

## **DESCRIPTION OF SUPPORTING INFORMATION**

**Supplemental Table 1.** Major cardiovascular disease complication definitions from Northwestern University Enterprise Data Warehouse (NMEDW) and Organ Procurement and Transplantation Network (OPTN) databases

**Supplemental Table 2.** Potential Preoperative and Perioperative CVD risk factors analyzed from the Organ Procurement and Transplantation Network (OPTN) and the Northwestern Medicine Enterprise Data Warehouse (NMEDW)

**Supplemental Table 3.** Demographic and Clinical Characteristics of First Liver Transplant Recipients at Northwestern Medicine Compared to the National Sample (OPTN, 2002-2011)

**Supplemental Table 1. Major cardiovascular disease complication definitions from Northwestern University Enterprise Data Warehouse (NMEDW) and Organ Procurement and Transplantation Network (OPTN) databases**

<b>Major CVD Complication</b>	<b>International Classification of Diseases (ICD-9) or Common Procedural Terminology (CPT) codes*^</b>
Myocardial infarction	410.xx
Revascularization**	36.0x, 36.1x, 36.2 92982, 92984, 92995, 92996, 92980, 92981, G8963, G8964, 4561F, 92928, 92929, 92933, 92934, 92937, 92938, 92941, 92943, 92944, C1027, C1060, C1173, C1312, C1313, C1314, C1334, C1375, C5030, C5031, C5032, C5033, C5034, C5035, C5036, C5037, C5038, C5041, C5042, C5043, C5044, C5045, C5046, C5047, C5048, C8830, C9600-C9608, G0290, G0291, S2211; 00566, 00567, 33510 to 33523, 33533 to 33536
Heart failure	398.91, 422, 428, 402.x1, 404.x1, 404.x3
Pulmonary embolism	415.1x
Atrial fibrillation	427.31x
Cardiac arrest	427.5
Stroke or TIA	430, 431, 432, 433.x1, 434.x1, 435.x, 997.02

Abbreviations: CVD, cardiovascular disease; TIA, transient ischemic attack

\*Major CVD events or procedures were defined by a discharge ICD-9 or CPT code within the first 3 diagnosis positions

^All codes combined with "OR" term

\*\*Revascularization was defined as percutaneous coronary intervention (PCI) or stent placement or coronary artery bypass grafting

**Supplemental Table 2. Potential Preoperative and Perioperative CVD risk factors analyzed from the Organ Procurement and Transplantation Network (OPTN) and the Northwestern Medicine Enterprise Data Warehouse (NMEDW)**

Covariate name	NMEDW		OPTN variables*	N (%) missing
	Procedure Codes*	Diagnosis codes*		
Recipient Age**		Validated in NMEDW	AGE	0 (0)
Recipient Sex**		Validated in NMEDW	GENDER	0 (0)
Recipient Race & ethnicity**		Validated in NMEDW	ETHNICITY and ETHCAT	0 (0)
Education level**		Validated in NMEDW	EDUCATION	175 (17.1)
Employment status at transpl**		Validated in NMEDW	WORK_INCOME_TRR	10 (0.98)
Marital status**		NMEDW code		6 (0.59)
Primary Payor**		NMEDW code		3 (0.29)
Primary cause of Liver Disease**		Validated in NMEDW	DIAG DGN_TCR	0 (0)
Functional status at transplant**			FUNC_STAT TRR LIFE_SUP_TRR OTH_LIFE_SUP_TRR OTH_VENT_TRR	45 (4.4)
Hospitalization status at transplant**		NMEDW code	Validated with MED_CON_TRR	0 (0)
Calculated MELD score**		Validated in NMEDW	Calculated from <i>Liver Data STAR file</i>	0 (0)
Days on waiting list**			DAYSWAIT_CHRON	0 (0)
Simultaneous liver-kidney transplant**	Validated in NMEDW		TXKID	0 (0)
<b>Recipient Complications of ESLD</b>				
Ascites		789.5, 789.51, 789.59	ASCITES_TX or FINAL_ASCITES	0 (0)
Spontaneous bacterial peritonitis (SBP)**		567.23	BACT_PERIT_TRR	0 (0)
Hepatic encephalopathy**		572.2	ENCEPH_TCR or ENCEPH_TRR_OLD or ENCEPH_TX or FINAL_ENCEPH	0 (0)
Portal Vein Thrombosis**		452	PORTAL_VEIN_TCR or PORTAL_VEIN_TRR	0 (0)
Transjugular intrahepatic portosystemic shunt (TIPS) placement	CPT: 37182, 37183	39.1	TIPSS_TCR or TIPSS_TRR	0 (0)
Bleeding esophageal or gastric varices		46.0, 456.1, 456.2, 456.20, 456.21, 456.8	VARIC_BLEED_TCR	0 (0)
Hepatocellular Carcinoma**		v10.07, 155, 155.1, 155.2, 156.1, 156.9, 235.3, 230.8	HCC_DIAG	0 (0)
Hepatopulmonary syndrome**		573.5		0 (0)
Hepatorenal syndrome**		572.4		0 (0)
Hyponatremia		Validated in NMEDW	sodium < 135 mg/dL	74 (7.2)

