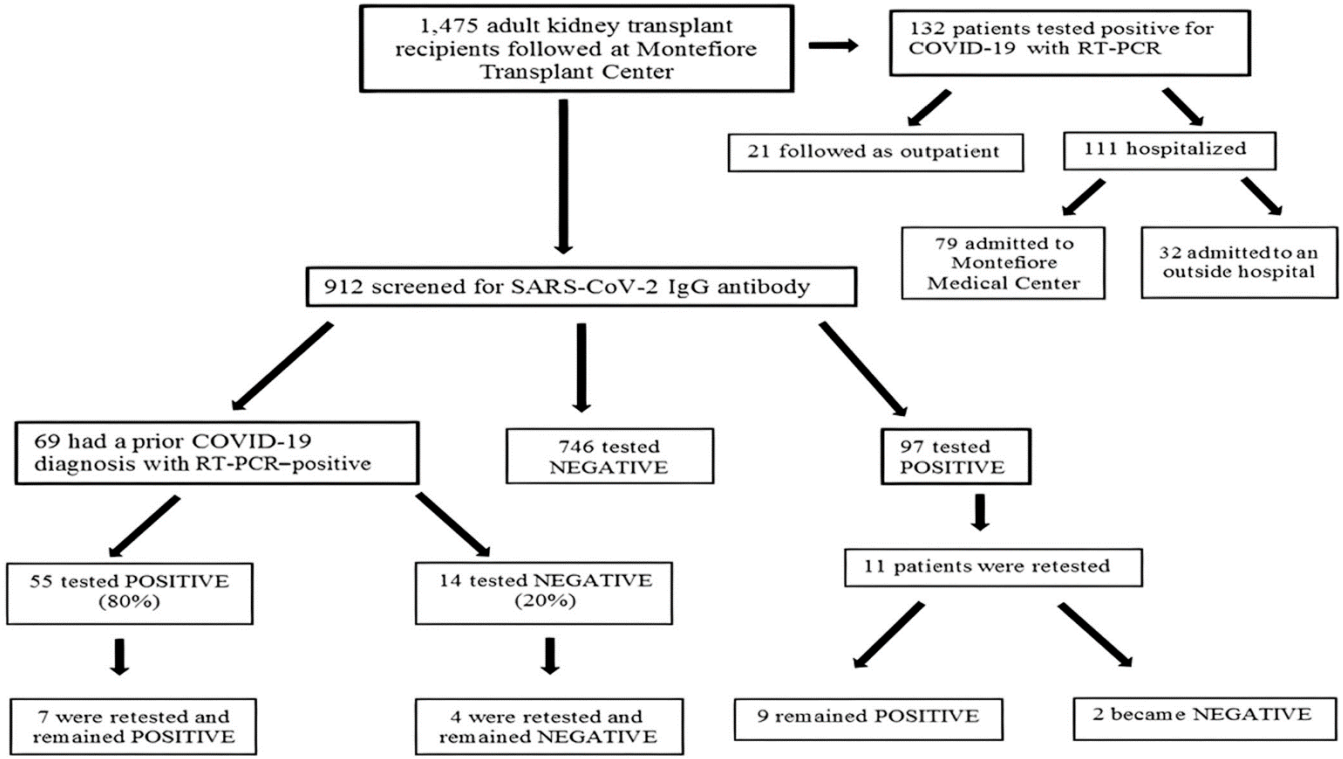


Figure 1 | Study design. COVID-19, coronavirus disease 2019; RT-PCR, reverse-transcription polymerase chain reaction; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

COVID-19 infection in kidney transplant recipients at the epicenter of pandemics

see commentary on page 1404

Yorg Azzi[1,2], Michael Parides[3], Omar Alani[2], Pablo Loarte-Campos[1,2], Rachel Bartash[4], Stefanie Forest[5], Adriana Colovai[2], Maria Ajaimy[1,2], Luz Liriano-Ward[1,2], Cindy Pynadath[1,2], Jay Graham[2,3], Marie Le[2,3], Stuart Greenstein[2,3], Juan Rocca[2,3], Milan Kinkhabwala[2,3] and Enver Akalin[1,2]

[1]Division of Nephrology, Montefiore Medical Center Transplant Center, Albert Einstein College of Medicine, Bronx, New York, USA; [2]Einstein-Montefiore Abdominal Transplant Center, Bronx, New York, USA; [3]Department of Surgery, Montefiore Medical Center Transplant Center, Albert Einstein College of Medicine, Bronx, New York, USA; [4]Division of infectious Disease, Montefiore Medical Center Transplant Center, Albert Einstein College of Medicine, Bronx, New York, USA; and [5]Department of Pathology, Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, New York, USA

- The prevalence of SARS-CoV-2 infection was 23.4% in the 975 patients tested by either RT-PCR or SARS-CoV-2 IgG
- 229 COVID-19 patients were followed for a median of 140 days (IQR, 86-164). Forty-seven patients (20.5%) died at a median 10 days (IQR, 6-16) after diagnosis
- Among the 111 patients who required hospitalization, mortality was 37.8%

Table 1 | Clinical characteristics of patients by type of COVID-19 diagnosis and mortality

Characteristics	Total patients (*N* = 229)	COVID-19 diagnosis			Mortality		
		COVID-19 RT-PCR–positive (*N* = 132)	SARS-CoV-2 IgG antibody–positive (*N* = 97)	*P* value	Survivors (*N* = 182)	Nonsurvivors (*N* = 47)	*P* value
Sex				0.84			
Male	141 (62)	82 (62)	59 (61)		113 (62)	28 (60)	0.75
Female	88 (38)	50 (38)	38 (39)		69 (38)	19 (40)	
Age, yr	59 [49–68]	62.5 [51–71]	57 [46–65]	0.0024	58 [46–66]	70 [58–74]	< 0.001
Race				0.87			0.53
Hispanic	125 (55)	74 (56)	51 (53)		74 (56)	51 (53)	
African American	74 (32)	41 (31)	33 (34)		41 (31)	33 (34)	
Other	30 (13)	17 (13)	13 (13)		17 (13)	13 (13)	
Type of transplant				0.039			
Deceased donor	165 (73)	101 (77)	64 (66)		124 (69)	41 (89)	0.0058
Living donor	61 (27)	28 (21)	33 (34)		56 (31)	5 (11)	
Time after transplantation, mo	58.2 [25.4–127.6]	60.8 [20–128.5]	57.7 [28.7–124.6]	0.9	57.7 [27.3–123.7]	65.2 [16.3–134.1]	0.82
Transplantation at <6 mo	13 (7)	9 (9)	4 (4)	0.49	10 (6)	3 (6)	0.21
Transplantation at <12 mo	18 (9)	11 (11)	7 (8)	0.97	13 (7)	5 (11)	0.43
Etiology of ESRD				0.005			
Diabetes mellitus	106 (47)	72 (55)	34 (35)		73 (40)	33 (70)	0.0065
Hypertension	49 (22)	21 (16)	28 (29)		45 (25)	4 (9)	
Glomerulonephritis	52 (23)	23 (18)	29 (30)		44 (24)	8 (17)	
Polycystic kidney disease	9 (4)	2 (2)	7 (5)		8 (4)	1 (2)	
Others	12 (5)	8 (6)	4 (4)		11 (6)	1 (2)	
Body mass index, kg/m^2	28.5 [24.2–32.6]	28.7 [23.7–32.5]	28.1 [24.7–32.6]	0.76	28.3 [24.2–32.3]	29.1 [23.7–34.3]	0.66
History of smoking	81 (36)	48 (37)	33 (34)	0.68	64 (35)	17 (36)	0.92
Influenza vaccination	193 (89)	102 (86)	91 (94)	0.055	162 (93)	31 (66)	0.0015
Comorbidities							
Hypertension	224 (98)	128 (98)	96 (99)	0.47	178 (98)	46 (98)	0.83
Diabetes mellitus	140 (61)	89 (68)	51 (53)	0.019	104 (58)	36 (77)	0.016
Heart disease	49 (22)	28 (21)	21 (22)	0.96	38 (21)	11 (23)	0.72
Lung disease	16 (7)	11 (8)	5 (5)	0.34	10 (6)	6 (13)	0.083
Cancer	23 (10)	12 (9)	11 (11)	0.59	18 (10)	5 (11)	0.89
Angiotensin-converting enzyme inhibitor or angiotensin receptor blocker use	60 (26)	33 (25)	27 (28)	0.65	47 (26)	13 (28)	0.81
Statin use	143 (63)	84 (64)	59 (61)	0.61	113 (62)	30 (64)	0.86
Baseline serum creatinine, mg/dl	1.4 [1.0–1.7]	1.4 [1.1–1.8]	1.2 [1.0–1.5]	0.0048	1.3 [1.0–1.6]	1.5 [1.2–1.8]	0.032
Blood type				0.73			
A	84 (38)	47 (37)	37 (39)		64 (36)	20 (43)	0.68
B	44 (20)	28 (22)	16 (17)		35 (20)	9 (19)	
AB	6 (3)	4 (3)	2 (2)		4 (2)	2 (4)	
O	90 (40)	49 (38)	41 (43)		74 (42)	16 (34)	

Azzi et al. Kidney Int. 2020 Dec;98(6):1559-1567

Table 2 | Laboratory values and inflammatory markers on admission of the patients admitted to Montefiore Medical Center

