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Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: Webb GJ, Marjot T, Cook JA, et al. Outcomes following SARS-CoV-2 infection in liver transplant recipients: an international registry study.
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Outcomes following SARS-CoV-2 infection in liver transplant recipients: an international registry study: Supplementary data

Supplementary tables

Supplementary table 1 – Supporting societies and routes of advertisement

Society or route of advertisement
European Association for the Study of the Liver
United European Gastroenterology
International Liver Cancer Association
British Society of Gastroenterology
British Association for the Study of the Liver
Hepatology Society of the Philippines
Gastroenterological Society of Australia
Australia and New Zealand Liver Transplant Registry
British Liver Trust
European Liver Patients' Association
Hellenic Association for the Study of the Liver
Twitter:
@COVIDHep
@SECUREcirrhosis

Supplementary table 2 – Reported ethnicity of transplant cases

Reported ethnicity	n	%
White	111	74%
African American	16	11%
South-East Asian	11	7%
Hispanic	6	4%
Unknown	4	3%
East Asian	2	1%
Arabic	2	1%

One patient had two recorded ethnicities

Supplementary table 3 – Countries of origin

Country	n	Percentage
USA	55	36%
UK	29	19%
Middle East*	18	12%
Italy	15	10%
Mexico	7	5%
Canada	6	4%
Sweden	5	3%
Belgium	3	2%
Netherlands	3	2%
Brazil	1	1%
Switzerland	1	1%
Germany	1	1%
Egypt	1	1%
Spain	1	1%
Greece	1	1%
India	1	1%
Philippines	1	1%
Portugal	1	1%
Turkey	1	1%

* = country known but unspecified at submitter's request.

Supplementary table 4 – Disease aetiologies requiring transplantation

Aetiologies	n	Percentage
HCV	26	17%
NASH	20	13%
Other	20	13%
Alcohol	19	13%
PSC	19	13%
HBV	14	9%
AIH	13	9%
PBC	6	4%
Alcohol HCV	2	1%
HBV Other	2	1%
Wilsons	2	1%
AIH PBC	1	1%
AIH Wilsons	1	1%
HCV HBV	1	1%
IGG4	1	1%
NASH Alcohol HCV	1	1%
NASH HBV	1	1%
NASH HCV	1	1%
NASH Other	1	1%

Supplementary table 5 – Characteristics and associations with death in comparison cohort

	Cohort (n = 627)		Survived (n = 469)		Died (n = 167)		Univariable analysis		Multivariable analysis	
	Median/n	IQR/%	Median/n	IQR/%	Median/n	IQR/%	OR (95%CI)	p value	OR (95%CI)	p value
Age (years)	73	73 (55-84)	63	63 (50-80)	82	82 (75-88)	1.07 (1.06-1.09)	**<0.001**	1.07 (1.05-1.09)	**<0.001**
Sex (male)	329	52.5%	227	49.3%	102	61.1%	1.61 (1.12-2.31)	**0.010**	1.89 (1.23-2.90)	**0.004**
Smoker	7	1.1%	6	1.3%	1	0.6%	0.46 (0.05-3.81)	0.469	0.38 (0.04-3.90)	0.415
White ethnicity	434	69.20%	296	64.40%	138	82.60%	2.64 (1.69-4.11)	**<0.001**	1.21 (0.71-2.06)	0.492
Obese (BMI >30kg/m²)	158	25.2%	121	26.3%	37	22.2%	0.80 (0.52-1.21)	0.291	1.06 (0.64-1.76)	0.810
Heart disease	202	32.2%	120	26.1%	82	49.1%	2.73 (1.89-3.95)	**<0.001**	1.03 (0.65-1.61)	0.910
Diabetes mellitus	144	23.0%	96	20.9%	48	28.7%	1.53 (1.02-2.29)	**0.039**	1.74 (1.08-2.80)	**0.022**
Asthma	69	11.0%	54	11.7%	15	9.0%	0.74 (0.41-1.35)	0.331	0.93 (0.46-1.89)	0.841
Chronic obstructive pulmonary disease	59	9.4%	35	7.6%	24	14.4%	2.04 (1.17-3.54)	**0.012**	1.10 (0.59-2.05)	0.771
Other chronic lung disease	32	5.1%	18	3.9%	14	8.4%	2.25 (1.09-4.63)	**0.028**	1.92 (0.84-4.41)	0.122
Hypertension	241	38.4%	164	35.7%	77	46.1%	1.54 (1.08-2.21)	**0.018**	1.01 (0.66-1.54)	0.978
Non-liver cancer	92	14.7%	56	12.2%	36	21.6%	1.98 (1.25-3.15)	**0.004**	1.55 (0.90-2.65)	0.112
Stroke or TIA	73	11.6%	48	10.4%	25	15.0%	1.51 (0.90-2.54)	0.119	0.90 (0.51-1.62)	0.736
Chronic kidney disease	95	15.2%	53	11.5%	42	25.1%	-	-	-	-
Cirrhosis	6	1.0%	0	0.0%	6	3.6%	-	-	-	-
Other organ transplant	3	0.5%	3	0.7%	0	0.0%	-	-	-	-
Prednisolone use	17	2.7%	11	2.4%	6	3.6%	1.52 (0.55-4.18)	0.416	1.19 (0.39-3.71)	0.758
Tacrolimus use	4	0.6%	4	0.9%	0	0.0%	-	-	-	-
Ciclosporin use	2	0.3%	2	0.4%	0	0.0%	-	-	-	-
Sirolimus use*	0	0.0%	0	0.0%	0	0.0%	-	-	-	-
Mycophenolate mofetil use	6	1.0%	6	1.3%	0	0.0%	-	-	-	-
Azathioprine use	1	0.2%	1	0.2%	0	0.0%	-	-	-	-
Serum creatinine (mg/dL)	1	0.9 (0.7-1.1)	1	0.8 (0.7-1.1)	1	1.0 (0.8-1.3)	1.01 (0.87-1.16)	0.942	0.98 (0.79-1.21)	0.824