**Supplemental Table 2 continued**

Covariate name	NMEDW		OPTN variables*	N (%) missing
	Procedure Codes*	Diagnosis codes*		
<b>Recipient Comorbid CVD Conditions</b>				
Hypertension**		401-405	DRUGTRT_HYP	0 (0)
Hyperlipidemia		272.0, 272.1, 272.3		0 (0)
Stroke or TIA**		430, 431, 432, 433.x1, 434.x1, 997.02, 435.x, V12.54	CEREB_VASC	0 (0)
Any cardiac dysrhythmia or conduction disorder**	ICD9-CM: 37.8x, 37.7x, 37.6x, 37.9x, 89.49  CPT: 33241, 33249, 33233, 33240, 93741, 93742, 93743-26, 93744-26	426.0, 427.0-427.4, V12.53		0 (0)
Atrial fibrillation**		427.31x		0 (0)
Peripheral vascular disease		440.0-440.9	PERIP_VASC	0 (0)
Congestive heart failure**		398.91, 422, 428, 402.x1, 404.x1, 404.x3, V42.1		0 (0)
Ischemic heart disease**	ICD9-CM: 36.0x, 36.1x, 36.2  CPT: 92982, 92984, 92995, 92996, 92980, 92981, G8963, G8964, 4561F, 92928, 92929, 92933, 92934, 92937, 92938, 92941, 92943, 92944, C1027, C1060, C1173, C1312, C1313, C1314, C1334, C1375, C5030, C5031, C5032, C5033, C5034, C5035, C5036, C5037, C5038, C5041, C5042, C5043, C5044, C5045, C5046, C5047, C5048, C8830, C9600-C9608, G0290, G0291, S2211 OR 33510 to 33523, 33533 to 33536	410.x, 411.x, 412, 413.x, 414.0x, 414.2, 414.3, 414.8, 414.9, V45.82, V45.09, V45.81	ANGINA or ANGINA_OLD	0 (0)

**Supplemental Table 2 continued**

Covariate name	NMEDW		OPTN variables*	N (%) missing
	Procedure Codes*	Diagnosis codes*		
Myocardial infarction**		410.x, 412		0 (0)
Prior revascularization	<u>ICD9-CM</u> : 36.0x, 36.2  <u>CPT</u> : 92982, 92984, 92995, 92996, 92980, 92981, G8963, G8964, 4561F, 92928, 92929, 92933, 92934, 92937, 92938, 92941, 92943, 92944, C1027, C1060, C1173, C1312, C1313, C1314, C1334, C1375, C5030, C5031, C5032, C5033, C5034, C5035, C5036, C5037, C5038, C5041, C5042, C5043, C5044, C5045, C5046, C5047, C5048, C8830, C9600-C9608, G0290, G0291, S2211	V45.82, V45.09		0 (0)
Prior CABG	<u>ICD9-CM</u> : 36.1x  <u>CPT</u> : 33510 to 33523, 33533 to 33536	V45.81		0 (0)

