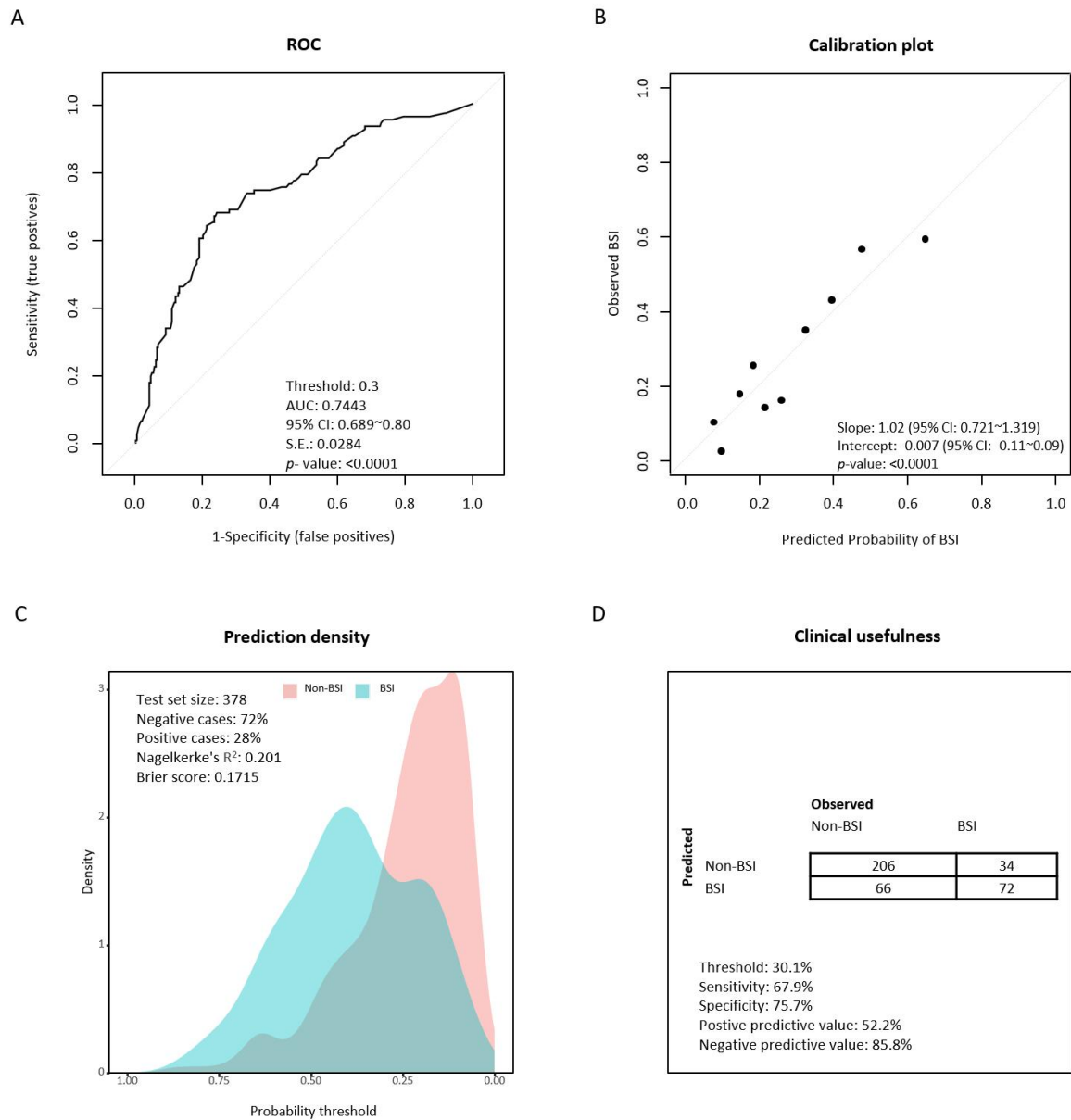


Supplementary material

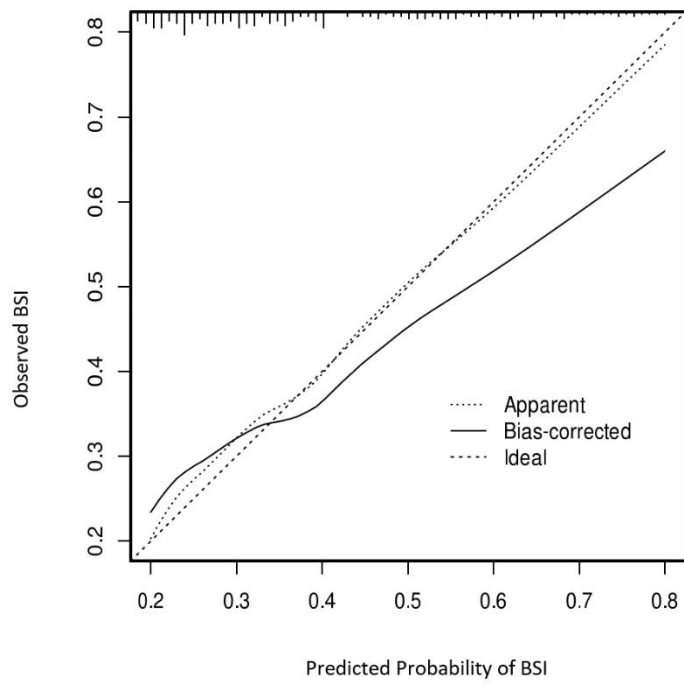
**Supplement to: Assessment of pathogens and risk factors associated with
bloodstream infection in the year after pediatric liver transplantation**

