



COVID-19 Vaccination Patterns and Disparities Among Inflammatory Bowel Disease and Liver Transplant Populations

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Introduction

Liver transplant (LT) recipients and patients with inflammatory bowel disease (IBD) on systemic corticosteroids may be at higher risk of adverse outcomes of COVID-19 infection, and vaccination is an essential preventive measure [1, 2].

Uptake of the 2-dose mRNA series was high in patients with IBD, while uptake of subsequent doses per interval recommendations is unknown [3].

COVID-19 vaccine uptake among U.S. LT recipients has not been reported.

Aim: evaluate uptake of 3 COVID-19 mRNA vaccine doses within IBD and LT populations

Hypothesis: Due to the greater risk of severe COVID-19 and reduced humoral immune response to COVID-19 vaccination, we hypothesized that LT recipients would have a higher completion rate of 3 COVID-19 mRNA vaccine doses than patients with IBD.

Methods

Single-center, retrospective study evaluating COVID-19 vaccine uptake among adult patients with IBD and LT recipients.

ZIP codes were assigned to one of six rural-urban geodisparity categories using the Health Innovation Program (HIP) toolkit: urban advantaged, urban, urban underserved, rural advantaged, rural, or rural underserved. Street-level addresses were used to assign 2018 ADI using the Neighborhood Atlas. Influenza and COVID-19 vaccination were evaluated in the Wisconsin Immunization Registry (WIR).

Primary outcome: receipt of ≥3 COVID-19 mRNA vaccine doses†

Secondary outcomes:

- Receipt of ≥4 COVID-19 mRNA vaccine doses in moderately to severely immunosuppressed patients*
- Incomplete vaccination

† a viral vector dose was defined as equivalent to two mRNA doses when used as the initial vaccine dose, or as one mRNA dose for subsequent doses

* Patients with IBD on antimetabolites, anti-tumor necrosis factor agents (anti-TNFs), or systemic corticosteroids in addition to solid organ transplant recipients on transplant-directed therapy

Results

Table 1: Demographic and characteristic data

	IBD (n=1012)	LT (n=579)	p value
Demographic data:			
Age [years]: median (IQR)	46 (33-61)	61 (49-68)	<0.001
Gender [male]: n (%)	535 (52.9%)	354 (61.1%)	<0.001
Hispanic/Latino: n (%)	19 (1.9%)	21 (3.6%)	0.035
Underrepresented minority: n (%)	59 (5.8%)	47 (8.1%)	0.089
Geography: n (%)			
Rural	302 (29.8%)	203 (35.1%)	0.032
Underserved	57 (5.6%)	57 (9.8%)	<0.001
Area deprivation index: median (IQR)	3 (1-4)	4 (2-7)	<0.001

Table 2: Independent variables and association with uptake of a third COVID-19 vaccine dose in patients with IBD

	<3 doses (n=284)	≥3 doses (n=728)	p value
Demographic data			
Age [years]: median (IQR)	38 (28-52)	49 (36-64)	<0.001
Gender [male]: n (%)	166 (58.5%)	369 (50.7%)	0.023
Hispanic/Latino: n (%)	10 (3.5%)	9 (1.2%)	<0.001
Underrepresented minority: n (%)	30 (10.6%)	29 (4.0%)	<0.001
Geography: n (%)			
Rural	110 (38.7%)	192 (26.4%)	<0.001
Underserved	18 (6.3%)	39 (5.4%)	0.210
Area deprivation index: median (IQR)	4 (2-5)	2 (1-4)	<0.001
Clinical data			
Charlson comorbidity index: median (IQR)	0 (0-1)	1 (0-3)	<0.001
Crohn's disease: n (%)	148 (52.1%)	400 (54.9%)	0.420
Duration of IBD [years]: median (IQR)	10 (5-17)	12 (6-22)	<0.001
IBD-directed therapy: n (%)			
No therapy	28 (9.9%)	60 (8.2%)	0.160
Mesalamine monotherapy	60 (21.1%)	207 (28.4%)	
Vedolizumab monotherapy	19 (6.7%)	56 (7.7%)	
Vedolizumab combination therapy	1 (0.4%)	4 (0.5%)	
Azathioprine or mercaptopurine monotherapy	19 (6.7%)	6 (0.8%)	
Methotrexate monotherapy	1 (0.4%)	2 (0.3%)	
Anti-TNF monotherapy	88 (31.0%)	194 (26.6%)	
Anti-TNF combination therapy	21 (7.4%)	50 (6.9%)	
Ustekinumab monotherapy	14 (4.9%)	30 (4.1%)	
Ustekinumab combination therapy	1 (0.4%)	3 (0.4%)	
Tofacitinib therapy	1 (0.4%)	8 (1.1%)	
Systemic corticosteroid therapy	31 (10.9%)	46 (6.3%)	
Influenza vaccination [2021-22]: n (%)	87 (30.6%)	582 (79.9%)	<0.001