**Supplemental Table 2 continued**

Covariate name	NMEDW		OPTN variables*	N (%) missing
	Procedure Codes*	Diagnosis codes*		
<b>Other Recipient Comorbid Conditions</b>				
Any Venous thromboembolism**		453.4x, 453.7x, 453.5x, 453.8x, 453.9, 415.11, 415.13, 415.19, 416.2, V12.55 V12.51	PULM_EMBOL	0 (0)
Deep venous thrombosis		453.4x, 453.5x, 453.8x, 453.7x, 453.9x, V12.51		0 (0)
Acute or chronic Pulmonary embolism**		416.2, 415.11, 415.13, 415.19, V12.55	PULM_EMBOL	0 (0)
Diabetes**		250.xx, v12.29, v45.85	DIAB	0 (0)
Pulmonary hypertension**		416.0, 416.8		0 (0)
COPD/Asthma		490 , 491.x, 492.x, 494.0, 494.1, 496, 518.1, 518.2, 493.xx	DRUGTRT_COPD	0 (0)
Obstructive sleep apnea		327.23, 327.26, 327.27, 780.53		0 (0)
Respiratory failure on a ventilator**		Validated in NMEDW	LIFE_SUP_TRR or ON_VENT_TRR or OTH_LIFE_SUP_TRR	0 (0)
Chronic kidney disease**		V13.03, 585.x		0 (0)
Renal failure requiring RRT**		Validated in NMEDW	DIAL_TCR or DIAL_TX or FINAL_DIALYSIS_PRIOR_WEEK	0 (0)
Obesity		278.00, 278.01, 278.02, 278.03	BMI_CALC ≥ 30 k/m <sup>2</sup> from BMI_TCR	0 (0)
Recipient body mass index		Validated in NMEDW	BMI_TCR	131 (12.8)
Peptic ulcer disease		V12.71, 530.21, 531.xx, 532.xx, 533,xx		0 (0)
<b>Substance Use History</b>				
Recipient tobacco use**		305.1, v15.82 and natural language processing**		0 (0)
Alcohol dependence		V11.3, 291.x, 303.xx, 305.xx, 571.x		0 (0)
Cocaine use		304.2x		0 (0)
Other drug use		304.0x, 304.1x, 304.3x, 304.4x, 304.5x, 304.6x, 304.7		0 (0)
Family history of cardiovascular disease		v17.1, v17.3, v17.4, v17.41, v17.49		0 (0)

**Supplemental Table 2 continued**

Covariate name	NMEDW		OPTN variables*	N (%) missing
	Procedure Codes*	Diagnosis codes*		
<b>Medication usage within 48 hours of transplant</b>				
Antihypertensive	INCLUDES: Thiazides: Chlorthalidone indapimide; Renin blocker: Aliskiren; Calcium-channel blockers (see below); ACE inhibitors; ARBs (EXCLUDES: eplerenone, Spironolactone); vasodilator: Hydralazine; Alpha2 agonist			0 (0)
Calcium Channel Blocker	INCLUDES: Verapamil, Diltiazem, Amlodipine (Norvasc), Isradipine (DynaCirc, Prescal), Felodipine (Plendil), Nicardipine (Cardene, Carden SR), Nifedipine (Procardia, Adalat) Nimodipine (Nimotop)			0 (0)
Beta Blocker	INCLUDES those possibly given for variceal bleeding prophylaxis			0 (0)
Diuretic	INCLUDES: Loop diuretics: bumetanide, ethacrynic acid, furosemide, torsemide; Thiazide-like diuretics: metolazone; Potassium-sparing diuretics: spironolactone			0 (0)
Statin	All types			0 (0)
Aspirin	All doses			0 (0)
Antiarrhythmic	INCLUDES: Class 1: sodium channel (Disopyramide, Quinidine, Procainamide, Lidocaine, Mexiletine, Tocainide, Moricizine. Flecainide, Propafenone Class 2: beta blockers Class 3: potassium channel (bretylum, amiodarone, ibutilide sotalol, dofetilide, dronedarone Class 4: diltiazem, verapamil			0 (0)
Pulmonary vasodilator	All doses			0 (0)
Insulin	All doses			0 (0)
Antiplatelet	INCLUDES: ASA, Plavix			0 (0)
Other anticoagulant	(EXCLUDES prophylactic doses) INCLUDES: low molecular weight heparins: bemiparin, certoparin, dalteparin, enoxaparin, nadroparin, parnaparin, reviparin, tinzaparin therapeutic unfractionated heparin: drip or subcutaneous dose > 5000 units TID; Coumadin/warfarin; Factor Xa: Fondaparinux, Idraparinux, rivaroxaban, apixaban; direct thrombin, hirudin, lepirudin, bivalirudin; argatroban, dabigatran			0 (0)
Quinolone	INCLUDES: Ciprofloxacin, norfloxacin, ofloxacin, levofloxacin			0 (0)