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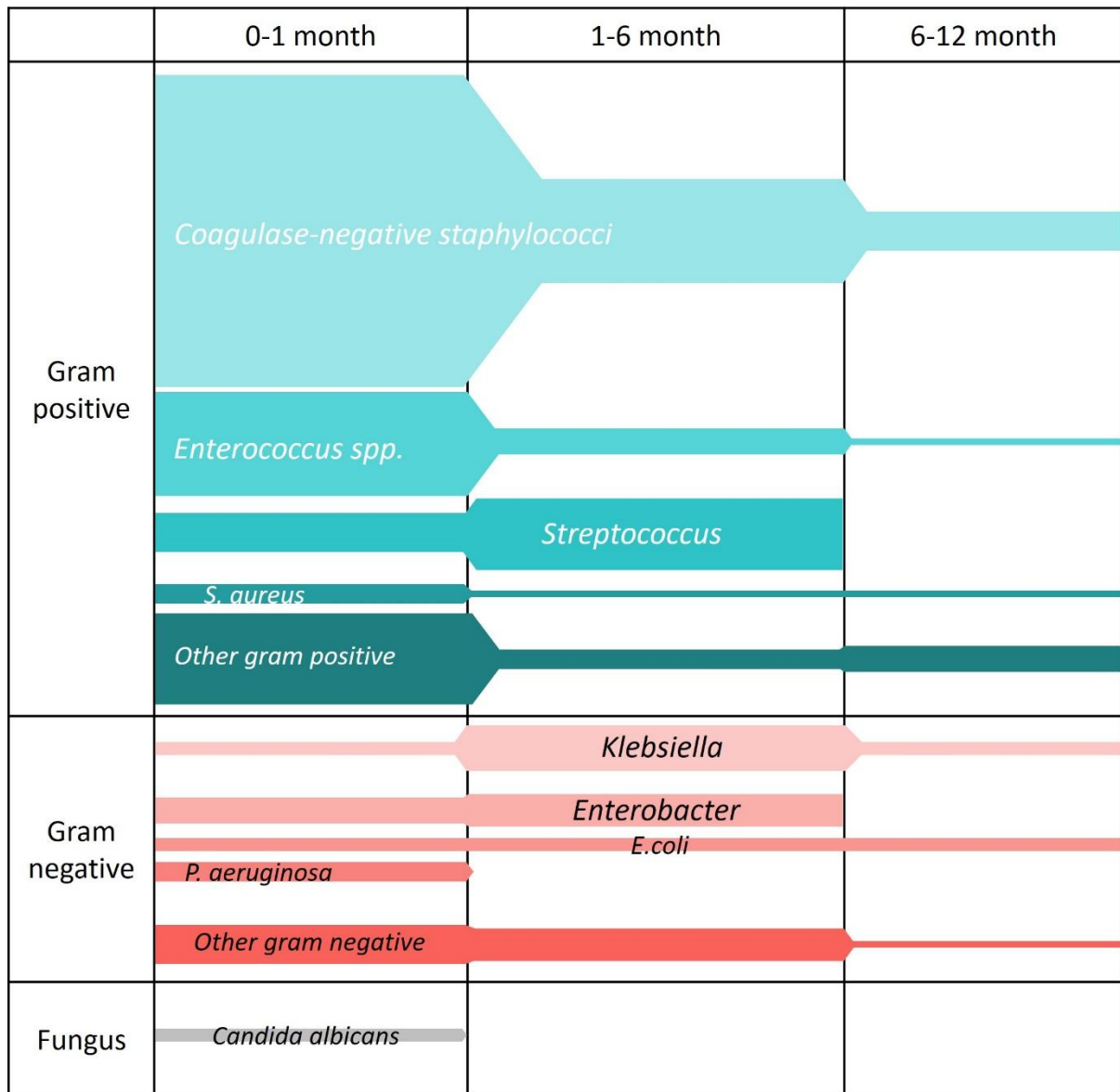
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Supplementary Figure 1 Performance evaluation of multivariate logistic regression model. A: ROC curve analysis; B: Calibration plot; C: Prediction density; D: Clinical usefulness.



