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Permalink

<https://escholarship.org/uc/item/4qg9964s>

Journal

American Journal of Transplantation, 21(2)

ISSN

1600-6135

Authors

Logan, Cathy
Yumul, Ily
Cepeda, Javier
[et al.](#)

Publication Date

2021-02-01

DOI

10.1111/ajt.16245

Peer reviewed



Published in final edited form as:

Am J Transplant. 2021 February ; 21(2): 657–668. doi:10.1111/ajt.16245.

COST-EFFECTIVENESS OF USING HEPATITIS C VIRUS VIREMIC HEARTS FOR TRANSPLANTATION INTO HCV-NEGATIVE RECIPIENTS

Cathy Logan¹, Ily Yumul², Javier Cepeda¹, Victor Pretorius³, Eric Adler⁴, Saima Aslam¹, Natasha K Martin^{1,5}

¹Division of Infectious Diseases and Global Public Health, Department of Medicine, University of California San Diego

²Division of Cardiology, Department of Medicine, University of Iowa

³Division of Cardiothoracic Surgery, Department of Surgery, University of California San Diego

⁴Division of Cardiology, Department of Medicine, University of California San Diego

⁵Population Health Sciences, University of Bristol, UK.

Abstract

Background: Outcomes following hepatitis C virus (HCV)-viremic heart transplantation into HCV-negative recipients with HCV treatment are good. We assessed cost-effectiveness between cohorts of transplant recipients willing and unwilling to receive HCV-viremic hearts.

Methods: Markov model simulating long-term outcomes among HCV-negative patients on the transplant waitlist. We compared costs (2018 US\$) and health outcomes (quality-adjusted life-years, QALYs) between cohorts willing to accept any heart and those only willing to accept HCV-negative hearts. We assumed 4.9% HCV-viremic donor prevalence. Patients receiving HCV-viremic hearts were treated, assuming \$39,600/treatment with 95% cure. Incremental cost-effectiveness ratios (ICERs) were compared to a \$100,000/QALY gained willingness-to-pay threshold. Sensitivity analyses included stratification by blood type or region, and potential negative consequences of receipt of HCV-viremic hearts.

Results: Compared to accepting only HCV-negative hearts, accepting any heart gained 0.14 life-years and 0.11 QALYs, while increasing costs by \$9,418/patient. Accepting any heart was cost-effective (ICER \$85,602/QALY gained). Results were robust to all transplant regions and blood types, except type AB. Accepting any heart remained cost-effective provided post-transplant mortality and costs among those receiving HCV-viremic hearts was not >7% higher compared to HCV-negative hearts.

Conclusions: Willingness to accept HCV-viremic hearts for transplantation into HCV-negative recipients is cost-effective and improves clinical outcomes.

INTRODUCTION

Heart failure is a major medical problem affecting nearly 5.7 million Americans, and is projected to increase over the next decade¹. While advances in pharmacological and resynchronization therapy have led to symptomatic and survival benefit, many with heart failure continue to progress to end-stage disease with poor quality of life and high mortality rates². The gold standard for treatment of end-stage heart failure remains heart transplantation for those who are eligible. Over the last decade, the number of new listings for heart transplant (HT) increased by 50%, and the number of candidates actively awaiting transplant has more than doubled³. Advances in heart failure management are allowing more patients to survive long enough to undergo transplant and are offering the possibility of transplant to a greater proportion of older patients²⁻⁵. With a shortage of viable organs, transplant rates have not paralleled this rise in candidates. Between 2005 and 2017, HT rates have fluctuated slightly but have overall stayed the same, and the median wait time in 2016–2017 was 7.9 months, varying considerably with listing status and blood type³. Due to a shortage of available donor hearts and an increasing pool of eligible recipients, ventricular assist devices (VAD) have become increasingly accepted and utilized as a life-saving bridge to transplant, but these remain costly with high rates of adverse events^{2,4,5}.