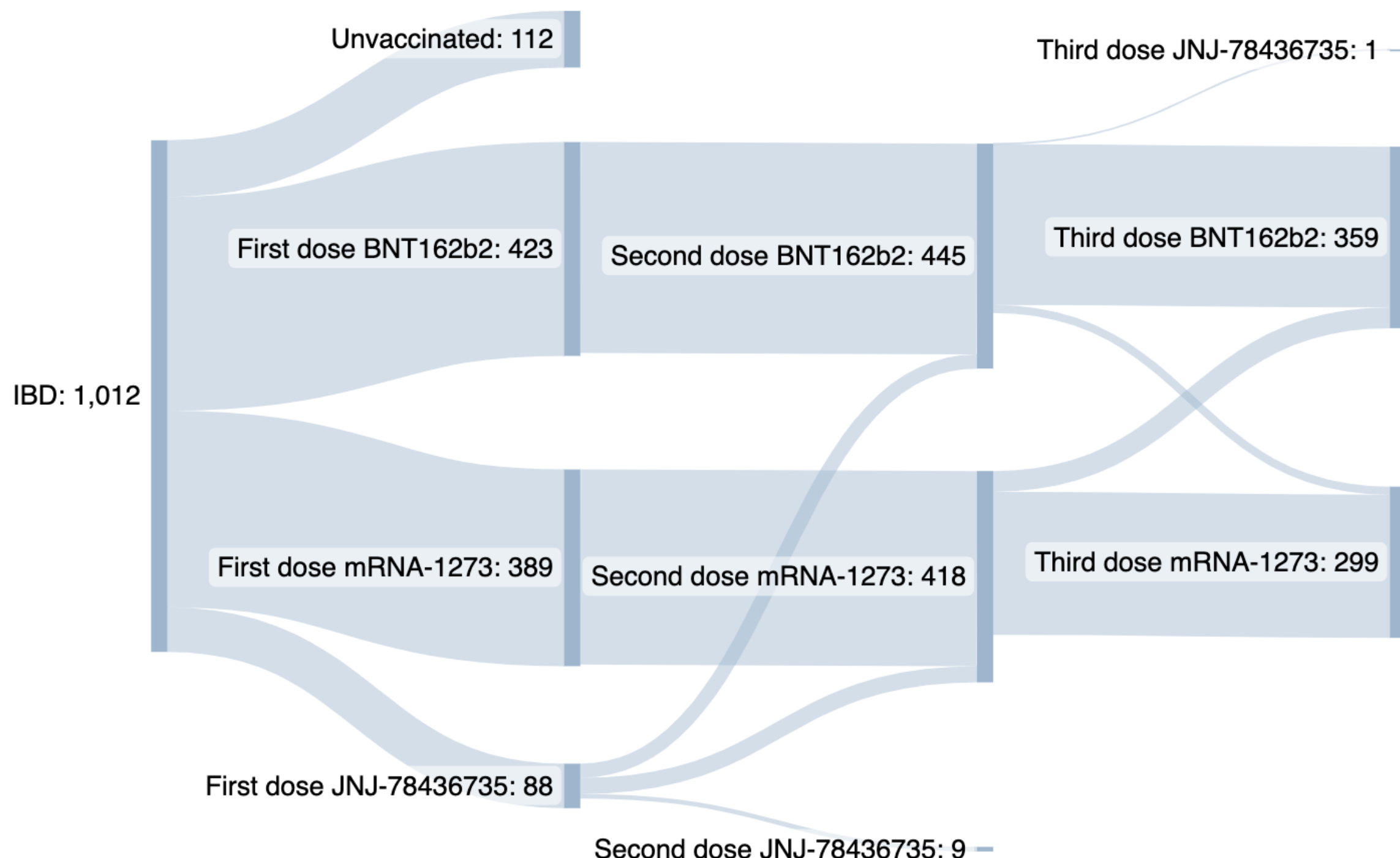