Supplementary Figure 2 Bootstrap-corrected calibration slope assessed by the bootstrap resampling method.



Supplementary Figure 3 Causative pathogens contributing to BSI according to the time after transplantation. Gram-positive bacteria predominated in the first month, but after that, the proportion of gram-negative bacteria increases. Fungal infections were identified only in the first month. Line thickness indicates the number of BSI episodes.

Supplementary Table 1 Univariate analyses of risk factors for blood stream infection after liver transplantation

Variables	Non-BSI (<i>n</i> = 272)			BSI (<i>n</i> = 106)			ROC analysis			Univariate analysis				
	Median or n	IQR (%)	or	Median or n	IQR (%)	or	<i>P</i> valu e	AU C	95% CI	cut-off value	OR s	95% CI	<i>P</i> valu e	
Age	1.83	(0.86- 6.0)		1.17	(0.75- 3.08)		0.005	0.5 99	(0.548- 0.649)	≤ 1.33	0.00 18	2.2 25	1.408- 3.515	0.001
Sex, male	124	45.6%		52	49.1%		0.544					1.1 49	(0.733- 1.801)	0.544
Height, z score	-0.66	(-1.60- 0.34)		-1.23	(-2.17- 0.0)		0.005	0.5 94	(0.543- 0.644)	≤ -1.22	0.00 49	2.2 93	1.450- 3.627	< 0.001
Weight, z score	-0.07	(-1.04- 0.71)		-0.53	(-1.7- 0.4)		0.002	0.6 04	(0.552- 0.653)	≤ -0.11	0.00 16	1.9 49	(1.225- 3.102)	0.005
Growth failure	52	19.1%		42	39.6%		< 0.001					2.7 76	(1.696- 4.545)	< 0.001
Diagnosis: biliary atresia	134	49.3%		66	62.3%		0.023					1.6 99	(1.074- 2.689)	0.024
Ventilator	14	5.1%		11	10.4%		0.066					2.1	(0.936-)	0.071

											34	4.864)	
Renal replacement	11	4.0%	8	7.5%	0.161						1.9	(0.757-	0.168
											37	4.958)	
Liver support system	10	3.70%	10	9.4%	0.025						2.7	(1.102-	0.03
											29	6.761)	
PELD	16.2	(6.40-	15.5	(10.6-	0.209	0.5	(0.486-	> 8.99	0.21	1.0	(0.997-	0.093	
		23.7)		24.3)		41	0.595)		53	17	1.037)		
MELD	27.1	(11.3-	29	(27.8-	0.746	0.5	(0.381-	> 27.74	0.63	1.0	(0.946-	0.432	
		32.3)		29.7)		42	0.696)		44	38	1.139)		
LT, DDLT	71	26.1%	20	18.9%	0.139						0.6	(0.377-	0.141
											58	1.149)	
ABO mismatch	8	2.9%	3	2.8%	0.954						0.9	(0.250-	0.954
											61	3.694)	
Operation time	417	(357-	411	(350-	0.408	0.5	(0.467-	> 8.25	0.56	1.0	(0.998-	0.715	
		536)		507)		19	0.570)		6	00	1.001)		
RBC transfusion, cc/kg	17.37	(7.55-	25.71	(9.82-	0.003	0.6	(0.554-	> 21.51	0.00	2.2	(1.451-	<	
		29.54)		42.11)		06	0.655)		16	94	3.627)	0.001	
Post-LT hospital	36	(26-50)	41	(28-67)	0.002	0.5	(0.542-	> 44	0.00	2.0	(1.272-	0.003	