Hosmer-Lemeshow goodness of fit = 0.949; 546 of 627 patients included in multivariable analysis

Supplementary table 6 – Symptoms at diagnosis among transplant and non-transplant cohorts

Symptom profile	Non-transplant (529 of 627 with data)	Transplant (149 of 151 with data)	p value
GI symptoms only	12 (2%)	14 (9%)	-
Respiratory symptoms only	378 (71%)	83 (56%)	-
Both respiratory & GI	50 (9%)	31 (21%)	-
Neither respiratory & GI	89 (17%)	21 (14%)	-
GI symptoms	62 (12%)	45 (30%)	<0.001
Respiratory symptoms	431 (81%)	114 (77%)	0.248

Supplementary table 7 – Characteristics of groups after propensity score matching

	Model 1 (n=144)		Model 2 (n=144)		Model 3 (n=144)		Model 4 (n=151)	
	Transplant	**Non-transplant**	**Transplant**	**Non-transplant**	**Transplant**	**Non-transplant**	**Transplant**	**Non-transplant**
Age (years)	60 (47–66)	56 (46–66)	60 (47–66)	55 (48–64)	60 (47–66)	56 (47–66)	60 (47–66)	58 (47–65)
Years after transplant	5 (2–11)	-	5 (2–11)	-	5 (2–11)	-	5 (2–11)	-
Sex (male)	95 (66%)	94 (65%)	95 (66%)	94 (65%)	95 (66%)	101 (70%)	102 (67%)	108 (72%)
Smoker	3 (2%)	7 (5%)	3 (2%)	2 (1%)	3 (2%)	3 (2%)	3 (2%)	2 (1%)
Ethnicity (white)	105 (73%)	102 (71%)	105 (73%)	103 (72%)	105 (73%)	9 (67%)	111 (74%)	110 (73%)
Heart disease	21 (15%)	34 (24%)	21 (15%)	28 (19%)	21 (15%)	37 (26%)	22 (15%)	26 (17%)
Diabetes mellitus	61 (42%)	62 (43%)	61 (42%)	55 (38%)	61 (42%)	60 (42%)	65 (43%)	59 (39%)
Hypertension	57 (40%)	56 (39%)	57 (40%)	58 (40%)	57 (40%)	55 (28%)	63 (42%)	67 (44%)
Cancer	8 (5%)	13 (9%)	8 (5%)	13 (9%)	8 (5%)	12 (8%)	8 (5%)	5 (3%)
Prednisolone	64 (44%)	4 (3%)	64 (44%)	10 (7%)	64 (44%)	12 (8%)	67 (44%)	2 (1%)
Calcineurin inhibitor use	129 (90%)	2 (1%)	129 (90%)	10 (7%)	129 (90%)	18 (13%)	135 (89%)	2 (1%)
Antimetabolite	86 (60%)	1 (1%)	86 (60%)	8 (6%)	86 (60%)	14 (10%)	90 (60%)	2 (1%)
Creatinine (mg/dl)	1.2 (0.9–1.5)	0.9 (0.8–1.1)	1.2 (0.9–1.5)	0.9 (0.8–1.1)	1.2 (0.9–1.5)	1.0 (0.8–2.3	1.2 (0.9–1.5)	0.9 (0.8–1.1)
Respiratory symptoms	109 of 143 (76%)	101 of 121 (83%)	109 of 143 (76%)	117 of 133 (88%)	109 of 143 (76%)	92 of 127 (72%)	114 of 149 (77%)	100 of 120 (83%)
Gastrointestinal symptoms	45 of 143 (31%)	13 of 121 (11%)	45 of 143 (31%)	14 of 133 (11%)	45 of 143 (31%)	22 of 127 (17%)	30 of 149 (30%)	13 of 120 (11%)

Table shows four separate propensity-score matched models with liver transplantation as the treatment variable, death as the outcome variable. For Model 1, variables included for calculation of propensity score were age, sex, obesity, white ethnicity, hypertension, diabetes mellitus, and serum creatinine; for Model 2, interactions with age were added; for Model 3, interactions with serum creatinine were added; for Model 4, serum creatinine was removed. Seven of 151 transplant patients lacked baseline data for serum creatinine and were not included in models including serum creatinine.

Supplementary table 8 – Causes of death among transplant and non-transplant cohorts

Mode of death	Transplant cohort (n=28)	Non-transplant (n=164)
Respiratory	21 (75%)	146 (89%)
Hepatic	0 (0%)	0 (0%)
Cardiogenic	2 (7%)	3 (2%)
Other†	5 (18%)	15 (9%)

† = For LT patients, all 'other' causes of death represented multi-organ failure; among the non-transplant cohort, all those in the 'other' classification died from causes not immediately attributable to SARS-CoV-2 infection / COVID-19.