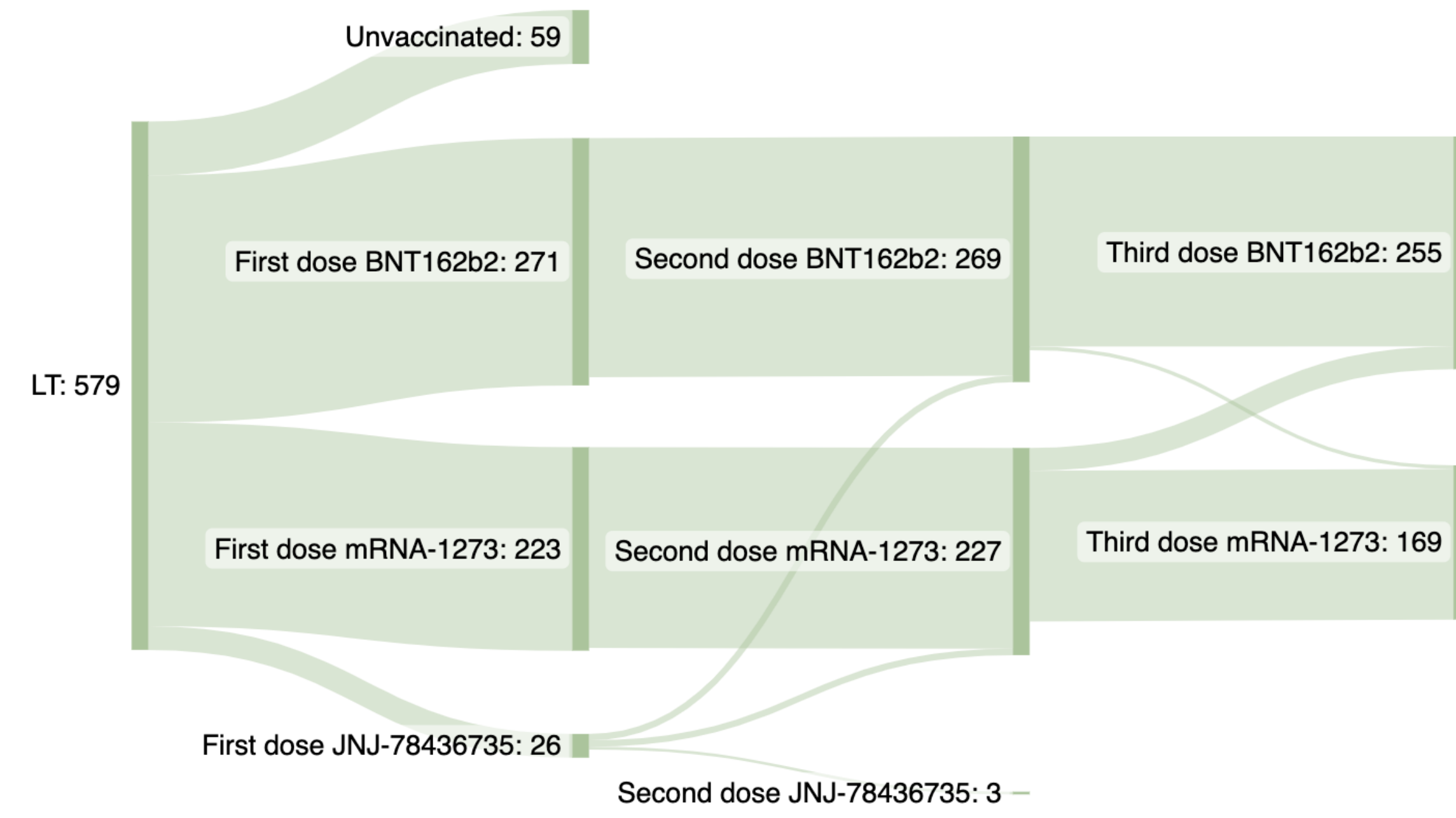