Laboratory values and inflammatory markers on admission	Total patients ($N = 79$)	Survivors ($N = 51$)	Nonsurvivors ($N = 28$)	P value
Hemoglobin, g/dl	12.1 [10.6–13.2]	12.2 [10.6–13.3]	11.8 [11.1–13]	0.94
WBC count, k/μl	6.2 [4.4–8.0]	5.8 [4.1–7.7]	6.4 [5.4–8.1]	0.23
WBC count <4 k/μl	12 (15)	11 (22)	1 (4)	
Lymphocytes, k/μl	0.6 [0.4–0.8]	0.6 [0.4–0.8]	0.7 [0.4–0.8]	0.96
Lymphocyte count <1 k/μl	67 (85)	42 (82)	25 (89)	
Platelets, k/μl	178 [132–240]	189 [132–241]	162 [118.5–205.5]	0.22
Platelets count <150 k/μl	30 (38)	18 (35)	12 (43)	
CD3 cell count, cells/μl	319 [205–552]	390 [226.5–574]	243 [158–529]	0.12
CD3 count <706 cells/μl	54 (68)	33 (65)	21 (75)	
CD4 cell count, cells/μl	147 [88–304]	178 [117–305]	120 [74–252]	0.085
CD4 count <344 cells/μl	52 (66)	31 (61)	21 (75)	
CD8 cell count, cells/μl	126 [83–272]	147 [87.5–263]	123 [71–272]	0.4
CD8 count <104 cells/μl	22 (28)	13 (26)	9 (32)	
CRP, mg/dl	9.9 [4.9–16.2]	7.2 [4.6–14.8]	11.3 [5.7–18.1]	0.25
CRP >10 mg/dl	38 (48)	23 (45)	15 (54)	
Procalcitonin, ng/ml	0.3 [0.1–1.7]	0.2 [0.1–1.6]	0.4 [0.2–2.9]	0.065
Procalcitonin >0.2 ng/ml	41 (52)	22 (43)	19 (68)	
Ferritin, ng/ml	1345 [681–2397]	1516 [713–3179]	1029 [629–1939]	0.16
Ferritin >900 ng/ml	50 (63)	35 (69)	15 (54)	
D-dimer, μg/ml	1.7 [0.8–3.3]	1.8 [0.7–3.5]	1.7 [1.1–2.2]	0.99
D-dimer >0.5 μg/ml	66 (84)	42 (82)	24 (86)	
D-dimer >3 μg/ml	20 (25)	15 (29)	5 (18)	
IL-6, pg/ml	54 [25–154]	47 [26–98]	101 [22–335]	0.036
IL-6 >60 pg/ml	32 (41)	15 (29)	17 (61)	
LDH, U/l	356 [274–414]	350 [271–406]	364 [286.5–433]	0.42
LDH >1.5 times upper limit of normal	53 (67)	33 (65)	20 (71)	
Creatine kinase, U/l	103 [56–204]	91 [55–143]	140 [68–362]	0.095
Creatine kinase >200 U/l	19 (24)	8 (16)	11 (39)	
Fibrinogen, mg/dl	605.5 [504.5–728.5]	606 [511–754]	605 [459–666]	0.46
Fibrinogen >500 mg/dl	49 (62)	33 (65)	16 (57)	
Pro-BNP, pg/ml	1785 [740–4987]	1278 [450–3234]	2380 [1152–9342]	0.031
Pro-BNP >900 pg/ml	43 (54)	24 (47)	29 (68)	
Serum creatinine, mg/dl	2.2 [1.5–3.0]	1.9 [1.3–3.0]	2.3 [1.7–2.9]	0.33

Table 3 | Peak values of laboratory values and inflammatory markers of the patients during hospitalization

Peak laboratory values and inflammatory markers	Total patients ($N = 79$)	Survivors ($N = 51$)	Nonsurvivors ($N = 28$)	P value
Lowest hemoglobin, g/dl	10.2 [8.2–11.9]	9.9 [8.2–11.8]	10.9 [7.9–11.9]	0.19
Lowest WBC count, k/μl	4.7 [3.6–6.2]	4.6 [3.0–5.9]	5.8 [4.1–6.4]	0.052
Lowest lymphocyte count, k/μl	0.4 [0.3–0.6]	0.5 [0.3–0.6]	0.3 [0.2–0.4]	0.021
Lowest platelet count, k/μl	154 [111–214]	170 [124–222]	135 [102–170]	0.045
Highest CRP, mg/dl	16.2 [10.2–27.8]	14.3 [5.9–25.6]	22.8 [17.4–31.9]	0.0032
Highest procalcitonin, ng/ml	0.6 [0.1–2.7]	0.3 [0.1–1.7]	1.9 [0.4–3.9]	0.006
Highest ferritin, ng/ml	1908 [936–4489]	2079 [1057–4489]	1568 [675.5–5493]	0.59
Highest D-dimer, μg/ml	3.5 [1.4–8.7]	3.3 [1.0–5.2]	4.4 [2.3–16.2]	0.06
Highest IL-6, pg/ml	64 [32–208]	48 [28–98]	182 [83–498]	0.0004
Highest LDH, U/l	448 [337–683]	389 [303–578]	612 [446–868]	0.0017
Highest creatine kinase, U/l	138 [69–318]	105.5 [64.5–182.5]	194 [107–481]	0.022

CRP, C-reactive protein; IL, interleukin; IQR, interquartile range; LDH, lactate dehydrogenase; WBC, white blood cell.
Data are median [IQR], unless otherwise noted.

Every 10 unit increase in serum IL-6 levels was associated with a 3.6% increase in the odds of death [OR 1.036, 95% CI 1.008-1.065, p=0.01]

Table 4 | Clinical outcomes of the hospitalized patients

Clinical outcomes	Total patients ($N = 79$)	Survivors ($N = 51$)	Nonsurvivors ($N = 28$)	*P* value
Intubation	28 (35)	5 (10)	23 (82)	<0.001
Acute kidney injury requiring renal replacement therapy	18 (23)	9 (18)	9 (32)	0.15
Bacteremia	7 (9)	4 (8)	3 (6)	0.67
Urinary tract infection	9 (11)	5 (10)	4 (14)	0.55
Bacterial pneumonia	4 (5)	0 (0)	4 (14)	0.014
Fungal infection	4 (5)	1 (2)	3 (11)	0.12
Cytomegalovirus viremia	12 (15)	8 (16)	4 (14)	0.87
Deep venous thrombosis	10 (13)	6 (12)	4 (14)	0.75
Cerebrovascular accident	3 (4)	1 (2)	2 (7)	0.29

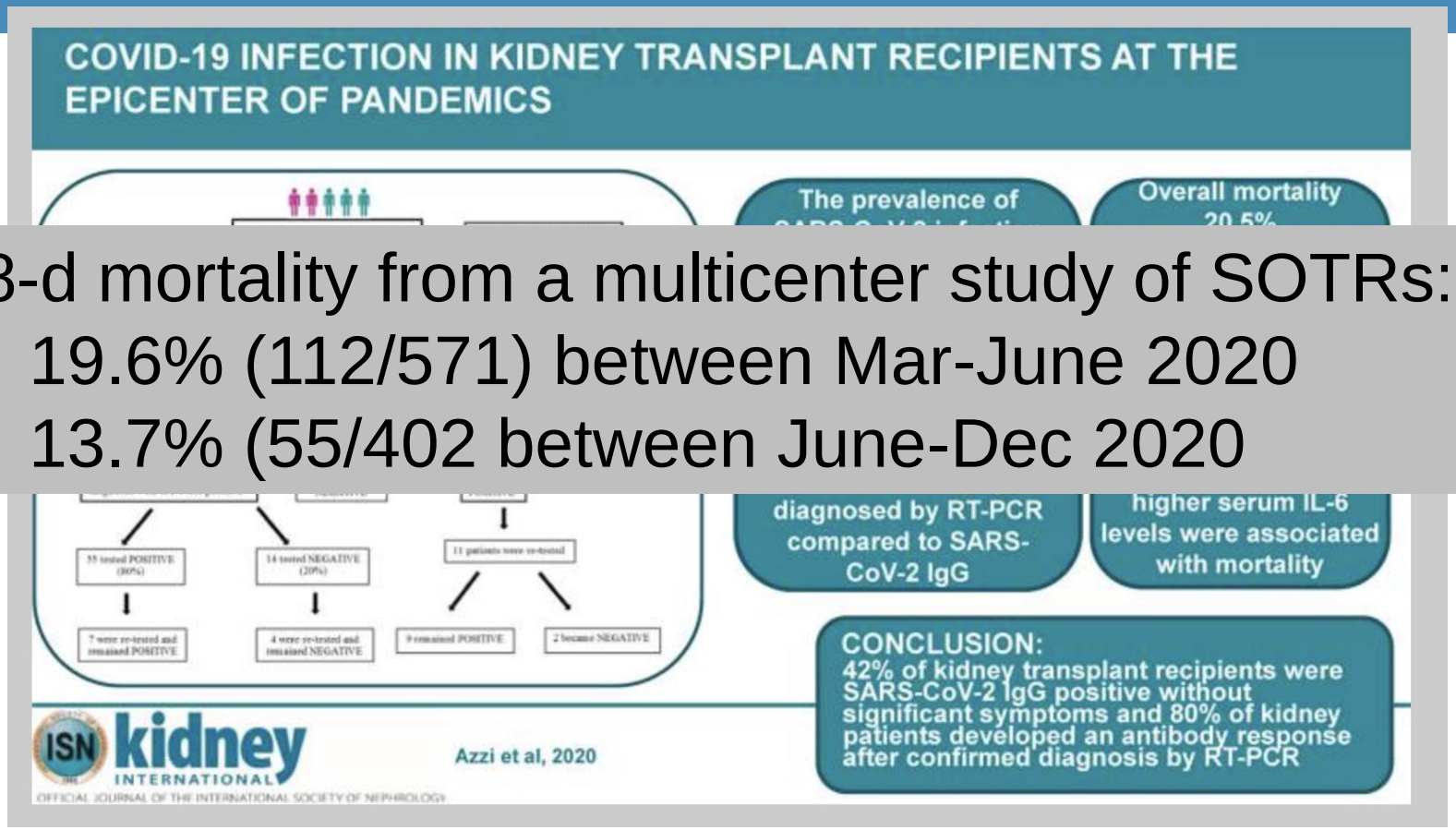
Data are *n* (%) unless otherwise noted.

Table 5 | Therapeutics of patients hospitalized at Montefiore Health System

Treatment	Total patients ($N = 79$)	Survivors ($N = 51$)	Nonsurvivors ($N = 28$)
Antimetabolite withdrawal	74 (94)	48 (94)	26 (93)
Calcineurin inhibitor withdrawal	11 (14)	4 (8)	7 (25)
Antibiotics	65 (82)	38 (75)	27 (96)
Hydroxychloroquine	59 (75)	35 (69)	24 (86)
Remdesivir[a]	6 (8)	5 (10)	1 (4)
High-dose corticosteroids	35 (44)	14 (28)	21 (75)
Tocilizumab	11 (14)	5 (10)	6 (21)
Sarilumab[a]	2 (3)	0 (0)	2 (7)
Leronlimab	6 (8)	3 (6)	3 (11)
Convalescent plasma	7 (9)	3 (6)	4 (14)
i.v. Ig	1 (1)	0 (0)	1 (4)
Anakira	1 (1)	0 (0)	1 (4)
Anticoagulation	44 (56)	26 (51)	18 (64)

[a]Patients enrolled in a randomized clinical trial; the arms to which patients were randomized are unknown.
Data are *n* (%).