Supplementary table 9 – Standardised differences and variance ratio for unmatched and propensity score matched groups

	Model 1				Model 2				Model 3				Model 4			
Variables	**UV**	**MV**	**USD**	**MSD**	**UV**	**MV**	**USD**	**MSD**	**UV**	**MV**	**USD**	**MSD**	**UV**	**MV**	**USD**	**MSD**
Age	0.55	0.65	-0.9	0.09	0.55	1.27	-0.93	0.02	0.55	0.81	-0.93	0.07	0.49	1.03	-0.75	0.02
Age#Age	-	-	-	-	0.36	1.08	-1.02	0.05	0.36	0.79	-1.02	0.05	0.33	0.95	-0.86	0.02
Sex	0.91	0.99	0.3	0.01	0.91	0.99	0.26	0.01	0.91	1.07	0.26	-0.09	0.88	1.08	0.31	-0.09
Obesity	0.98	0.96	0	0.05	0.98	0.97	0.02	0.03	0.98	0.90	0.02	0.12	0.92	0.98	0.09	0.01
White ethnicity	1.11	0.94	0.1	0.07	1.11	0.93	0.10	-0.09	1.11	0.97	0.10	-0.03	1.10	0.99	0.09	-0.01
Hypertension	1.32	1.00	0.4	0.01	1.32	1.03	0.38	0.08	1.32	1.00	0.38	0.01	1.39	1.03	0.44	0.08
Diabetes mellitus	0.99	1.01	0	0.01	0.99	0.99	-0.03	-0.01	0.99	1.01	-0.03	0.03	1.03	0.99	0.07	-0.05
Creatinine	1.02	1.31	0.3	0.33	1.02	0.62	0.28	0.14	1.02	1.13	0.28	-0.04	-	-	-	-
Creatinine#Creatinine	-	-	-	-	-	-	-	-	0.46	2.94	0.07	0.00	-	-	-	-

Table shows four separate propensity-score matched models with liver transplantation as the treatment variable, death as the outcome variable. For Model 1, variables included for calculation of propensity score were age, sex, obesity, white ethnicity, hypertension, diabetes mellitus, and serum creatinine; for Model 2, interactions with age were added; for Model 3, interactions with serum creatinine were added; for Model 4, serum creatinine was removed. Seven of 151 transplant patients lacked baseline data for serum creatinine and were not included in models including serum creatinine. UV = unmatched variance, MV = matched variance, USD = unmatched standardised difference, MSD = matched standardised difference; - denotes omitted variable omitted. # denotes interactions.

Supplementary table 10 – Liver and renal biochemistry

Category	Transplant patients	Non-transplant patients	p value
Mild liver injury (ALT >ULN)	36 of 121 (30%)	126 of 448 (28%)	0.734
Moderate liver injury (ALT >2×ULN)	19 of 121 (16%)	63 of 448 (14%)	0.662
Severe liver injury (ALT >5×ULN)	10 of 121 (8%)	17 of 448 (4%)	0.052
Renal injury stage 2 (>2 fold rise in creatinine from baseline)	27 of 129 (21%)	94 of 537 (18%)	0.374
Renal injury stage 3 (>3 fold rise in creatinine from baseline or renal replacement therapy)	22 of 130 (17%)	74 of 537 (14%)	0.403

Supplementary table 11– Contributors

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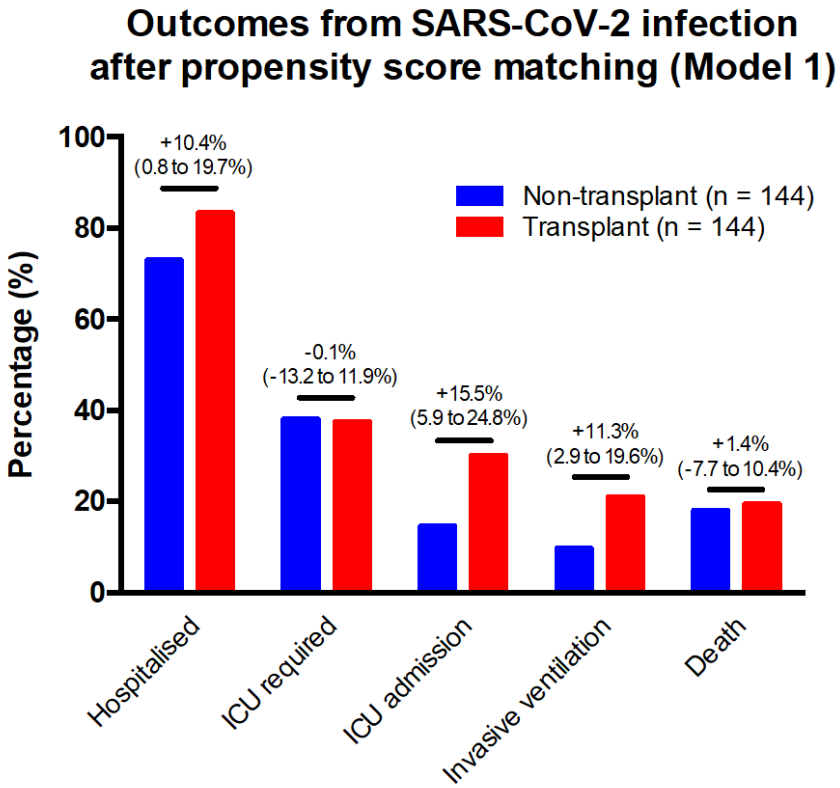
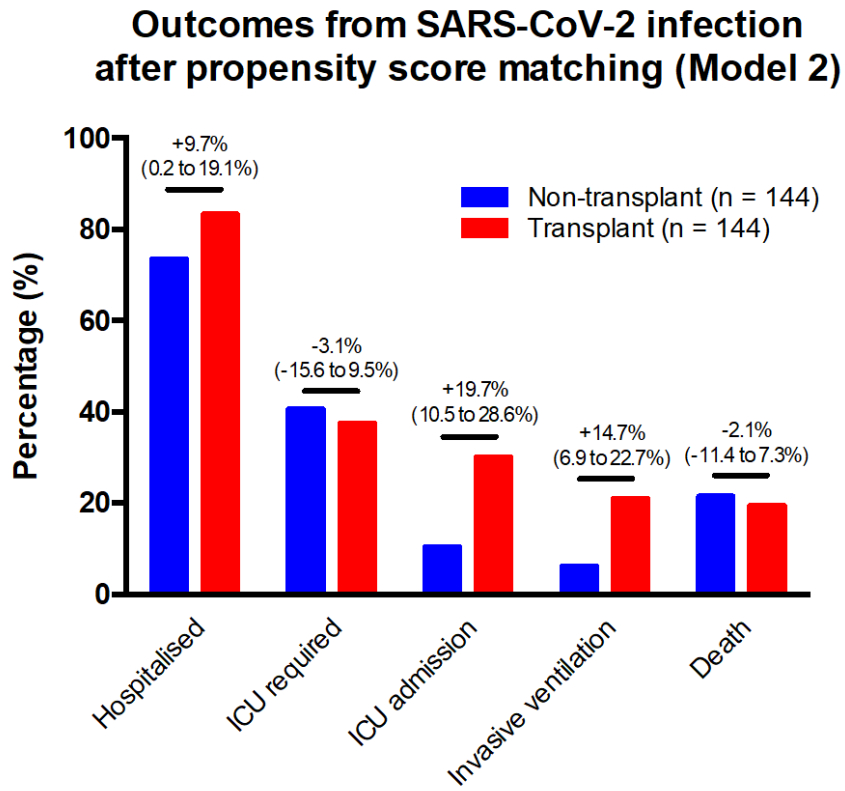
Supplementary figure 1 – Key outcomes after propensity score matching (model 1)