**Supplemental Table 2 continued**

Covariate name	NMEDW		OPTN variables*	N (%) missing
	Procedure Codes*	Diagnosis codes*		
Vasopressor	within 24 hours of transplant and > 1 hour in duration administered INCLUDES: dopamine, dobutamine, epinephrine, norepinephrine, vasopressin, phenylephrine, desmopressin (DDAVP), octreotide, terlipressin, midodrine, milrinone, neosynephrine			0 (0)
Steroid	INCLUDES: hydrocortisone, prednisone, prednisolone, dexamethasone, methylprednisolone, fludrocortisone, aldosterone			0 (0)
<b>Vital signs at transplant</b>				
Height	NMEDW code, Average of 3 values within 24 hours of transplant			126 (12.3)
Weight				117 (11.4)
Systolic blood pressure				136 (13.3)
Diastolic blood pressure				136 (13.3)
Heart rate				136 (13.3)
Glascow coma score	Minimum recorded Glascow coma score within 24 hours of transplant			822 (80.3)
<b>Laboratory values at transplant</b>				
Arterial PO2	Most recent value within 72 hours of transplant			503 (49.1)
Arterial pH				503 (49.1)
Lactic Acid				503 (49.1)
ALT				20 (2.0)
AST				99 (10.0)
Albumin				0 (0)
Alkaline Phosphatase				106 (10.4)
Bicarbonate				97 (9.5)
Glucose_Level				97 (9.5)
Hemoglobin				87 (8.5)
INR				194 (18.9)
Platelet Count				89 (8.7)
Sodium				74 (7.2)
Total Bilirubin				0 (0)
White Cell Count				85 (8.3)
eGFR_African_Am				252 (24.6)
eGFR_NonAfr_Am				252 (24.6)
Creatinine**				7 (0.68)
LDL**	Most recent value within 1 year of transplant			400 (39.0)
Non-HDL Cholesterol				806 (78.7)
Total Cholesterol**				306 (37.7)
Triglycerides**				370 (36.1)
HDL				391 (38.2)
Hemoglobin A1C	Most recent value within 90 days of transplant			806 (78.7)
Ferritin				1000 (97.7)
Troponin I				1020 (99.6)
C Reactive Protein				1021 (99.7)
CKMB				1021 (99.7)
BNP				1023 (99.9)



**Supplemental Table 2 continued**

Covariate name	NMEDW		OPTN variables*	N (%) missing
	Procedure Codes*	Diagnosis codes*		
<b>Pretransplant cardiac testing</b>				
ECG performed QTc interval Ventricular rate** QRS duration, mean**	Most recent value within 1 year of transplant			368 (35.9) 368 (35.9) 368 (35.9) 368 (35.9)
Echo performed Ejection fraction Diastolic dysfunction/grade** Tricuspid regurg/severity** Septal flattening	Most recent value within 1 year of transplant			231 (22.6) 231 (22.6) 200 (19.5) 200 (19.5) 231 (22.6)
Stress test performed & type Stress test result Normal Abnormal Maximal predicted heart rate	Most recent value within 1 year of transplant			486 (47.5) 486 (47.5)   486 (47.5)
Left heart catheterization performed** Normal Left main not intervened Any other CAD not intervened Intervened on CAD	Most recent value within 1 year of transplant			575 (56.2)  575 (56.2) 575 (56.2) 575 (56.2) 575 (56.2)
Right heart catheterization performed** Pulmonary capillary wedge pressure Mean pulmonary arterial pressure Portopulmonary hypertension present	Most recent value within 1 year of transplant			760 (74.2)  760 (74.2)  760 (74.2)
CT angiography performed	Most recent value within 1 year of transplant			984 (96.0)