Poor Initial SARS-CoV2 outcomes in transplant recipients



28-d mortality from a multicenter study of SOTRs:

19.6% (112/571) between Mar-June 2020

13.7% (55/402 between June-Dec 2020

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Montefiore

Azzi et al 2020

Kates et al. Clin Infect Dis 2021

Estimating the infection-fatality risk of SARS-CoV-2 in New York City during the spring 2020 pandemic wave: a model-based analysis

Wan Yang, Sasikiran Kandula, Mary Huynh, Sharon K Greene, Gretchen Van Wye, Wenhui Li, Hiu Tai Chan, Emily McGibbon, Alice Yeung, Don Olson, Anne Fine, Jeffrey Shaman

Summary

Background As the COVID-19 pandemic continues to unfold, the infection-fatality risk (ie, risk of death among all infected individuals including those with asymptomatic and mild infections) is crucial for gauging the burden of death due to COVID-19 in the coming months or years. Here, we estimate the infection-fatality risk of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in New York City, NY, USA, the first epidemic centre in the USA, where the infection-fatality risk remains unclear.

Methods In this model-based analysis, we developed a meta-population network model-inference system to estimate the underlying SARS-CoV-2 infection rate in New York City during the 2020 spring pandemic wave using available case, mortality, and mobility data. Based on these estimates, we further estimated the infection-fatality risk for all ages overall and for five age groups (<25, 25–44, 45–64, 65–74, and ≥75 years) separately, during the period March 1 to June 6, 2020 (ie, before the city began a phased reopening).

Findings During the period March 1 to June 6, 2020, 205 639 people had a laboratory-confirmed infection with SARS-CoV-2 and 21 447 confirmed and probable COVID-19-related deaths occurred among residents of New York City. We estimated an overall infection-fatality risk of 1·39% (95% credible interval 1·04–1·77) in New York City. Our estimated infection-fatality risk for the two oldest age groups (65–74 and ≥75 years) was much higher than the younger age groups, with a cumulative estimated infection-fatality risk of 0·116% (0·0729–0·148) for those aged 25–44 years and 0·939% (0·729–1·19) for those aged 45–64 years versus 4·87% (3·37–6·89) for those aged 65–74 years and 14·2% (10·2–18·1) for those aged 75 years and older. In particular, weekly infection-fatality risk was estimated to be as high as 6·72% (5·52–8·01) for those aged 65–74 years and 19·1% (14·7–21·9) for those aged 75 years and older.

Interpretation Our results are based on more complete ascertainment of COVID-19-related deaths in New York City than other places and thus probably reflect the true higher burden of death due to COVID-19 than that previously reported elsewhere. Given the high infection-fatality risk of SARS-CoV-2, governments must account for and closely monitor the infection rate and population health outcomes and enact prompt public health responses accordingly as the COVID-19 pandemic unfolds.

Lancet Infect Dis 2020

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Department of Epidemiology (W Yang PhD), **and Department of Environmental Health Sciences** (S Kandula MS, Prof J Shaman PhD), **Mailman School of Public Health, Columbia University, New York City, NY, USA; and Bureau of Vital Statistics** (M Huynh PhD, G Van Wye PhD, W Li PhD, H T Chan MS), **Bureau of Communicable Disease** (S K Greene PhD, E McGibbon MPH, A Yeung MPH, A Fine MD), **and Bureau of Equitable Health Systems** (D Olson MPH), **New York City Department of Health and Mental Hygiene, New York City, NY, USA**

Correspondence to:
Dr Wan Yang, Department of Epidemiology, Mailman School of Public Health, Columbia University, New York City, NY 10032, USA
wy2202@cumc.columbia.edu

COVID-19 and Solid Organ Transplantation: A Review Article

Yorg Azzi, MD,[1] Rachel Bartash, MD,[2] Joseph Scalea, MD,[3] Pablo Loarte-Campos, MD,[1] and Enver Akalin, MD, FAST, FASN[1]

(*Transplantation* 2021;105: 37–55).

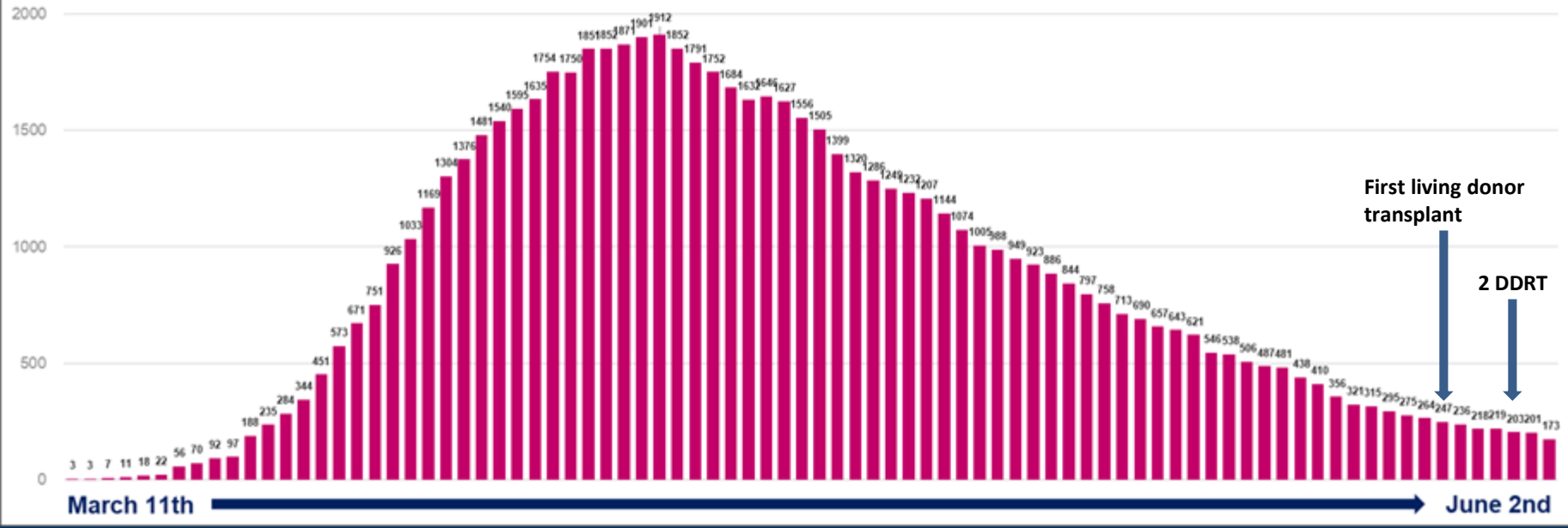
Article/country	Patient number	Patient's characteristics and comorbidities	Clinical outcomes	Predictors of mortality
Sanchez-Alvarez et al Spain Registry of Spanish Society of nephrology[61]	286 patients	Sex: Male 189/286 (66%) Mean age: 60 SD (±13)	Mortality 53/286 (19%) Hospitalized 268/286 (94%) ICU stay 25/286 (9%)	Older age Pneumonia on imaging
Fava et al Spain Multicenter[60]	104 patients	Sex: Male 60/104 (56%) Mean age: 59.7 SD (±12.48) Race: Caucasian 90/104 (87%), Hispanic 9/104 (9%), African American 4/104 (4%) Hypertension 90/104 (87%) Diabetes mellitus 32/104 (31%) Obesity 28/104 (27%) Heart disease 31/104 (30%) Lung disease 16/104 (15%)	Mortality 28/104 (27%) Hospitalized 104/104 (100%) ICU stay 24/104 (23%) AKI 47/100 (47%)	Older age ARDS on admission Elevated LDH on admission
Crespo et al Spain Multicenter[57]	16 patients	Sex: Male 12/16 (75%) Mean age: 73.6 SD (±4.7) Race: Caucasian 14/16 (88%) Hypertension 14/16 (88%) Diabetes mellitus 8/16 (50%) Obesity 7/16 (44%) Heart disease 8/16 (50%) Lung disease 3/16 (19%) Cancer 5/16 (31%)	Mortality 8/16 (50%) Hospitalized 15/16 (94%) ICU stay 2/16 (13%) AKI 5/15 (33%)	Higher respiratory rate on admission Anemia on admission Lymphopenia on admission Higher serum creatinine, D-Dimer and C-Reactive protein on admission
Bossini et al Italy Multicenter[55]	53 patients	Sex: Male 42/53 (79%) Median age: 60 IQR (50–67) Hypertension 42/53 (79%) Diabetes mellitus 11/53 (21%) Heart disease 10/53 (19%)	Mortality 15/45 (33%) Hospitalized 45/53 (85%) ICU stay 10/45 (22%) AKI 15/45 (33%) RRT 3/15 (20%) Discharged 27/45 (60%)	Age >60 Dyspnea on admission
Alberici et al Italy Single Center[54]	20 patients	Sex: Male 16/20 (80%) Median age: 59 IQR (51–64) Hypertension 17/20 (85%) Diabetes mellitus 3/20 (15%) Heart disease3/20 (15%)	Mortality 5/20 (25%) Hospitalized 20/20 (100%) ICU stay 4/20 (20%) AKI 6/20 (30%) RRT 1/6 (17%) Discharged 3/20 (15%)	N/A
Caillard et al France French Registry[56]	279 patients	Sex: Male 182/279 (65%) Median age: 61.6 IQR (50.8–69) Hypertension 201/252 (90%) Diabetes mellitus 92/223 (41%) Heart disease 81/224 (36%) Lung disease 33/223 (15%) Cancer 35/226 (16%)	Mortality at 30 d (23%) Hospitalized 243/279 (87%) ICU stay 88/243 (36%) AKI 106/243 (44%) RRT 27/243 (11%) Graft loss 9/243 (4%)	Age >60 Cardiovascular disease Dyspnea on admission
Elias et al France Multicenter[59]	66 patients	Sex: Male 37/66 (56%) Mean age: 56.4 SD (±12.5) Race: Non-white 24/66 (36%) Hypertension 58/66 (88%) Diabetes mellitus 31/66 (47%) Obesity 20/66 (30%) Heart disease 1/66 (2%) Lung disease 13/66 (20%)	Mortality 16/66 (24%) Hospitalized 60/66 (91%) ICU stay 15/66 (22%) AKI 28/66 (42%) RRT 7/28 (25%)	N/A
Benotmane et al France Single Center[62]	49 patients	Sex: Male 37/49 (76%) Median age 62.2 IQR (52.3–67.8) Hypertension 41/49 (84%) Diabetes mellitus 23/49 (47%) Obesity 22/49 (45%) Heart disease 18/49 (37%)	Mortality 9/49 (19.5%) Hospitalized 41/49 (84%) ICU stay 14/41 (34%) AKI 31/41 (76%)	C-reactive protein >100 mg/L Interleukin-6 >65 ng/L D-dimer >960 ng/ml High-sensitivity Troponin I >30 ng/L