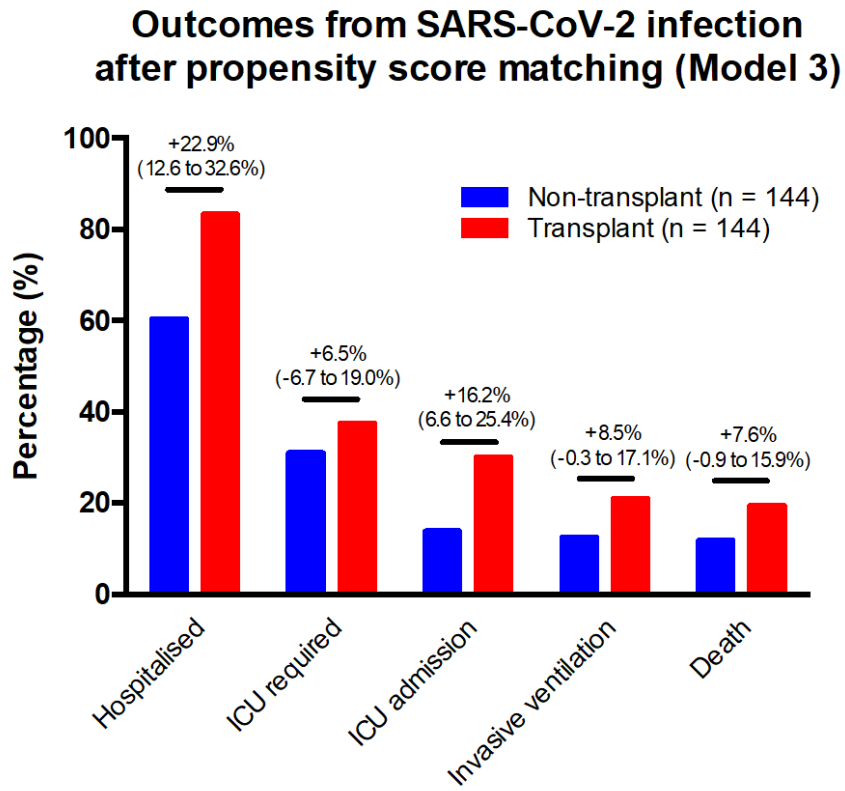
Comparison of major outcomes from SARS-CoV-2 infection between 144 liver transplant recipients and 144 patients without liver transplants after propensity score matching (model 1) based on age, sex, ethnicity, obesity, diabetes, hypertension and baseline serum creatinine. 95% confidence intervals for the difference in risk are shown in brackets and are calculated with Newcombe's method 10. ICU, intensive care unit.

Supplementary figure 2 – Key outcomes after propensity score matching (model 2)



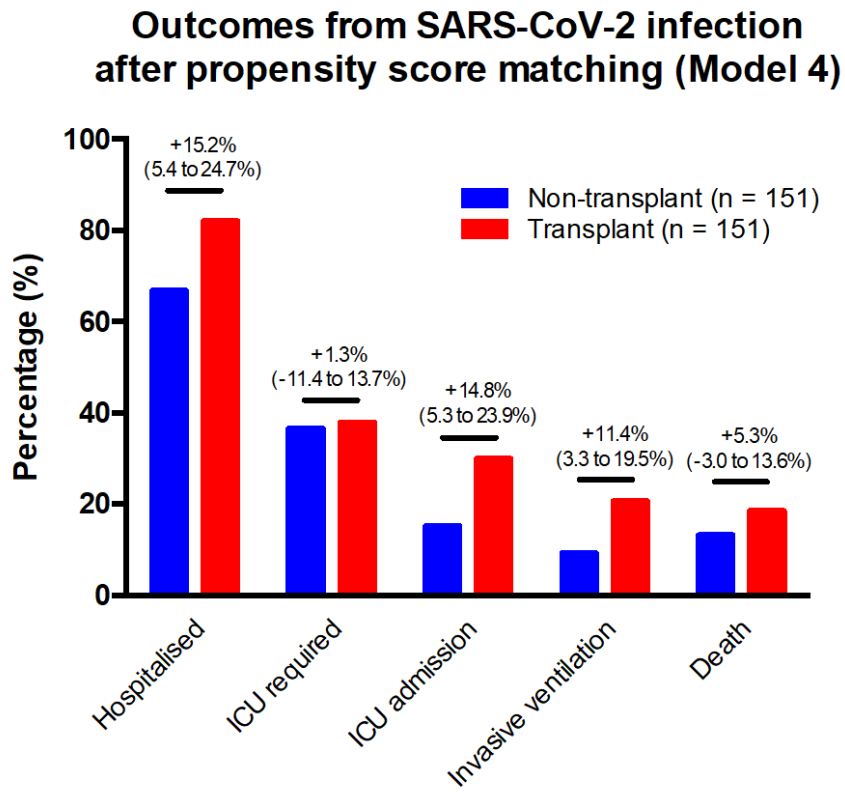
Comparison of major outcomes from SARS-CoV-2 infection between 144 liver transplant recipients and 144 patients without liver transplants after propensity score matching (model 2) based on age, interactions with age, sex, ethnicity, obesity, diabetes, hypertension and baseline serum creatinine. 95% confidence intervals for the difference in risk are shown in brackets and are calculated with Newcombe's method 10. ICU, intensive care unit.