**Supplemental Table 2 continued**

Covariate name	NMEDW		OPTN variables*	N (%) missing
	Procedure Codes*	Diagnosis codes*		
DonAge**			AGE_DON	0 (0)
Sex			GENDER_DON	0 (0)
Ethnicity			ETHCAT_DON	0 (0)
Donor Risk Index			Calculated variable	150 (14.6)
Donor BMI (kg/m <sup>2</sup> )**			BMI_DON_CALC	1 (0.09)
Donor Liver Fat			MACRO_FAT_LI_DON	825 (80.6)
Inotropes at procurement			INOTROP_AGENTS_DON	0 (0)
Antihypertensives			ANTIHYPE_DON	0 (0)
Steroids			PT_STEROIDS_DON	0 (0)
Thyroid replacement			PT_T3_DON or PT_T4_DON	0 (0)
Desmopressin (DDAVP)			DDAVP_DON	0 (0)
Diabetes			HIST_DIABETES_DON	0 (0)
Hypertension			HIST_HYPERTENS_DON	0 (0)
Myocardial Infarction			HISTORY_MI_DON	0 (0)
Malignancy			HIST_CANCER_DON	0 (0)
Infection at time of transplant			BLOOD_INF_DON	0 (0)
Smoker			HIST_CIG_DON	0 (0)
Alcohol dependency			ALCOHOL_HEAVY_DON	0 (0)
Cocaine			HIST_COCAINE_DON	0 (0)
Other drug use			HIST_OTH_DRUG_DON	0 (0)
Donation after Cardiac Death			NON_HRT_DON	0 (0)
Living Donor			DON_TY	0 (0)
CDC high risk donor			CDC_HIGH_RISK_DONOR	0 (0)
Allocation Type			ALLOCATION_TY	0 (0)
Graft cold ischemia time			COLD_ISCH	1 (0.09)
Graft warm ischemia time			WARM_ISCH_TM	588 (57.4)

**Supplemental Table 2 continued**

Covariate name	NMEDW		OPTN variables*	N (%) missing
	Procedure Codes*	Diagnosis codes*		
<b>Perioperative characteristics</b>				
Transfusion received Platelets** Red blood cells Fresh frozen plasma** Cryoprecipitate**	Analyzed by units given within 48 hours of OR entry time			0 (0) 0 (0) 0 (0) 0 (0) 0 (0)
Surgical duration (min)**		NMEDW code		43 (4.2)
ASA class**		NMEDW code		417 (40.7)
Operative features Biliary anastomosis Hepatic artery anastomosis replaced/accessory artery Portal vein anastomosis Cava anastomosis Venovenous bypass used Wound open at end of case		NMEDW code		0 (0) 0 (0) 0 (0) 0 (0) 0 (0) 0 (0)
Intraoperative TEE Ejection fraction Tricuspid regurgitation Aortic regurgitation Aortic stenosis Mitral regurgitation Pulmonic regurgitation Intraatrial shunt LA thrombus Wall motion abnormality Septal flattening	Valvular disease was graded as present/absent and by severity (trace/mild; mild-moderate; moderate; and moderate-severe)			869 (84.9) 869 (84.9) 920 (89.8) 869 (84.9) 869 (84.9) 869 (84.9) 869 (84.9) 869 (84.9) 869 (84.9) 869 (84.9) 869 (84.9)
OR vasopressor required** Dopamine Epinephrine Norepinephrine Vasopressin Octreotide Milrinone DDAVP		NMEDW code		0 (0) 0 (0) 0 (0) 0 (0) 0 (0) 0 (0) 0 (0) 0 (0)
Intraop thromboelastogram (TEG) performed Stage I (preanhepatic) Stage II (anhepatic) Stage III (post-reperfusion)		NMEDW code		658 (64.2)
Intraoperative Laboratory values, mean Lowest Arterial pH** Lowest hemoglobin** Lowest hematocrit Peak INR** Peak PT Peak PTT Lowest fibrinogen** Lowest factor V Peak arterial lactate**		NMEDW code		96 (9.4) 97 (9.5) 97 (9.5) 233 (22.8) 233 (22.8) 233 (22.8) 233 (22.8) 998 (97.5) 96 (9.4)