Mortality in Europe during first wave of the pandemic mirrored that of USA

Older age and elevated inflammatory markers were most common risk factors for mortality

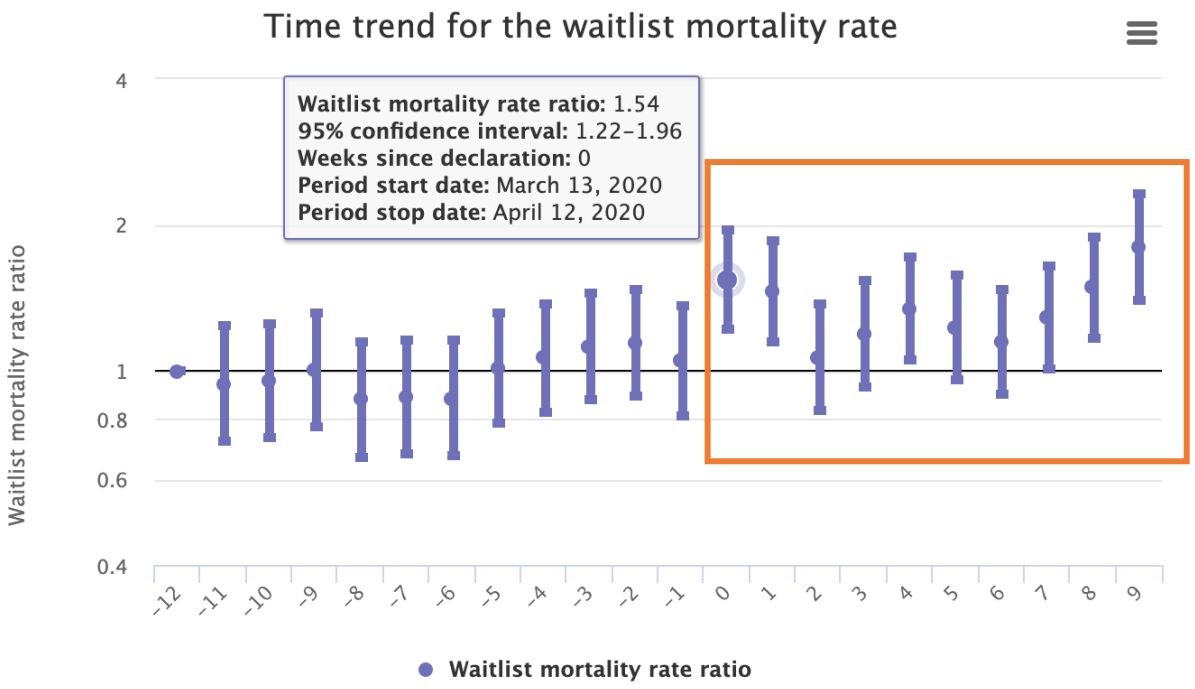
MHS Cases	NYS Cases	US Cases	Global Cases
173	373,040	1,802,523	6,325,303
14% ↓ from previous day	<0.5% ↑ from previous day	<1% ↑ from previous day	2% ↑ from previous day

Total MHS COVID+ Cases (Currently Admitted as of 6/2)



SCIENTIFIC REGISTRY OF TRANSPLANT RECIPIENTS

Kidney Waitlist Mortality Rate



Waitlist Mortality increased through the pandemic

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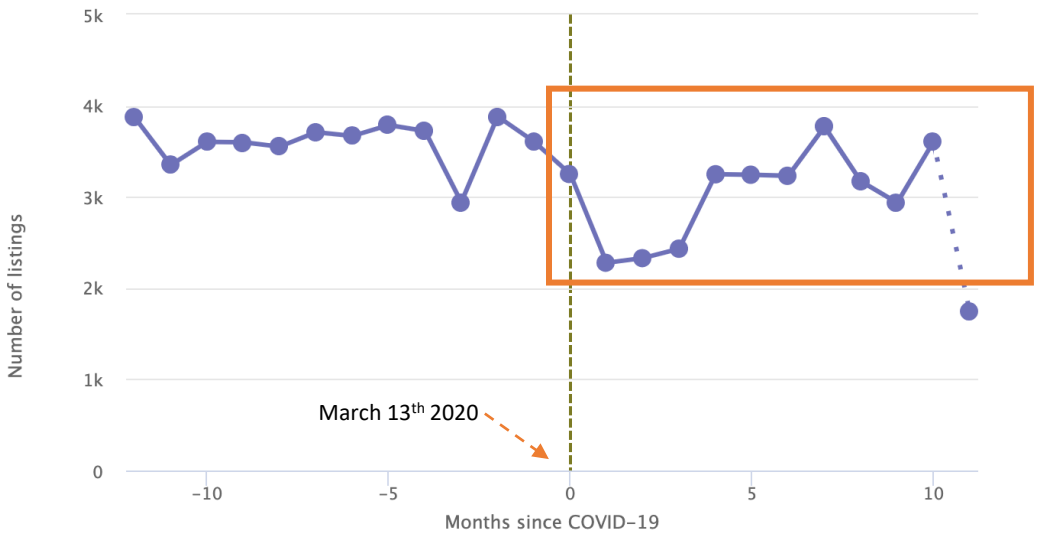
SCIENTIFIC REGISTRY OF TRANSPLANT RECIPIENTS

New Kidney Candidate Listings



Overall number of listings decreased after National Emergency declaration

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Kidney360

Risks and Benefits of Kidney Transplantation during the COVID-19 Pandemic: Transplant or Not Transplant?

Maria Ajaimy, Luz Liriano-Ward, Jay A. Graham, and Enver Akalin

KIDNEY360 2: 1179–1187, 2021.

Table 3. Coronavirus disease 2019 incidence and mortality in patients on the waiting list versus transplant recipients

Study	Total Number of waitlisted Patients who Are Coronavirus Disease 2019+	Incidence of Coronavirus Disease 2019 in Waitlisted Patients, %	Overall Mortality in Waitlisted Patients, %	Total Number of Coronavirus Disease 2019+ Transplant Recipients	Incidence of Coronavirus Disease 2019 in Transplant Recipients, %	Overall Mortality in Transplant Recipients, %
Thaunat *et al.* (35)	478	3	13	606	1	20
Ravanan *et al.* (11)	197	4	10	470	1	26
Hilbrands *et al.* (9)	148	n/a	5	23	n/a	30
Craig-Schapiro *et al.* (32)	56	n/a	34	80	n/a	16
Clarke *et al.* (31)	53	18	11	16	7	38
Mamode *et al.* (33)	52	4	27	121	n/a	30
Mohamed *et al.* (34)	32	10	16	28	2	32

Table 4. Clinical approach to living and deceased donor sand recipients during the coronavirus disease 2019 pandemic

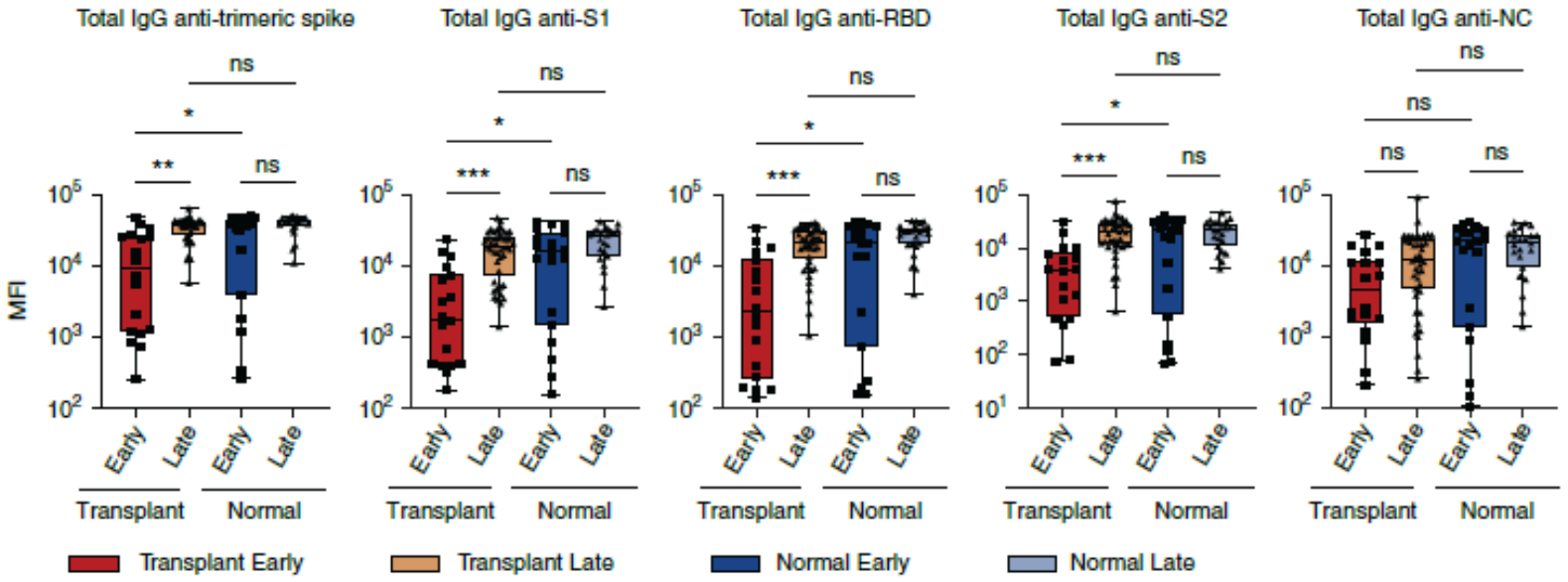
Clinical Approach
Donor assessment
1. Deceased and living donor transplant activity should be assessed at each center on the basis of COVID-19 pandemic severity at their region.
2. One sample from the respiratory tract by RT-PCR for SARS-CoV-2 should be performed within 3 days of procurement. A second viral test be performed 24 hours after the initial test and within 24–48 hours of procurement when feasible.
3. For donors previously known to have had COVID-19, it is suggested the initial COVID-19 infection occurred between 21 and 90 days before donor evaluation, irrespective of repeat NAT test results, and at least 30 days passed after symptom resolution.
4. Chest computerized tomography should be negative for COVID-19 suspicious pneumonia.
5. Consideration should be given toward ensuring lower cold ischemia times to minimize delayed graft function.
6. For living donors who were previously known to have had COVID-19, ≥30 days should have passed after all symptoms were resolved.
7. Living donors should be vaccinated for SARS-CoV-2 before transplantation.
Recipient assessment
1. Patients aged >65years, especially if they have additional comorbidities such as cardiovascular disease and diabetes mellitus, transplantation could be deferred at the peak of pandemics.
2. Transplantation in patients who are highly sensitized with use of antithymocyte globulin and/or rituximab should be assessed patient by patient, considering the recipient's age and other comorbidities, degree of HLA-matching and mismatching, and severity of the pandemic at the region.
3. For recipients who were previously known to have had COVID-19, at least 30 days should have passed after all symptoms were resolved and should have an updated cardiac and pulmonary assessment before they are considered for transplantation.
4. Patients ideally should be vaccinated for SARS-CoV-2 before transplantation.