Supplementary figure 3 – Key outcomes after propensity score matching (model 3)



Comparison of major outcomes from SARS-CoV-2 infection between 144 liver transplant recipients and 144 patients without liver transplants after propensity score matching (model 3) based on age, interactions with age, sex, ethnicity, obesity, diabetes, hypertension, baseline serum creatinine, and interactions with baseline serum creatinine. 95% confidence intervals for the difference in risk are shown in brackets and are calculated with Newcombe's method 10. ICU, intensive care unit.

Supplementary figure 4 – Key outcomes after propensity score matching (model 4)



Comparison of major outcomes from SARS-CoV-2 infection between 151 liver transplant recipients and 151 patients without liver transplants after propensity score matching (model 4) based on age, interactions with age, sex, ethnicity, obesity, diabetes, and hypertension. 95% confidence intervals for the difference in risk are shown in brackets and are calculated with Newcombe's method 10. ICU, intensive care unit.

Supplementary appendix – Data collection tool

Inclusion Criteria:

1) Chronic liver disease or post-liver transplantation AND

2) Laboratory confirmed COVID 19 infection

Ideally this form should be completed after the patient has had COVID 19 for a long enough duration to experience complete recovery, discharge, or death.

If you have any questions, please reach out to info@covid-hep.net

Reporter Information

Name of reporter	_____
Email address of reporter	_____
Name of lead physician providing care for liver disease/post-liver transplant	_____
Name of center providing care for liver disease/post-liver transplant	_____
Name of hospital where patient received care for COVID 19 (enter 'NA' if patient not hospitalized)	_____

Patient Information

Is the patient >90 years of age?

◯ Yes
◯ No

Age

- ◯ 89
- ◯ 88
- ◯ 87
- ◯ 86
- ◯ 85
- ◯ 84
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Country of residence

- ◯ --- Not in this country list ---
- ◯ land Islands
- ◯ Afghanistan
- ◯ Albania
- ◯ Algeria
- ◯ Andorra
- ◯ Angola
- ◯ Anguilla
- ◯ Antarctica
- ◯ Antigua and Barbuda
- ◯ Argentina
- ◯ Armenia
- ◯ Aruba
- ◯ Australia
- ◯ Austria
- ◯ Azerbaijan
- ◯ Bahamas
- ◯ Bahrain
- ◯ Bangladesh
- ◯ Barbados
- ◯ Belarus
- ◯ Belgium
- ◯ Belize
- ◯ Benin
- ◯ Bermuda
- ◯ Bhutan
- ◯ Bolivia, Plurinational State of
- ◯ Bosnia and Herzegovina
- ◯ Botswana
- ◯ Bouvet Island
- ◯ Brazil
- ◯ British Indian Ocean Territory
- ◯ Brunei Darussalam
- ◯ Bulgaria
- ◯ Burkina Faso
- ◯ Burundi
- ◯ Cte dIvoire
- ◯ Cambodia
- ◯ Cameroon
- ◯ Canada
- ◯ Cape Verde
- ◯ Cayman Islands
- ◯ Central African Republic
- ◯ Chad
- ◯ Chile
- ◯ China
- ◯ Christmas Island
- ◯ Cocos (Keeling) Islands
- ◯ Colombia
- ◯ Comoros
- ◯ Congo
- ◯ Congo, the Democratic Republic of the
- ◯ Cook Islands
- ◯ Costa Rica
- ◯ Croatia
- ◯ Cuba
- ◯ Cyprus
- ◯ Czech Republic
- ◯ Denmark
- ◯ Djibouti
- ◯ Dominica
- ◯ Dominican Republic
- ◯ Ecuador
- ◯ Egypt
- ◯ El Salvador
- ◯ Equatorial Guinea
- ◯ Eritrea
- ◯ Estonia
- ◯ Ethiopia

◯ Falkland Islands (Malvinas)
◯ Faroe Islands
◯ Fiji
◯ Finland
◯ France
◯ French Guiana
◯ French Polynesia
◯ French Southern Territories
◯ Gabon
◯ Gambia
◯ Georgia
◯ Germany
◯ Ghana
◯ Gibraltar
◯ Greece
◯ Greenland
◯ Grenada
◯ Guadeloupe
◯ Guatemala
◯ Guernsey
◯ Guinea
◯ Guinea-Bissau
◯ Guyana
◯ Haiti
◯ Heard Island and McDonald Islands
◯ Holy See (Vatican City State)
◯ Honduras
◯ Hong Kong
◯ Hungary
◯ Iceland
◯ India
◯ Indonesia
◯ Iran, Islamic Republic of
◯ Iraq
◯ Ireland
◯ Isle of Man
◯ Israel
◯ Italy
◯ Jamaica
◯ Japan
◯ Jersey
◯ Jordan
◯ Kazakhstan
◯ Kenya
◯ Kiribati
◯ Korea, Democratic Peoples Republic of
◯ Korea, Republic of
◯ Kuwait
◯ Kyrgyzstan
◯ Lao Peoples Democratic Republic
◯ Latvia
◯ Lebanon
◯ Lesotho
◯ Liberia
◯ Libyan Arab Jamahiriya
◯ Liechtenstein
◯ Lithuania
◯ Luxembourg
◯ Macao
◯ Macedonia, the former Yugoslav Republic of
◯ Madagascar
◯ Malawi
◯ Malaysia
◯ Maldives
◯ Mali
◯ Malta
◯ Marshall Islands
◯ Martinique
◯ Mauritania
◯ Mauritius
◯ Mayotte