**Supplemental Table 2 continued**

Covariate name	NMEDW		OPTN variables*	N (%) missing
	Procedure Codes*	Diagnosis codes*		
Immediate postoperative laboratory values, mean		NMEDW code		
Peak arterial lactic acid (lactate)**				105
Peak ALT				0 (0)
Peak AST				0 (0)
Peak bilirubin**				0 (0)
Peak alkaline phosphatase				0 (0)
Peak INR				0 (0)
Peak creatinine**				2 (0.19)
Immediate postoperative Liver Ultrasound		NMEDW code		102 (10.0)
Main portal vein velocity				102 (10.0)
Right portal vein velocity				102 (10.0)
Left portal vein velocity				102 (10.0)
Main hepatic artery peak systolic velocity				102 (10.0)
Main hepatic artery RI				102 (10.0)
Right hepatic artery RI				102 (10.0)
Left hepatic artery RI				102 (10.0)
Fluid collection seen				102 (10.0)
Fluid collection size				102 (10.0)
Biliary ductal dilation				102 (10.0)
Recipient Immunoprophylaxis**,		NMEDW validation	Liver Immuno Discharge and followup STAR files	0 (0)

Abbreviations: ALT, alanine aminotransferase; ASA, American Society of Anesthesiologists ; AST, aspartate aminotransferase; BNP, brain natriuretic peptide; CDC, centers for disease control; CABG, coronary artery bypass grafting; CAD, coronary artery disease; CKMB, creatinine kinase myocardial based; COPD, chronic obstructive pulmonary disease; CPT, common procedural code terminology; CT, computed tomography; DDAVP, desmopressin; DRG, Medicare severity diagnosis-related groups; eGRF, estimated glomerular filtration rate; ESLD, end-stage liver disease; HDL, high density lipoprotein; ICD9, International Classification of Diseases, 9th revision; INR, international normalized ratio; LDL, low density lipoprotein; MELD, model for end stage liver disease; NMEDW, Northwestern Medicine Enterprise Data Warehouse; OPTN, Organ Procurement and Transplantation Network; RI, resistive index; RRT, renal replacement therapy; STAR, standard transplant analysis research files; SBP, spontaneous bacterial peritonitis; TEG, thromboelastogram; TIA, transient ischemic attack; TIPS, transjugular intrahepatic portosystemic shunt

\*All codes and columns combined with "OR" term

\*\*denotes variable that was significant in age, race and gender adjusted univariate analysis prior to model building

\*\*\*Smoking status was assessed using natural language processing, which is a technique that converts free text information relevant to smoking status that is commonly found in clinical documentation into a structured form that can be readily processed and analyzed, as described previously<sup>13</sup>

**Supplemental Table 3. Demographic and Clinical Characteristics of First Liver Transplant Recipients at Northwestern Medicine Compared to the National Sample (OPTN, 2002-2011)**

Characteristic	OPTN N=58,608	NMEDW N=1024	P value <sup>^</sup>
Age, years, mean ± SD	53.4 ± 10.1	56.3 ± 9.7	<0.0001
<45, %	15.0	11.1	
45-49	13.4	10.6	
50-54	21.4	19.3	
55-59	22.6	21.7	
60-64	16.0	18.2	
65+	11.6	19.1	
Sex (men), %	67.1	65.9	0.42
Recipient race & ethnicity, %			0.0001
Non-Hispanic White	72.4	78.6	
Non-Hispanic Black	9.2	6.9	
Hispanic	12.8	10.9	
Asian	4.5	3.1	
Other	1.1	0.4	
Socioeconomic Status, %			
College education	47.4	64.1	<0.0001
Working for income at time of transplant	24.3	16.9	<0.0001
Primary Payer, %			NA
Private		40.9	
Medicare	Not available	48.9	
Medicaid		7.5	
Other		2.6	
Hospitalization status at transplant, %			<0.0001
Not hospitalized	70.6	69.5	
Hospitalized not in ICU	17.7	23.1	
In ICU	11.8	7.4	