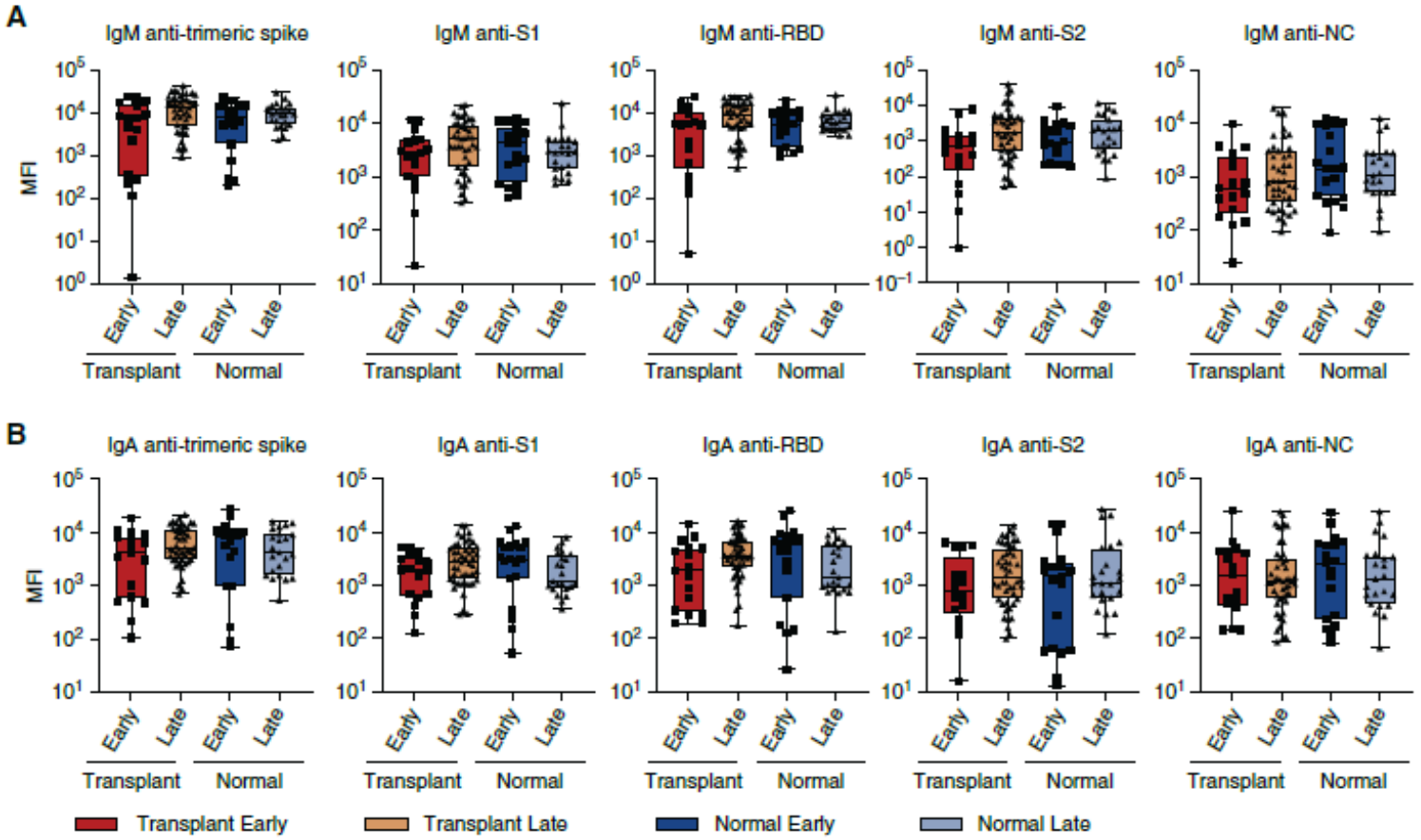
COVID-19, coronavirus disease 2019; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2; NAT, nucleic acid amplification technique.

Delayed Kinetics of IgG, but Not IgA, Antispike Antibodies in Transplant Recipients following SARS-CoV-2 Infection

JASN 32: 3221–3230, 2021.

Paolo Cravedi,[1] Patrick Ahearn,[2] Lin Wang,[3] Tanuja Yalamarti,[2] Susan Hartzell,[1] Yorg Azzi,[4] Madhav C. Menon,[1,5] Aditya Jain,[6] Marzuq Billah,[6] Marcelo Fernandez-Vina,[3] Howard M. Gebel,[7] E. Steve Woodle,[8] Natalie S. Haddad,[9] Andrea Morrison-Porter,[9] F. Eun-Hyung Lee,[9] Ignacio Sanz,[9] Enver Akalin,[4] Alin Girnita,[10] and Jonathan S. Maltzman[2,11]