day						94	0.644)			44	22	3.214)	
Donor, male	128	47.1%	44	41.5%	0.33						0.7	(0.507-	0.331
											98	1.257)	
Donor, body mass index	22.3	(20.3-	22.7	(21.1-	0.267	0.5	(0.483-	> 20.58	0.28	1.0	(0.983-	0.143	
		24.4)		24.5)		35	0.587)		17	52	1.125)		
Reoperation	29	10.7%	21	19.8%	0.018					2.0	(1.121-	0.02	
										70	3.823)		
Hepatic artery complication	2	0.7%	2	1.9%	0.326					2.5	(0.361-	0.343	
										96	18.672)		
Hepatic vein complication	24	8.8%	15	14.2%	0.126					1.7	(0.856-	0.129	
										03	3.390)		
PV cx	27	9.9%	24	22.6%	0.001					2.6	(1.452-	0.002	
										56	4.859)		
Bile duct complication	16	5.9%	5	4.7%	0.657					0.7	(0.283-	0.657	
										92	2.219)		
Cytomegalovirus infection	161	59.2%	61	57.5%	0.771					0.9	(0.593-	0.771	
										35	1.473)		
Epstein-Barr virus	187	69.0%	72	67.9%	0.839					0.9	(0.587-	0.839	

infection								51	1.541)
Acute	cellular	127	46.7%	59	55.7%	0.117		1.4	(0.913- 0.118
rejection								33	2.250)

BSI: Blood stream infection; DDLT: Deceased donor liver transplantation; IQR: Interquartile range; MELD: Model for End-Stage Liver Disease; OR: Odds ration; PELD: Pediatric End-Stage Liver Disease.
Mann-Whitney *U* test, χ^2 test, or Fisher's exact test.

Supplementary Table 2 10-fold cross-validation of logistic regression model for blood stream infection

Fold no.	Cases in fold, n	AUC	Accuracy	Precision	Recall	F-Score
1	37	0.787698	0.783784	0.571429	0.444444	0.5
2	38	0.688552	0.657895	0.25	0.090909	0.133333
3	38	0.760536	0.763158	0.5	0.222222	0.307692
4	38	0.718462	0.684211	1	0.076923	0.142857
5	37	0.64	0.675676	0.5	0.166667	0.25
6	38	0.778802	0.789474	0.333333	0.142857	0.2
7	38	0.573913	0.578947	0	0	0
8	38	0.756923	0.710526	0.75	0.230769	0.352941
9	38	0.5553	0.789474	0.333333	0.142857	0.2
10	38	0.751786	0.763158	1	0.1	0.181818

Supplementary Table 3 Proportion and risk factors of blood stream infection after liver transplantation in studies including pediatric patients

Ref.	Type of study	Population	Number	Age	Rate of BSI	Risk factors
Shoji <i>et al</i> ^[1]	Retrospective, single center	LDLT	210 patients, Re-transplantation due to graft failure was excluded	< 18 yr	25.2% (86 BSIs in 53 patients)	Body weight, log blood volume loss during LT, CMV antigenemia
Duncan <i>et al</i> ^[2]	Retrospective, single center	LDLT + DDLT	69 transplants in 65 patients	< 18 yr	28% (transplant procedures complicated by BSI, 19/69)	BA as a cause of liver failure, biliary complications

Møller <i>et al</i> ^[3]	Prospective cohort study, single center	Liver and combined liver-kidney transplant recipients	54 patients	< 18 yr	22% (20 patients)	BSIs in 12	Not available
Rhee <i>et al</i> ^[4]	Retrospective, single center	LDLT	149 patients	Children	21.5 %		Age ≤ 1 year, bile duct complication
Pouladfar <i>et al</i> ^[5]	Prospective, single center	LDLT + DDLT	94 patients, 2 patients who died within 2 d after LT were excluded	< 18 yr	Bacterial infection: 51 (54.3%); 22 (20.4%) pathogens were isolated in blood/108 pathogens		longer hospital stay after LT
Furuichi <i>et al</i>	Retrospective	LDLT +	340	< 18 yr	155 BSI episodes	[117:	Prolonged operative time > 12

al^[6] ve single DDLT, 6 patients within 6 mo, 38: after 6 h, biliary stenosis
center mo after mo, 29 patients (9%]
LT

BSI: Blood stream infection; DDLT: Deceased donor liver transplantation.