**Supplemental Table 3 continued.**

<b>Characteristic</b>	<b>OPTN N=58,608</b>	<b>NMEDW N=1024</b>	<b>P value<sup>^</sup></b>
Recipient functional status at transplant, %			0.26
Independent	47.0	45.9	
Partially dependent	25.9	22.6	
Totally dependent	27.2	27.1	
Calculated MELD score at LT, mean $\pm$ SD	21.1 $\pm$ 10.1	20.9 $\pm$ 11.6	0.63
Waitlist time, days, mean $\pm$ SD	263.9 $\pm$ 485.8	370.9 $\pm$ 694.3	<0.0001
Cause of ESLD, %			<0.0001
Hepatitis C	37.8	33.5	
Alcohol	13.8	23.5	
NASH	5.1	6.5	
Other	19.5	26.9	
Unknown	2.1	9.6	
Hepatocellular Carcinoma, %	28.6	40.1	<0.0001
Complications of ESLD at LT, No (%)			
Hepatic Encephalopathy	77.9	95.8	<0.0001
Ascites at transplant	79.0	76.4	0.04
Spontaneous bacterial peritonitis	7.9	19.5	<0.0001
Variceal Bleed	2.4*	24.9	NA
Hepatorenal syndrome	Not available	22.1	NA
Hyponatremia	12.0	17.2	<0.0001
TIPS	10.0	15.9	<0.0001
Portal Vein Thrombosis	6.5	9.5	<0.0001
Hepatopulmonary syndrome	Not available	0.4	NA

**Supplemental Table 3 continued.**

<b>Characteristic</b>	<b>OPTN N=58,608</b>	<b>NMEDW N=1024</b>	<b>P value<sup>^</sup></b>
<b>CVD comorbidities present at LT, %</b>			
Ischemic heart Disease	1.5	6.5	<0.0001
Myocardial infarction	Not available	2.7	NA
Prior revascularization	Not available	4.4	NA
Prior CABG	Not available	0.98	NA
Any dysrhythmia	Not available	3.1	NA
Atrial Fibrillation	Not available	6.1	NA
Hypertension	7.9**	59.3	NA
Peripheral Vascular Disease	0.40	1.1	0.0007
Hyperlipidemia	Not available	16.3	NA
Heart failure	Not available	14.9	NA
Cerebrovascular disease	2.25	6.2	0.11
<b>Other comorbidities present at LT, %</b>			
Diabetes	29.0	32.5	0.06
COPD	0.6	12.9	<0.0001
Venous thromboembolism, any	Not available	8.3	NA
Deep venous thrombosis	Not available	2.7	NA
Pulmonary Embolism	0.11	0.98	<0.0001
Respiratory failure on ventilator	6.0	9.6	<0.0001
Chronic kidney disease	Not available	34.1	NA
Renal Failure requiring RRT	10.7	17.3	<0.0001
Connective tissue disease	Not available	2.7	NA
Dementia	Not available	0.2	NA
Obstructive sleep apnea	Not available	3.5	NA
Peptic ulcer disease	Not available	3.7	NA
Pulmonary hypertension	Not available	10.6	NA

**Supplemental Table 3 continued.**

<b>Characteristic</b>	<b>OPTN N=58,608</b>	<b>NMEDW N=1024</b>	<b>P value<sup>^</sup></b>
Recipient BMI (kg/m <sup>2</sup> ) at transplant, mean	28.2 ± 5.6	29.6 ± 6.9	<0.0001
Underweight (BMI < 18 kg/m <sup>2</sup> )	1.9	2.1	
Normal weight (BMI 18.1-24.9 kg/m <sup>2</sup> )	24.9	24.9	
Overweight (BMI 25-29.9 kg/m <sup>2</sup> )	32.4	32.4	
Obese (BMI ≥ 30 kg/m <sup>2</sup> )	40.6	40.6	
Smoking status			
Former or current	Not available	34.0	NA
Never	Not available	66.0	NA
Simultaneous liver-kidney, %	5.7	16.9	<0.0001
Living donor, %	4.2	15.2	<0.0001

Abbreviations: OPTN, Organ Procurement and Transplantation Network; NMEDW, Northwestern Medicine Enterprise Data Warehouse; No, number; ESLD, end-stage liver disease; LT, liver transplant; MELD, model for end-stage liver disease; NA, not applicable; NASH, nonalcoholic steatohepatitis; SD, standard deviation

Obesity defined as BMI ≥ 30 kg/m<sup>2</sup>

Results are presented as mean ± standard deviation or %

<sup>^</sup>Analysis of variance for continuous variables and chi-square or Fischer exact for categorical variables

\*In OPTN, variceal bleeding is defined as bleeding within 2 weeks of transplant. In NMEDW, variceal bleeding is defined as any history of variceal bleeding.

\*\*In OPTN, hypertension is defined as drug treated hypertension. In NMEDW, hypertension is defined as any prior drug treated hypertension.