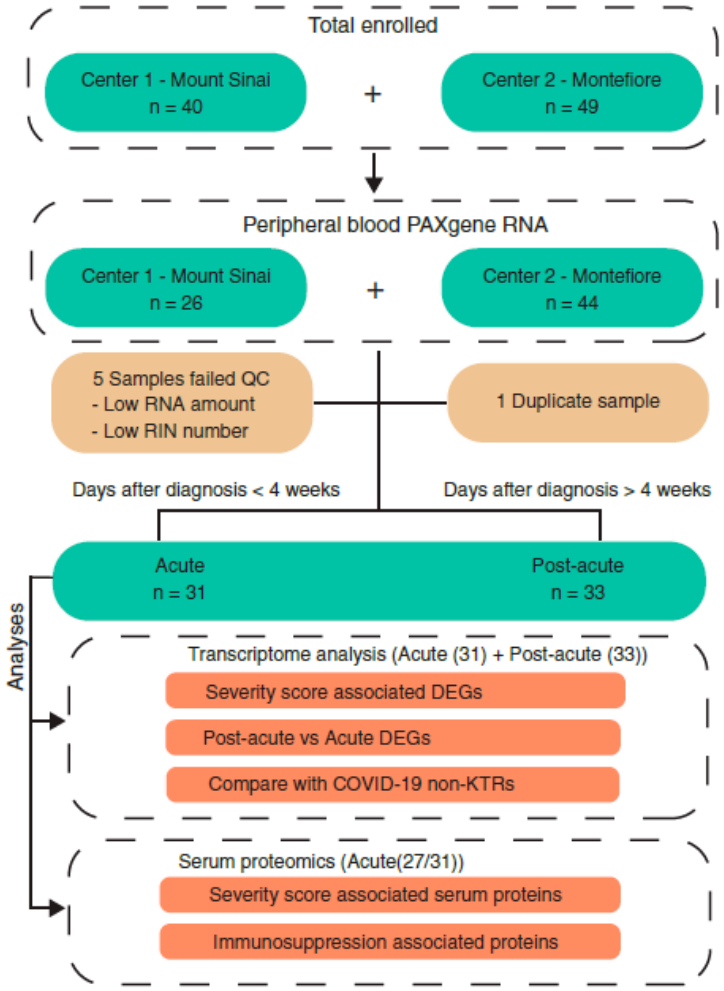


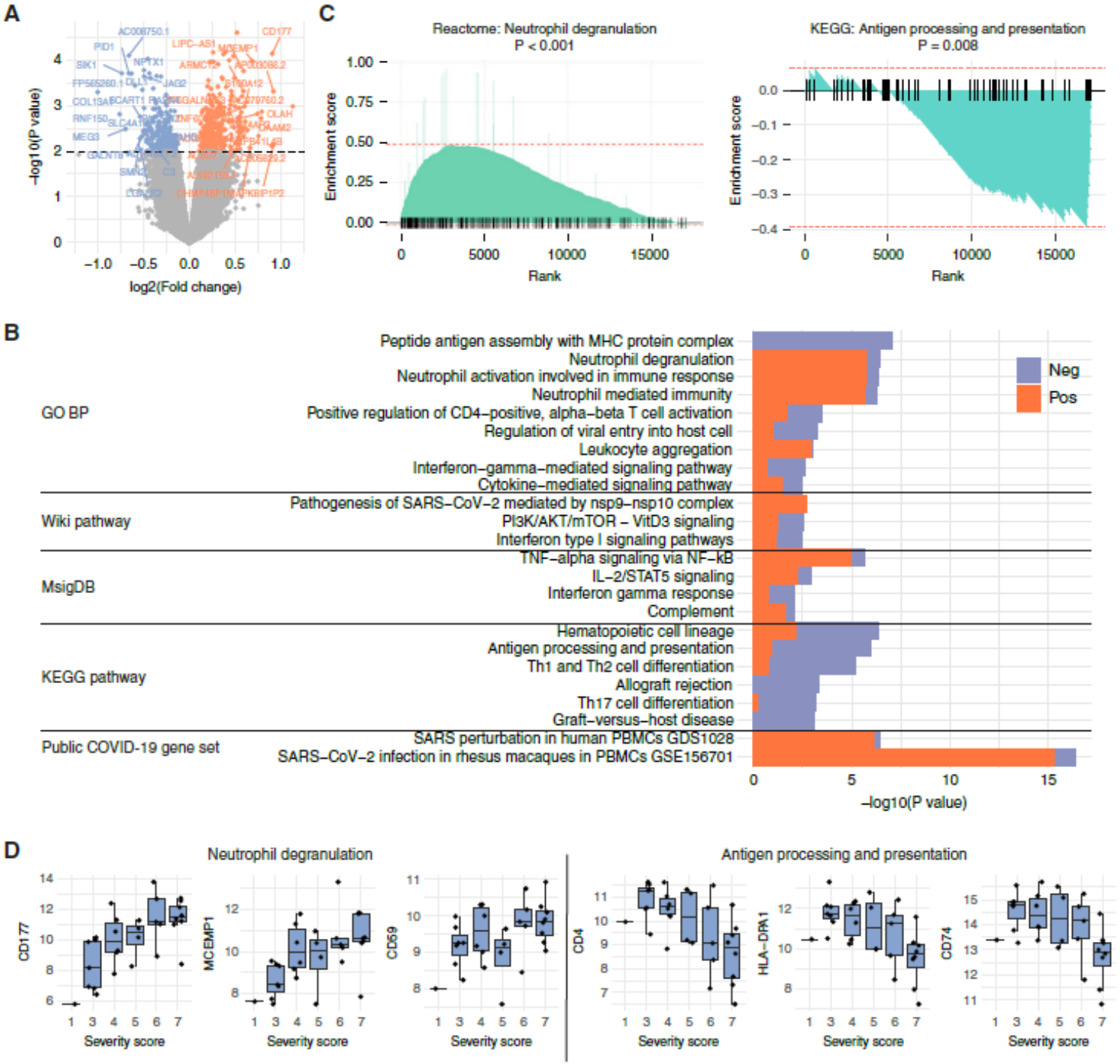

A
IgM anti-trimeric spike
IgM anti-S1
IgM anti-RBD
IgM anti-S2
IgM anti-NC
MFI
Early
Late
Transplant
Normal
B
IgA anti-trimeric spike
IgA anti-S1
IgA anti-RBD
IgA anti-S2
IgA anti-NC
Transplant Early
Transplant Late
Normal Early
Normal Late

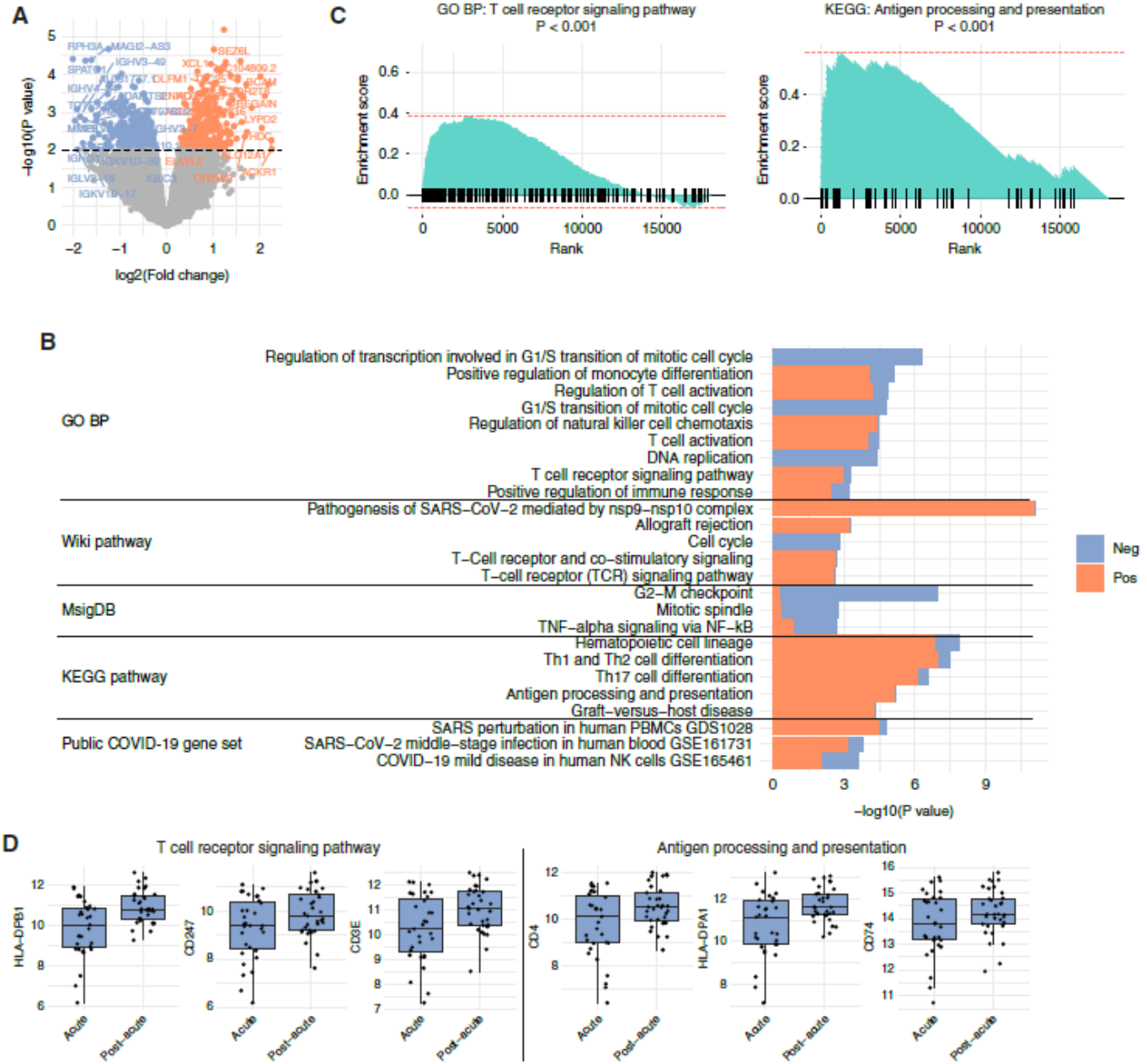
Blood Transcriptomes of SARS-CoV-2–Infected Kidney Transplant Recipients Associated with Immune Insufficiency Proportionate to Severity

JASN 33: 2108–2122, 2022.

Zeguo Sun,[1] Zhongyang Zhang,[2,3] Khadija Banu,[4] Yorg Al Azzi,[5] Anand Reghuvaran,[4] Samuel Fredericks,[1] Marina Planoutene,[4] Susan Hartzell,[1] Yesl Kim,[6] John Pell,[4] Gregory Tietjen,[7] William Asch,[4] Sanjay Kulkarni,[7] Richard Formica,[4] Meenakshi Rana,[1] Jonathan S. Maltzman,[6,8] Weijia Zhang,[1] Enver Akalin,[5] Peter S. Heeger,[1] Paolo Cravedi,[1] and Madhav C. Menon[1,4]




A
−log10(P value)
log2(Fold change)
C
Reactome: Neutrophil degranulation
P < 0.001
KEGG: Antigen processing and presentation
P = 0.008
Enrichment score
Rank
B
GO BP
Peptide antigen assembly with MHC protein complex
Neutrophil degranulation
Neutrophil activation involved in immune response
Neutrophil mediated immunity
Positive regulation of CD4−positive, alpha−beta T cell activation
Regulation of viral entry into host cell
Leukocyte aggregation
Interferon−gamma−mediated signaling pathway
Cytokine−mediated signaling pathway
Wiki pathway
Pathogenesis of SARS−CoV−2 mediated by nsp9−nsp10 complex
PI3K/AKT/mTOR − VitD3 signaling
Interferon type I signaling pathways
MsigDB
TNF−alpha signaling via NF−kB
IL−2/STAT5 signaling
Interferon gamma response
Complement
KEGG pathway
Hematopoietic cell lineage
Antigen processing and presentation
Th1 and Th2 cell differentiation
Allograft rejection
Th17 cell differentiation
Graft−versus−host disease
Public COVID-19 gene set
SARS perturbation in human PBMCs GDS1028
SARS−CoV−2 infection in rhesus macaques in PBMCs GSE156701
Neg
Pos
−log10(P value)
D
Neutrophil degranulation
Antigen processing and presentation
CD177
MCEMP1
CD69
CD4
HLA−DRA
CD74
Severity score


A
−log10(P value)
log2(Fold change)
C
GO BP: T cell receptor signaling pathway
P < 0.001
Enrichment score
Rank
KEGG: Antigen processing and presentation
P < 0.001
Enrichment score
Rank
B
GO BP
Regulation of transcription involved in G1/S transition of mitotic cell cycle
Positive regulation of monocyte differentiation
Regulation of T cell activation
G1/S transition of mitotic cell cycle
Regulation of natural killer cell chemotaxis
T cell activation
DNA replication
T cell receptor signaling pathway
Positive regulation of immune response
Wiki pathway
Pathogenesis of SARS−CoV−2 mediated by nsp9−nsp10 complex
Allograft rejection
Cell cycle
T−Cell receptor and co−stimulatory signaling
T−cell receptor (TCR) signaling pathway
MsigDB
G2−M checkpoint
Mitotic spindle
TNF−alpha signaling via NF−kB
KEGG pathway
Hematopoietic cell lineage
Th1 and Th2 cell differentiation
Th17 cell differentiation
Antigen processing and presentation
Graft−versus−host disease
Public COVID-19 gene set
SARS perturbation in human PBMCs GDS1028
SARS−CoV−2 middle−stage infection in human blood GSE161731
COVID−19 mild disease in human NK cells GSE165461
−log10(P value)
Neg
Pos
D
T cell receptor signaling pathway
HLA−DPB1
CD247
CD3E
Antigen processing and presentation
CD4
HLA−DPA1
CD74
Acute
Post−acute