Table 1 cont.: Demographic and characteristic data

	IBD (n=1012)	LT (n=579)	p value
Vaccination data: n (%)			
Influenza vaccination [2021-22]	669 (66.1%)	421 (72.7%)	0.006
COVID-19 vaccine addressed by provider	339 (33.5%)	523 (90.3%)	<0.001
COVID-19 mRNA vaccine 2 doses received	891 (88.0%)	508 (87.7%)	0.860
COVID-19 mRNA vaccine 3 doses received	728 (71.9%)	441 (76.2%)	0.066
COVID-19 mRNA vaccine 4 th dose eligible	529 (52.3%)	576 (99.5%)	<0.001
COVID-19 mRNA vaccine 4 doses received	48/529 (9.1%)	162/576 (28.1%)	<0.001

Table 3: Independent variables and association with uptake of a third COVID-19 vaccine dose in LT recipients

	<3 doses (n=138)	≥3 doses (n=441)	p value	
Demographic data				
Age [years]: median (IQR)	55 (41-63)	63 (52-70)	<0.001	
Gender [male]: n (%)	82 (59.4%)	272 (61.7%)	0.640	
Hispanic/Latino: n (%)	1 (0.7%)	20 (4.5%)	0.038	
Underrepresented minority: n (%)	6 (4.3%)	41 (9.3%)	0.065	
Geography: n (%)				
Rural	54 (39.1%)	149 (33.8%)	0.260	
Underserved	16 (11.6%)	41 (9.3%)	0.210	
Area deprivation index: median (IQR)	5 (3-8)	4 (2-7)	0.002	
Clinical data				
Charlson comorbidity index: median (IQR)	2 (1-4)	3 (2-5)	<0.001	
Time since transplant [years]: median (IQR)	7 (3-14)	7 (3-15)	0.620	
LT indication: n (%)				
PSC	7 (5.1%)	43 (9.8%)	0.091	
HCV	7 (5.1%)	26 (5.9%)		
NASH	10 (7.2%)	56 (12.7%)		
ALD	63 (45.7%)	155 (35.1%)		
HCC	12 (8.7%)	31 (7.0%)		
Other	39 (28.3%)	130 (29.5%)		
LT-directed therapy: n (%)				
No therapy	2 (1.4%)	1 (0.2%)	0.130	
Calcineurin inhibitor monotherapy	30 (21.7%)	92 (20.9%)		
Antimetabolite monotherapy	4 (2.9%)	13 (2.9%)		
mTOR inhibitor monotherapy	2 (1.4%)	1 (0.2%)		
Calcineurin inhibitor + antimetabolite combination therapy	58 (42.0%)	217 (49.2%)		
mTOR inhibitor + antimetabolite combination therapy	0 (0.0%)	5 (1.1%)		
Systemic corticosteroid therapy	42 (30.4%)	112 (25.4%)		
Influenza vaccination [2021-22]: n (%)	49 (35.5%)	372 (84.4%)		<0.001



Conclusions

There was high COVID-19 vaccine uptake among patients with IBD and LT recipients alike

- A trend towards higher receipt of ≥3 COVID-19 mRNA vaccine doses in LT recipients (76%) vs IBD (72%)
- Higher receipt of ≥4 doses in LT recipients (28%)

Among patients with IBD, disparities of age, gender, race/ethnicity, and socioeconomic status were observed

Among LT recipients, disparities pertaining to age and socioeconomic status were observed. Alcohol-related liver disease was associated with incomplete vaccination.

Gastroenterologists and hepatologists should continue to address and recommend COVID-19 vaccination with their patients.

Future studies evaluating uptake of bivalent vaccines and addressal of vaccine uptake disparities are needed.

References

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