◯ Mexico
◯ Micronesia, Federated States of
◯ Moldova, Republic of
◯ Monaco
◯ Mongolia
◯ Montenegro
◯ Montserrat
◯ Morocco
◯ Mozambique
◯ Myanmar
◯ Namibia
◯ Nauru
◯ Nepal
◯ Netherlands
◯ Netherlands Antilles
◯ New Caledonia
◯ New Zealand
◯ Nicaragua
◯ Niger
◯ Nigeria
◯ Niue
◯ Norfolk Island
◯ Northern Mariana Islands
◯ Norway
◯ Oman
◯ Pakistan
◯ Palau
◯ Palestinian Territory, Occupied
◯ Panama
◯ Papua New Guinea
◯ Paraguay
◯ Peru
◯ Philippines
◯ Pitcairn
◯ Poland
◯ Portugal
◯ Qatar
◯ R union
◯ Romania
◯ Russian Federation
◯ Rwanda
◯ Saint Barthlemy
◯ Saint Helena, Ascension and Tristan da Cunha
◯ Saint Kitts and Nevis
◯ Saint Lucia
◯ Saint Martin (French part)
◯ Saint Pierre and Miquelon
◯ Saint Vincent and the Grenadines
◯ Samoa
◯ San Marino
◯ Sao Tome and Principe
◯ Saudi Arabia
◯ Senegal
◯ Serbia
◯ Seychelles
◯ Sierra Leone
◯ Singapore
◯ Slovakia
◯ Slovenia
◯ Solomon Islands
◯ Somalia
◯ South Africa
◯ South Georgia and the South Sandwich Islands
◯ Spain
◯ Sri Lanka
◯ Sudan
◯ Suriname
◯ Svalbard and Jan Mayen
◯ Swaziland
◯ Sweden
◯ Switzerland

◯ Syrian Arab Republic
◯ Taiwan, Province of China
◯ Tajikistan
◯ Tanzania, United Republic of
◯ Thailand
◯ Timor-Leste
◯ Togo
◯ Tokelau
◯ Tonga
◯ Trinidad and Tobago
◯ Tunisia
◯ Turkey
◯ Turkmenistan
◯ Turks and Caicos Islands
◯ Tuvalu
◯ Uganda
◯ Ukraine
◯ United Arab Emirates
◯ United Kingdom
◯ United States
◯ Uruguay
◯ Uzbekistan
◯ Vanuatu
◯ Venezuela, Bolivarian Republic of
◯ Vietnam
◯ Virgin Islands, British
◯ Wallis and Futuna
◯ Western Sahara
◯ Yemen
◯ Zambia
◯ Zimbabwe

State of residence	◯ ALABAMA ◯ ALASKA ◯ AMERICAN SAMOA ◯ ARIZONA ◯ ARKANSAS ◯ CALIFORNIA ◯ COLORADO ◯ CONNECTICUT ◯ DELAWARE ◯ DISTRICT OF COLUMBIA ◯ FLORIDA ◯ GEORGIA ◯ GUAM ◯ HAWAII ◯ IDAHO ◯ ILLINOIS ◯ INDIANA ◯ IOWA ◯ KANSAS ◯ KENTUCKY ◯ LOUISIANA ◯ MAINE ◯ MARYLAND ◯ MASSACHUSETTS ◯ MICHIGAN ◯ MINNESOTA ◯ MISSISSIPPI ◯ MISSOURI ◯ MONTANA ◯ NEBRASKA ◯ NEVADA ◯ NEW HAMPSHIRE ◯ NEW JERSEY ◯ NEW MEXICO ◯ NEW YORK ◯ NORTH CAROLINA ◯ NORTH DAKOTA ◯ OHIO ◯ OKLAHOMA ◯ OREGON ◯ PENNSYLVANIA ◯ PUERTO RICO ◯ RHODE ISLAND ◯ SOUTH CAROLINA ◯ SOUTH DAKOTA ◯ TENNESSEE ◯ TEXAS ◯ UTAH ◯ VERMONT ◯ VIRGIN ISLANDS ◯ VIRGINIA ◯ WASHINGTON ◯ WEST VIRGINIA ◯ WISCONSIN ◯ WYOMING
Gender	◯ Female ◯ Male ◯ Other
Race/Ethnicity (may check more than one)	☐ White ☐ Black or African American ☐ American Indian / Native Alaskan ☐ East Asian (incl. Chinese, Japanese, Korean) ☐ South / South-East Asian (incl. Bangladeshi, Indian, Pakistani, Sri Lankan) ☐ Native Hawaiian / Pacific Islander ☐ Arabic ☐ Other ☐ Unknown
Other race/ethnicity	_____
Hispanic ethnicity	◯ Hispanic/Latino ◯ Not Hispanic/Latino ◯ Unknown
Patient BMI category (in kg/m2)	◯ < 18.5 (Underweight) ◯ 18.5-24.9 (Normal weight) ◯ 25.0-29.9 (Pre-obesity) ◯ 30.0-34.9 (Obesity class I) ◯ 35.0-39.9 (Obesity class II) ◯ >39.9 (Obesity class III) ◯ Unknown

Liver transplantation questions

Has the patient had a liver transplantation?

- ◯ Yes
- ◯ No

What year was the liver transplantation performed?