Letters

RESEARCH LETTER JAMA Published online May 5, 2021

Antibody Response to 2-Dose SARS-CoV-2 mRNA Vaccine Series in Solid Organ Transplant Recipients

Brian J. Boyarsky, MD, PhD

Receptor binding domain IgG

Spike protein IgG

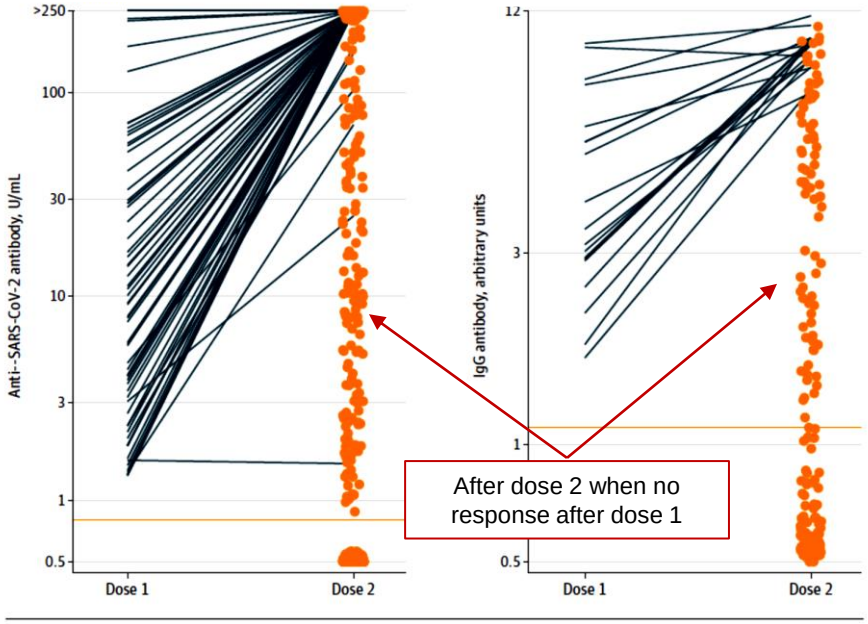


Table. Demographic and Clinical Characteristics of Study Participants, Stratified by Immune Response to the 2 Doses of SARS-CoV-2 mRNA Vaccine

N = 658

	No. (%) by postvaccination antibody response			
	Dose 1− Dose 2−	Dose 1− Dose 2+	Dose 1+ Dose 2+	*P* value
No.	301 (46)	259 (39)	98 (15)	
Age category, y[a]				
18-39	46 (41)	35 (31)	32 (28)	.002[b]
40-59	86 (42)	94 (46)	26 (13)	
≥60	169 (50)	129 (38)	40 (12)	
Organ[f]				
Kidney	168 (52)	118 (37)	36 (11)	<.001[d]
Liver	26 (20)	62 (48)	41 (32)	
Heart	42 (43)	45 (46)	10 (10)	
Lung	43 (61)	22 (31)	6 (8)	
Pancreas	4 (80)	1 (20)	0	
Other multiorgan	15 (58)	7 (27)	4 (15)	
Years since transplant[g]				
<3	114 (63)	54 (30)	13 (7)	.001[b]
3-6	69 (50)	53 (39)	15 (11)	
7-11	54 (38)	61 (43)	26 (18)	
≥12	62 (33)	85 (45)	43 (23)	
Maintenance immunosuppression regimen				
Includes antimetabolite[h]	268 (57)	167 (35)	38 (8)	<.001[d]
Does not include antimetabolite[i]	33 (18)	92 (50)	60 (32)	
Vaccine[i]				
mRNA-1273 (Moderna)	124 (40)	116 (38)	67 (22)	<.001[d]
BNT162b2 (Pfizer-BioNTech)	175 (51)	138 (40)	29 (8)	

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Risk factors associated with poor response to COVID-19 vaccination in kidney transplant recipients

Kidney International (2021) **100,** 1124–1143

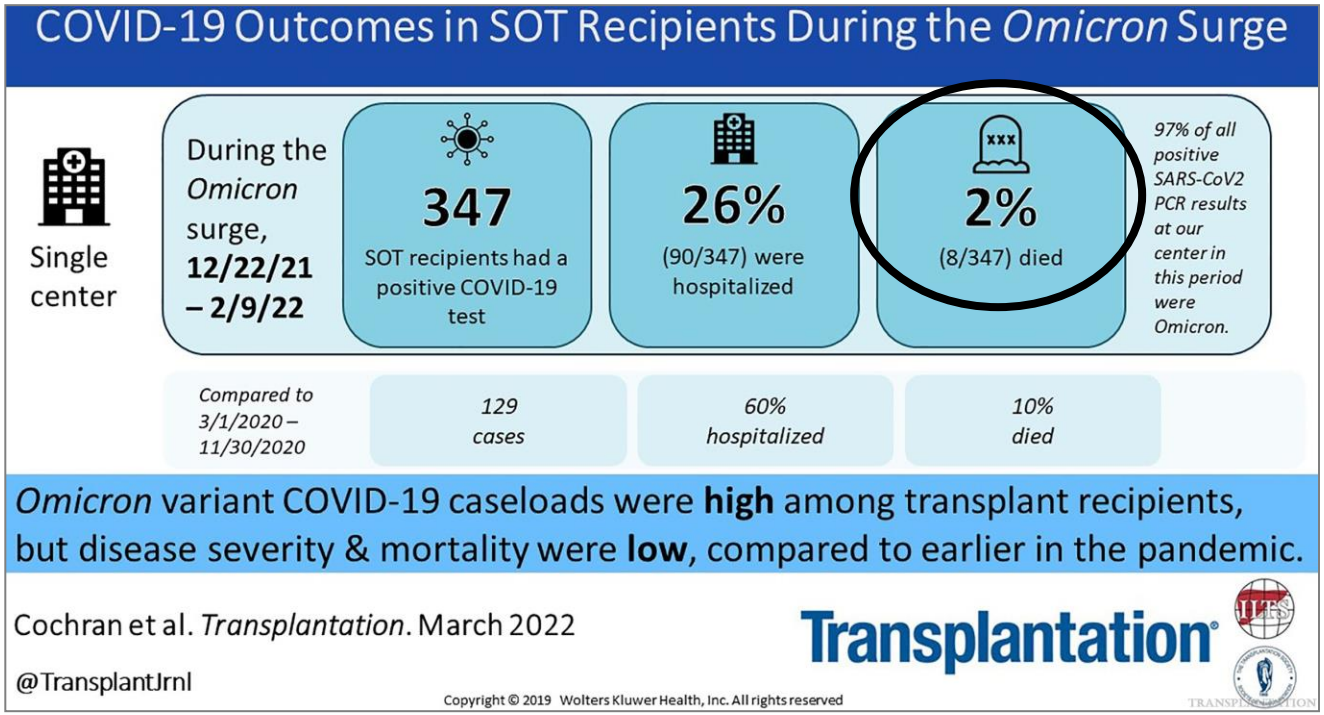
Yorg Azzi[1,2], Harith Raees[2], Tao Wang[3], Levi Cleare[4], Luz Liriano-Ward[1,2], Pablo Loarte-Campos[1,2], Cindy Pynadath[1,2], Maria Ajaimy[1,2], Omar Alani[2], Yi Bao[2], Liise-anne Pirofski[4,5] and Enver Akalin[1,2,5]

52% of patients with previous history of COVID had SARS-CoV-2 nucleocapsid IgG before vaccination, and 95% generated anti–spike IgG after vaccination. However, only 32% of patients without a previous history of COVID-19 and a negative anti–nucleocapsid IgG before vaccination generated an anti–spike IgG response.
A lack of response to COVID-19 vaccines was associated with African American race; being on high-dose anti-metabolite therapy; and having lower pre-vaccination CD3, CD4 T-cell, and serum IgM levels

Table 1 | Baseline demographics of kidney transplant recipients without previous history of COVID-19 and completed COVID-19 vaccination

Variable	Anti-spike IgG negative (N = 52)	Anti-spike IgG positive (N = 24)	*P* value
Age, yr	63 (54–69)	58 (41–70)	0.22
<65	65	67	1
≥65	35	33	
Male sex	63	50	0.39
Race			
White	12	33	
African American	52	25	0.04
Hispanic	29	25	
Other	8	17	
Transplant type			
Deceased donor	83	67	0.21
Living donor	17	34	
Cause of ESRD			
Diabetes mellitus	35	25	
Hypertension	31	25	0.67
Glomerular disease	29	46	
Others	6	4	
Comorbidities			
Diabetes mellitus	52	46	0.8
Hypertension	100	100	1
Heart disease	39	17	0.1
Lung disease	12	17	0.8
Cancer	15	25	0.49
BMI, kg/m^2	29.5 (23.7–32.4)	30.3 (25.5–34.3)	0.31
Vaccine type			
BNT162B2 (Pfizer–BioNTech)	64	63	0.94
mRNA-1273 (Moderna)	31	33	
Adenovirus (Johnson & Johnson)	5	4	
Time to vaccination from transplant, mo	54 (24–98)	39 (12–100)	0.47
Induction with anti-thymocyte globulin	69	48	0.13
Immunosuppressive regimen			
CNI	98	100	1
MPA/MMF	87	67	0.043
Prednisone	100	100	1
No MPA/MMF	14	33	*P* value for 3 groups = 0.093
MPA/MMF ≤720/1000 mg/d	33	33	
MPA/MMF >720/1000 mg/d	54	33	*P* value for no MPA/MMF vs. MPA/MMF >720/1000 mg/d = 0.045
eGFR , ml/min	55 (36–77)	62 (44–84)	0.23
PRA before vaccination, mean (SD)			
Class I	21 (35)	16 (29)	0.35
Class II	17 (31)	11 (26)	0.29
CD3 count, cells/µl	652 (427–1204)	1176 (653–1422)	0.032
CD4 count, cells/µl	303 (185–503)	632 (249–858)	0.046
CD8 count, cells/µl	314 (184–507)	454 (223–562)	0.2
IgM, mg/dl	67.5 (39–92)	100 (60–141)	0.009
IgA, mg/dl	156.5 (133.8–246.3)	194 (147.5–277.5)	0.31
IgG, mg/dl	1114.5 (801.5–1340)	954 (885–1183)	0.5

Omicron data in SOT



COVID-19 Clinical Outcomes in Solid Organ Transplant Recipients During the Omicron Surge

Cochran, Willa; Shah, Pali; Barker, Lindsay; Langlee, Julie; Freed, Kristin; Boyer, Lauren; Scott Anderson, R.; Belden, Maura; Bannon, Jaclyn; Kates, Olivia S.; Permpalung, Nitipong; Mostafa, Heba; Segev, Dorry L.; Brennan, Daniel C.; Avery, Robin K.