Supplementary Table 4 Pathogenic organisms and origins of blood stream infection after liver transplantation in studies including pediatric patients

Ref.	Pathogenic organisms	Origin of infection
Shoji <i>et al</i> ^[1]	<i>S. aureus</i> (19%)	Unknown (62%)
	<i>Klebsiella spp.</i> (19%)	Catheter-related BSI (27%)
	<i>Coagulase-negative staphylococci</i> (10%)	Peritonitis (7%)
	<i>Enterobacter spp.</i> (10%)	Urinary tract infection (2%)
	<i>E. coli</i> (7%)	Pneumonia (1%)
	<i>Enterococcus spp.</i> (6%)	Infectious endocarditis (1%)
	<i>Candida spp.</i> (4%)	
Duncan <i>et al</i> ^[2]	<i>K. pneumoniae</i> (34%)	Not available
	<i>E. faecium</i> (24%)	
	<i>E. coli</i> (14%)	
Møller <i>et al</i> ^[3]	<i>Enterococcus faecium</i> (20%)	Unknown (80%)
	<i>Candida albicans</i> (15%)	Drains of abdomen (15%)
	<i>E. faecalis</i> , <i>E. coli</i> , <i>E. cloacae</i> (10%, respectively)	Sputum (5%)
Rhee <i>et al</i> ^[4]	<i>Coagulase-negative staphylococci</i> (31%)	Unknown (50%)
	<i>K. pneumoniae</i> (22%)	Catheter-related BSI (39%)

		Intraabdominal (11%)
Pouladfar <i>et al</i> ^[5]	<i>Enterococcus spp.</i> (36%)	Sepsis (13%)
	<i>Acinetobacter spp.</i> (17%)	Catheter-related BSI (6%)
	<i>Klebsiella spp.</i> (12%)	Intra-abdominal SSI with secondary BSI (13%)
	<i>E. coli</i> (9%)	
Furuichi <i>et al</i> ^[6]	<i>E. coli</i>	Intraabdominal (47%)
	<i>Klebsiella spp.</i>	Unknown (37%)
	<i>P. aeruginosa</i>	
	<i>Enterococcus spp.</i>	

References

- 1 **Shoji K**, Funaki T, Kasahara M, Sakamoto S, Fukuda A, Vaida F, Ito K, Miyairi I, Saitoh A. Risk Factors for Bloodstream Infection After Living-donor Liver Transplantation in Children. *Pediatr Infect Dis J* 2015; **34**: 1063-1068 [PMID: 26121201 DOI: 10.1097/INF.0000000000000811]
- 2 **Duncan M**, DeVoll-Zabrocki A, Etheredge HR, Maher HA, Bouter C, Gaylard P, Loveland J, Fabian J, Botha JF. Blood stream infections in children in the first year after liver transplantation at Wits Donald Gordon Medical Centre, South Africa. *Pediatr Transplant* 2020; **24**: e13660 [PMID: 31985168 DOI: 10.1111/petr.13660]
- 3 **Møller DL**, Sørensen SS, Wareham NE, Reza Hosseini O, Knudsen AD, Knudsen JD, Rasmussen A, Nielsen SD. Bacterial and fungal bloodstream infections in pediatric liver and kidney transplant recipients. *BMC Infect Dis* 2021; **21**: 541 [PMID: 34103013 DOI: 10.1186/s12879-021-06224-2]
- 4 **Rhee KW**, Oh SH, Kim KM, Kim DY, Lee YJ, Kim T, Kim MN. Early bloodstream infection after pediatric living donor living transplantation. *Transplant Proc* 2012; **44**: 794-796 [PMID: 22483498 DOI: 10.1016/j.transproceed.2012.01.014]
- 5 **Pouladfar G**, Jafarpour Z, Malek Hosseini SA, Firoozifar M, Rasekh R, Khosravifard L. Bacterial infections in pediatric patients during early post liver transplant period: A prospective study in Iran. *Transpl Infect Dis* 2019; **21**: e13001 [PMID: 30221820 DOI: 10.1111/tid.13001]
- 6 **Furuichi M**, Fukuda A, Sakamoto S, Kasahara M, Miyairi I. Characteristics and Risk Factors of Late-onset Bloodstream Infection Beyond 6 Months After Liver Transplantation in Children. *Pediatr Infect Dis J* 2018; **37**: 263-268 [PMID: 28859015 DOI: 10.1097/INF.0000000000001754]