- ◯ Unknown
- ◯ 2020
- ◯ 2019
- ◯ 2018
- ◯ 2017
- ◯ 2016
- ◯ 2015
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- ◯ 1966
- ◯ 1965

Indication for liver transplant (select all that apply)

- ☐ Decompensated cirrhosis
- ☐ Hepatocellular carcinoma
- ☐ Acute liver failure
- ☐ Other

Other indication for liver transplantation	_____
Underlying aetiology of liver disease (select all that apply)	☐ Non-alcoholic fatty liver disease (NAFLD) ☐ Alcohol-related liver disease (ALD) ☐ Hepatitis C virus (HCV) ☐ Hepatitis B virus (HBV) ☐ Autoimmune hepatitis (AIH) ☐ IgG4-related disease ☐ Primary biliary cholangitis (PBC) ☐ Primary sclerosing cholangitis (PSC) ☐ Hemochromatosis ☐ Wilson's disease ☐ Other
Other aetiology	_____
Immunosuppression regimen at time of COVID 19 infection (select all that apply)	☐ Prednisone ☐ Tacrolimus ☐ Sirolimus ☐ Everolimus ☐ Cyclosporine ☐ Mycophenolate mofetil (MMF) ☐ Azathioprine ☐ Cyclophosphamide ☐ Other ☐ Unknown
What other immunosuppression medication was used at the time of COVID 19 infection?	_____
Current prophylactic antimicrobial regimen (select all that apply)	☐ Trimethoprim/sulfamethoxazole or Co-trimoxazole ☐ Dapsone ☐ Pentamidine ☐ Acyclovir/valacyclovir ☐ Fluconazole ☐ Ganciclovir/valganciclovir ☐ Foscarnet ☐ Other ☐ Unknown ☐ None
Other prophylactic antimicrobial regimen	_____

Does the patient have any of the following comorbidities (check all that apply)?	☐ Cardiovascular disease (coronary artery disease, heart failure, arrhythmia, etc.) ☐ Diabetes ☐ Asthma ☐ COPD ☐ Other Chronic Lung Disease (NOT asthma/COPD) ☐ Hypertension ☐ Non-HCC cancer ☐ History of stroke ☐ Chronic renal disease (CKD, etc.) ☐ Human immunodeficiency virus (HIV) infection ☐ Current cigarette smoker ☐ Current user of tobacco products other than cigarettes (vaping, etc) ☐ Current heavy alcohol use (>2 drinks/day for men, >1 drink/day for women) ☐ History of illicit drug use including injectable drugs or inhaled crack/cocaine but excluding marijuana

Chronic liver disease questions

Aetiology of liver disease (select all that apply)	☐ Non-alcoholic fatty liver disease (NAFLD) ☐ Alcohol-related liver disease (ALD) ☐ Hepatitis C virus (HCV) ☐ Hepatitis B virus (HBV) ☐ Autoimmune hepatitis (AIH) ☐ IgG4-related disease ☐ Primary biliary cholangitis (PBC) ☐ Primary sclerosing cholangitis (PSC) ☐ Hemochromatosis ☐ Wilson's disease ☐ Other
Other aetiology	_____
Does the patient have cirrhosis?	◯ Yes ◯ No ◯ Unknown
Child Pugh grade prior to COVID 19 diagnosis?	◯ A ◯ B ◯ C ◯ Unknown
Did the patient have ascites prior to COVID 19 diagnosis?	◯ None ◯ Mild/moderate (diuretic responsive) ◯ Severe (diuretic refractory) ◯ Unknown

What was the worst grade of hepatic encephalopathy patient developed prior to COVID 19 diagnosis?	◯ None ◯ Grade 1 (trivial lack of awareness, shortened attention span) ◯ Grade 2 (lethargy, minimal disorientation, subtle personality change) ◯ Grade 3 (somnolence to semi-stupor but responsive to verbal stimuli, gross disorientation) ◯ Grade 4 (coma - unresponsive to verbal or noxious stimuli) ◯ Unknown
Has the patient ever had hepatocellular carcinoma?	◯ Yes ◯ No ◯ Unknown
What immunosuppression was the patient taking for IgG4-related disease at time of COVID 19 diagnosis (may check more than one)?	☐ None ☐ Corticosteroids ☐ Azathioprine ☐ Rituximab ☐ Other ☐ Unknown
Other immunosuppression for IgG4-related disease	_____
Has the patient received steroids for alcoholic hepatitis recently (within 4 weeks of COVID 19 diagnosis)?	◯ Yes ◯ No ◯ Unknown
Treatment for primary biliary cholangitis (PBC) at time of COVID 19 diagnosis	☐ Ursodeoxycholic acid ☐ Obeticholic acid ☐ Fibrate ☐ Other ☐ No treatment ☐ Unknown
Other PBC treatments	_____
Does the patient have inflammatory bowel disease (IBD)?	◯ Yes ◯ No ◯ Unknown
Immunosuppression medication(s) patient was taking for IBD at time of COVID 19 diagnosis	☐ Prednisone/prednisolone ☐ Budesonide ☐ Azathioprine ☐ Methotrexate ☐ Mycophenolate ☐ Infliximab ☐ Adalimumab ☐ Ustekinumab ☐ Vedolizumab ☐ Other ☐ None ☐ Unknown
Other immunosuppression for IBD	_____