Transplantation106(7):e346-e347, July 2022.

doi: 10.1097/TP.0000000000004162

- Attenuated variant?
- Protection from vaccination?
- Treatment?

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COVID-19 Vaccines (2023-24 Formula)

- **Moderna: Monovalent** XBB.1.5 Variant Vaccine
  - Per Moderna:***Clinical trial data from research assay confirmed Moderna's updated COVID-19 vaccine showed an 8.7 to 11-fold increase in neutralizing antibodies against circulating variants, including BA.2.86, EG.5, and FL.1.5.1 variants***
- **Pfizer: Monovalent** component targeting Omicron variant XBB.1.5
  - *Pre-clinical data shows improved neutralizing antibody responses against BA.2.86 and EG.5.1*

Slide courtesy of Naida Koura-Mola, PharmD
PGY1 Pharmacy Resident

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CDC Recommendations for Immunocompromised adults

- 1 dose of updated (2023–2024 Formula) mRNA COVID-19 vaccine is recommended for everyone >5 years old
- Bivalent mRNA COVID-19 vaccines are no longer recommended in the United States

- People who are moderately or severely immunocompromised
  - Initial vaccination: 3-dose series of updated (2023–2024 Formula) Moderna or Pfizer-BioNTech COVID-19 vaccine
  - Previously vaccinated: 1 or 2 doses of updated (2023–2024 Formula) of Moderna or Pfizer-BioNTech COVID-19 vaccine, depending on the number of prior doses

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SARS-CoV2 Therapeutics

Antibody	Antiviral	Immunomodulatory
Convalescent plasma	Remdesivir	Steroids
	Nirmatrelvir-ritonavir	Tocilizumab
	Molnupiravir	Sarulimab
		Baracitinib

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Nirmatrelvir-ritonavir

Prescribe alternative	Temporarily Withhold	Adjust Dose/Monitor
Voclosporin	Everolimus	Cyclosporine
Glecaprevir/pibrentasvir	Tacrolimus	Clarithromycin
Rifampin	Sirolimus	Itraconazole
Rifapentine	Erythromycin	Ketoconazole
		Rifabutin
		Maraviroc

Also interactions with anti-infectives but ok to monitor including:
Posaconazole, voriconazole, isavuconazole

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Transplant recommendations

Table 1. Summary of COVID-19 Therapeutics

Therapy	Mild disease, outpatient	Mild disease, hospitalized (no O2)	Moderate disease, hospitalized	Severe disease, hospitalized
Corticosteroids	-	-	+	+++
Tocilizumab	-	-	+/-	+/-
Baricitinib			+/-	+/-
Convalescent plasma	+/-	+/-	-	-
Remdesivir	+	+	+	+
Nirmatrelvir/ritonavir (Paxlovid™)	+/-[a]	-	-	-
Molnupiravir (Lagevrio™)	+/-	-	-	-

[a] Given concern for drug-drug interactions, nirmatrelvir/ritonavir (Paxlovid™) should not be used together with calcineurin or mTOR inhibitors. **See full discussion in the AST guidance document published in January 2022** on strategies to mitigate this drug-drug interaction, including the temporary discontinuation of calcineurin or mTOR inhibitors during Paxlovid use.

www.myast.org/sites/default/files/COVID%20FAQ%20for%20Tx%20professionals%202-2023%20FINAL.pdf

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DOI: 10.1111/tid.13925

TRANSPLANT INFECTIOUS DISEASE

ORIGINAL ARTICLE

Solid organ transplantation from COVID positive donors in the United States: Analysis of United Network for Organ Sharing database

Abhay Dhand[1,2] | Kenji Okumura[2] | Christopher Nabors[1] | Seigo Nishida[2]

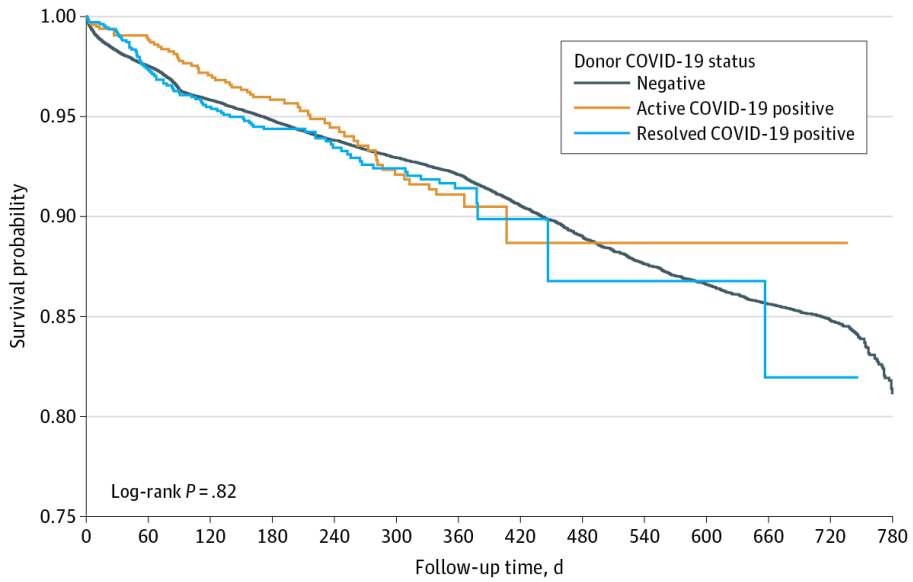
TABLE 2 Outcomes of solid organ transplants from COVID positive donors

	COVID positive donors	COVID negative donors	*p*
Kidney	*n* = 281	*n* = 27 013	
Posttransplant LOS, days, median (IQR)	4 (3–5)	5 (4–7)	<.001
Rejection before discharge, *n* (%)	1 (0.4%)	233 (0.9%)	.74
Delayed graft function, *n* (%)	61 (21.8%)	8233 (30.6%)	.001
30-day graft failure, *n* (%)	2 (0.7%)	478 (1.8%)	.25
30-day mortality, *n* (%)	1 (0.4%)	194 (0.7%)	.73
Mortality, *n* (%)	5 (1.8%)	1512 (5.6%)	
Deaths from COVID	0	511	
Liver	*n* = 106	*n* = 12 484	
Posttransplant LOS, days, median (IQR)	9 (7–16)	10 (7–17)	.25
Rejection before discharge, *n* (%)	10 (9.4%)	564 (4.5%)	.016
30-day graft failure, *n* (%)	5 (4.7%)	404 (3.2%)	.40
30-day mortality, *n* (%)	4 (3.8%)	271 (2.2%)	.30
Mortality, *n* (%)	7 (6.6%)	862 (6.9%)	
Causes of death	HAT (1)	COVID = 94	
	Sepsis (1)		
	Fungal infection (1)		
	Cardiac arrest (1)		
	Unknown (3)		
	COVID (0)		

From: **Patterns in Use and Transplant Outcomes Among Adult Recipients of Kidneys From Deceased Donors With COVID-19**

JAMA Netw Open. 2023;6(5):e2315908. doi:10.1001/jamanetworkopen.2023.15908

OPTN Database



No. at risk

Negative	40789	32463	31181	28572	24343	22810	18301	10050	9112	8823	8456	7723	5104	591
Active COVID-19 positive	1289	867	810	681	434	379	255	32	13	12	12	12	9	0
Resolved COVID-19 positive	1435	1034	971	829	582	508	355	46	22	19	19	17	9	0

Figure Legend:

Kaplan-Meier Curve for Graft Failure by Donor COVID-19 Status

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SUMMARY

- Severe COVID-19 pathogenesis is mediated through a dysregulated immune response
- Lymphopenia and low CD3, CD4, and CD8 cell counts are common in kidney transplant recipients with COVID-19
- Mortality in kidney transplant recipients were high at the first peak between 15-38% and older age is the most important predictor for mortality along with high IL6 levels
- Mortality significantly decreased to 1-2% at current era
- 40% of patients had COVID diagnosis by nucleocapside IgG without previous significant clinical symptoms
- 100% of immunocompetent patients develop antibodies to SARS-CoV-2 and it was stable up to 6-9 months
- Anti-SARS-CoV-2 IgG production is delayed in transplant recipients
- Delayed seroconversion kinetics correlated with impaired viral control in deceased patients
- Despite an initial delay in T cell response, most transplant patients develop comparable functional immune response

SUMMARY

- A lack of response to COVID-19 vaccines was associated with African American race; being on high-dose anti-metabolite therapy; and having lower pre-vaccination CD3, CD4 T-cell, and serum IgM levels
- Vaccination is encouraged to all transplant recipients and previously vaccinated patients should receive 1 or 2 doses updated 2023-2024 formula based on the number of previous vaccinations
- Most patients currently treated at outpatient setting with holding antimetabolite (MMF/MPA) for 5-7 days. If clinical symptoms are significant molnupiravir can be added
- Paxlovid should be avoided in transplant patients and calcineurin inhibitors
- Patients admitted with mild symptoms can receive Remdesivir IV for 3 days and convalescent plasma
- Patients admitted with moderate symptoms should receive dexamethasone for 5-10 days in addition to Remdesivir IV for 3 days and convalescent plasma
- COVID-19 positive donors can be safely transplanted to any transplant recipients