Prevalence of HIV and Patterns of ART Use Among U.S. Liver Transplant Candidates

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BACKGROUND

- Despite the high burden of liver disease among HIV+ individuals, the prevalence of HIV on the U.S. liver transplant (LT) waitlist is unknown.
- Further, some classes of antiretroviral therapy (ART) can interact with post-LT immunosuppression.
- Therefore, we sought to (a) estimate the prevalence of HIV, (b) describe candidate characteristics, and (c) explore patterns in ART use among U.S. LT candidates.

METHODS

Study Population

- Retrospective cohort study (2001-2016) of 126,531 adult LT candidates in the national transplant registry (Scientific Registry of Transplant Recipients) linked to pharmacy claims data using social security numbers with encrypted identifiers.
  - 85% of the U.S. LT waitlist in the study period was captured in the linkage.
  - HIV+ candidates were identified by ≥1 fill of ART (excluding HBV-related monotherapies).

Analyses

- We estimated the prevalence of HIV using multiple imputation by chained equations.
- We compared demographic and health characteristics of LT candidates by HIV-status, using rank-sum and chi-squared tests.
- We examined changes in the number of HIV+ LT candidates listed annually using Cuzick's non-parametric test for trends and linear regression with spline terms.
- We explored factors associated with ART regimens using multiple logistic regression.

RESULTS

Candidate Characteristics	HIV+ 1,116 (0.9%)	HIV- 125,415 (99.1%)	p-value
Age at listing, Median (IQR)	52 (46-57)	55 (49-61)	<0.001
% Men	81.6	64.2	<0.001
Race			<0.001
% Non-Hispanic Caucasian	54.8	72.1	
% African American	19.5	8.7	
% Cause of liver disease			<0.001
Hepatitis C Virus (HCV)	39.5	28.9	
Hepatitis B Virus (HBV)	22.8	3.0	
Alcoholic Liver Disease	6.9	23.2	
Malignancy	13.4	9.2	
Willing to accept HCV+ donor	48.4	38.8	<0.001
% Obese (BMI>30)	18.6	36.9	<0.001
Insurance Type			<0.001
% Public	44.3	37.5	
% Private	53.2	58.4	
% History of Diabetes	16.4	23.9	<0.001

Table 1. Demographic and health characteristics of HIV+ vs. HIV- LT candidates.

- We identified 1,116 LT candidates who were HIV+ at listing, according to their medication history (Table 1).
- Prior to 2008, the estimated prevalence of HIV on the U.S. LT waitlist was: 0.75% (95% CI: 0.67%-0.83%); after 2008, the estimated prevalence of HIV on the U.S. LT waitlist was: 0.87% (95% CI: 0.80%-0.94%).

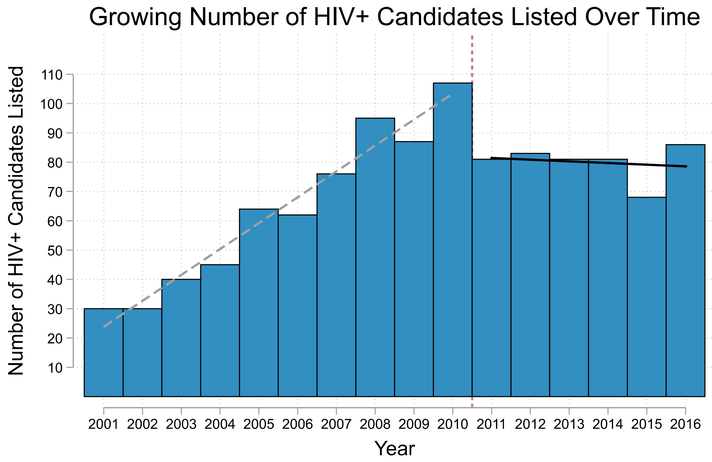

Figure 1. HIV+ LT Candidates Listed Per Year.

- The number of HIV+ LT candidates listed annually increased over time (trend p<0.01), growing at an average rate of 8.9 new HIV+ candidates listed per year from 2001 to 2010 (grey dotted line) after which the growth plateaued from 2011 to 2016 (black solid line) (Figure 1).
- Pharmacoenhancer use peaked in 2004 at 82.4%, decreased steadily each year thereafter to 20.0% in 2016.
- After their approval, integrase inhibitors became the most commonly used medication class among LT candidates with HIV, increasing from 6.7% in 2008 to 54.0% in 2016 (Figure 2).
- Pharmacoenhancers were more likely to be used by African American candidates (aOR: 1.72, 95% CI: 1.13-2.62, p<0.05), adjusting for age, sex, year, education, and public insurance, however the use of integrase inhibitors was not associated with race (aOR: 0.81, 95% CI: 0.50-1.31, p=.4).

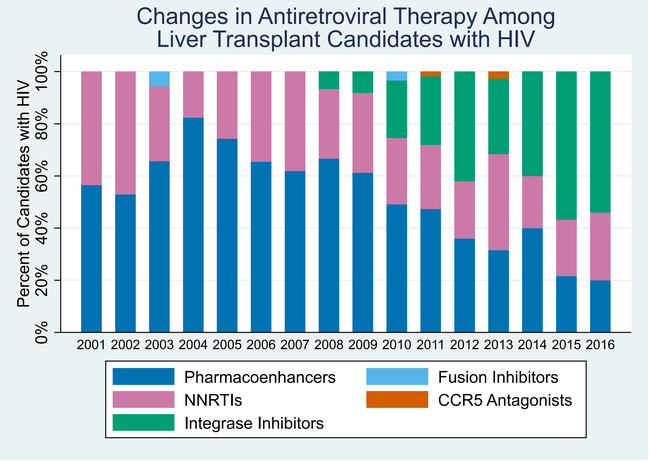

Figure 2. Changes ART Among LT Candidates with HIV. ART regimens were categorized by the medication class used in addition to the nucleoside reverse-transcriptase inhibitor backbone. Classes included: non-nucleoside reverse-transcriptase inhibitors (NNRTIs); pharmacoenhancers, including cytochrome p450 inhibitors; integrase strand transfer inhibitors (Integrase Inhibitors), fusion inhibitors, and entry inhibitors/CCR5 co-receptor antagonists (CCR5 Antagonists). We summarized the proportion of LT candidates prescribed ART regimens containing each medication class by year using the prescription nearest to each candidate's listing date.

CONCLUSION

- Using a novel data linkage, we identified a growing population of HIV+ candidates on the U.S. LT waitlist.
- The burden of HIV on the LT waitlist was nearly 1%, and ART use shifted over time from regimens containing pharmacoenhancers to integrase inhibitors.
- Controlling for secular trends, African Americans were more likely to be prescribed ART regimens containing pharmacoenhancers, which can interact with post-transplant immunosuppression.

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