Treatment for autoimmune hepatitis (AIH) at time of COVID 19 diagnosis	☐ Prednisone/prednisolone ☐ Budesonide ☐ Azathioprine ☐ Mycophenolate ☐ Tacrolimus ☐ Other ☐ None ☐ Unknown
Other treatment for AIH	_____
Hepatitis B surface antigen (HBsAg) positive	◯ Yes ◯ No ◯ Unknown
Treatment for HBV at the time of COVID 19 diagnosis	◯ Tenofovir ◯ Entecavir ◯ Interferon ◯ None ◯ Unknown
Did the patient have detectable hepatitis C virus (HCV) RNA at the time of or prior to COVID 19 diagnosis?	◯ Yes ◯ No ◯ Unknown
HCV genotype	◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ Unknown
Active treatment for HCV at the time of COVID 19 diagnosis	◯ Yes ◯ No ◯ Unknown
Does the patient have any of the following comorbidities (check all that apply)?	☐ Cardiovascular disease (coronary artery disease, heart failure, arrhythmia, etc.) ☐ Diabetes ☐ Asthma ☐ COPD ☐ Other Chronic Lung Disease (NOT asthma/COPD) ☐ Hypertension ☐ Non-HCC cancer ☐ History of stroke ☐ Chronic renal disease (CKD, etc.) ☐ Human immunodeficiency virus (HIV) infection ☐ Current cigarette smoker ☐ Current user of tobacco products other than cigarettes (vaping, etc) ☐ Current heavy alcohol use (>2 drinks/day for men, >1 drink/day for women) ☐ History of illicit drug use including injectable drugs or inhaled crack/cocaine but excluding marijuana

Laboratory data (leave fields blank if unknown)
• If COVID-19 suspected at presentation/admission then use recent pre-admission laboratory values as baseline.
• If hospital acquired COVID-19 suspected then please use first laboratory values obtained during hospitalisation as baseline.

Baseline serum sodium (mmol/L)

_____
(Before COVID 19 infection)

Nadir serum sodium (mmol/L)

_____
(During COVID 19 infection)

Creatinine units ◯ µmol/L ◯ mg/dl

Baseline serum creatinine

_____
(Before COVID 19 infection)

Peak serum creatinine

_____
(During COVID 19 infection)

Baseline prothrombin time (sec)

_____
(Before COVID 19 infection)

Peak prothrombin time (sec)

_____
(During COVID 19 infection)

Albumin units ◯ g/dl ◯ g/liter

Baseline albumin

_____
(Before COVID 19 infection)

Nadir albumin

_____
(During COVID 19 infection)

Total bilirubin units ◯ µmol/L ◯ mg/dl

Baseline total bilirubin

_____
(Before COVID 19 infection)

Peak total bilirubin

_____
(During COVID 19 infection)

Baseline alanine aminotransferase (ALT) (IU/L)

_____
(Before COVID 19 infection)

Peak alanine aminotransferase (ALT) (IU/L)	_____ (During COVID 19 infection)
Baseline alkaline phosphatase (IU/L)	_____ (Before COVID 19 infection)
Peak alkaline phosphatase (IU/L)	_____ (During COVID 19 infection)

COVID 19 questions

Was this lab confirmed COVID 19 infection?	◯ Yes ◯ No ◯ Unknown
What symptoms did the patient have at the time of COVID 19 diagnosis?	◯ GI symptoms (abdominal pain, diarrhea, nausea, vomiting) ◯ Respiratory symptoms (shortness of breath, cough) ◯ Both GI and respiratory symptoms ◯ Neither GI or respiratory symptoms ◯ Unknown
Did patient test positive for influenza at time of COVID 19 infection?	◯ Yes ◯ No ◯ Unknown
What complications did the patient develop during COVID 19 infection?	☐ New or worsening ascites ☐ Spontaneous bacterial peritonitis ☐ Hepatic encephalopathy ☐ Non-variceal upper GI bleeding ☐ Variceal upper GI bleeding ☐ New requirement for renal replacement therapy (e.g. hemodialysis) ☐ Other
Other complications of COVID 19 infection	_____
What was the grade of ascites during COVID 19 infection?	◯ Mild/moderate ◯ Severe ◯ Unknown
What was the worst grade of hepatic encephalopathy during COVID 19 infection (based on West Haven Criteria)?	◯ Grade 1 (trivial lack of awareness, shortened attention span) ◯ Grade 2 (lethargy, minimal disorientation, subtle personality change) ◯ Grade 3 (somnolence to semi-stupor but responsive to verbal stimuli, gross disorientation) ◯ Grade 4 (coma - unresponsive to verbal or noxious stimuli) ◯ Unknown
Did the patient receive specific antiviral treatment for COVID 19 infection?	◯ Yes ◯ No ◯ Unknown

Which of the following treatment(s) did patient receive for COVID 19 (select all that apply)?	☐ Remdesivir ☐ Tocilizumab ☐ Lopinovir/ritonavir ☐ Chloroquine/hydroxychloroquine ☐ Ribavirin ☐ Interferon-alpha ☐ Other ☐ Unknown
Other type of antiviral treatment(s) received for COVID-19	_____
What was the reason the patient did not receive COVID 19 antiviral treatment (select all that apply)?	☐ Elevated liver enzymes ☐ Underlying liver fibrosis/cirrhosis ☐ Other contraindication (eg AKI) ☐ Treatment not available ☐ Other ☐ Unknown
What was the reason the patient did not receive COVID 19 antiviral treatment?	_____
Did the patient die?	◯ Yes ◯ No ◯ Unknown
What was the primary cause of death?	◯ Liver-related complications ◯ COVID 19-related lung disease ◯ Cardiogenic shock ◯ Other
Other cause of death	_____
Has the patient been hospitalized?	◯ Yes ◯ No ◯ Unknown
Has the patient been discharged from the hospital?	◯ Yes ◯ No ◯ Unknown
Length of hospital stay (days)	_____
Did patient receive invasive ventilation?	◯ Yes ◯ No ◯ Unknown
Did the patient receive non-invasive ventilation?	◯ Yes ◯ No ◯ Unknown
Was the patient admitted to an intensive care unit?	◯ Yes ◯ No ◯ Unknown

Why was the patient not admitted to an intensive care unit?

- ◯ Disease not severe enough
- ◯ Disease was severe enough but limited availability of intensive care unit
- ◯ Disease was severe enough but escalation to intensive care unit not felt to be appropriate.
- ◯ Unknown