The scarcity of hearts available for transplantation and high mortality rate while awaiting transplant have led some institutions to begin transplanting organs that previously have not been used, including those from donors with hepatitis C virus (HCV) viremia³. Traditionally, hearts from HCV-viremic donors have not been transplanted into HCV negative recipients due to concerns of viral transmission, with an accelerated risk of cirrhosis and liver failure in the setting of immunosuppression. In addition, up until recently, interferon-based HCV treatments had low sustained virologic response (SVR) rates (~50%) and poor tolerability. The development of direct-acting antivirals (DAAs) changed the HCV treatment landscape with high rates of SVR (exceeding 90%) including for patients with solid-organ transplants⁶⁻¹⁸, yet treatments are expensive (\$40,000 or greater per treatment course)¹⁹. Single center data utilizing HCV-viremic donors for heart transplantation demonstrate 100% SVR rates with treatment following transplant with DAA²⁰⁻²⁴. While additional long-term data on safety and efficacy are being accumulated, the cost-effectiveness of such a strategy has not been evaluated.

With projected increasing rates of advanced heart failure, and supply and demand imbalance, it is ever more necessary to evaluate strategies to optimize the donor pool and allocation process to improve health and economic outcomes. Our aim was to compare the cost-effectiveness between cohorts of HCV-negative recipients who are willing and unwilling to receive HCV-viremic hearts for transplantation, followed by 12 weeks of DAA treatment for those receiving HCV-viremic hearts.

METHODS

Model Overview

We developed a Markov model of health and economic outcomes among cohorts of patients who are negative for HCV infection on the HT waitlist (WL). We created a virtual trial to

compare the cost-effectiveness between cohorts of patients willing to accept any (HCV-viremic and HCV-negative) heart and those only willing to accept HCV-negative hearts from a health payer perspective with a lifetime horizon. Our analysis is limited to the healthcare sector only, and neglects potential broader societal benefits on economic productivity, etc. Individuals who received HCV-viremic hearts were treated with DAAs for 12 weeks, and long-term health outcomes (including liver disease progression if remaining HCV-infected) and costs were simulated.

Baseline Heart Transplantation Cohort Characteristics

We created a hypothetical cohort of patients with end-stage heart failure who were active on the HT waitlist. We stratified our population by those managed with inotrope-dependent therapy (IDT) and with VADs, incorporating transition from IDT to VAD. Based on 2017 data from the Organ Procurement and Transplantation Network (OPTN), at baseline, we simulated a cohort aged 50 years, 65% were waitlisted with a VAD and 35% on IDT. We simulated the lifetime course of patients with advanced heart failure waiting for HT. While on the WL patients could transition from IDT to VAD, undergo HT, or die from either heart failure-related mortality from background mortality (Figure 1). We used published studies and 2017 United Network for Organ Sharing (UNOS) data to estimate transplant transition probabilities.

Cohort comparisons

We simulated two scenarios for the HT cohort (Figure 1): (1) “accept any” heart (HCV-viremic *or* HCV-negative), followed by DAA treatment if an HCV-viremic heart was received, and (2) accept HCV-negative heart only. For both groups, the probability of receiving a HT was dependent on management status (VAD versus IDT), and based on national averages pooling across blood types and UNOS geographic regions for our base case analysis.

In the “negative only” scenario, patients moved to the non-viremic post-transplant health state after successful heart transplantation. In the “accept any” scenario, patients could receive HCV-negative hearts and follow traditional outcomes. However, if the heart received was HCV-viremic, the patient was subsequently treated with DAA therapy, a maximum of 2 times. If patients were successfully treated (or re-treated) they moved to the SVR state and followed a standard post-transplant course. If patients failed the second course of therapy, we tracked natural history of HCV-related liver disease as categorized by METAVIR scoring system (F0, F1, F2, F3, F4/compensated cirrhosis, decompensated cirrhosis, hepatocellular carcinoma). When patients reached decompensated cirrhosis, they began to experience mortality from liver-attributable causes. We assume patients receiving HCV-viremic and HCV-negative hearts received the same surgical procedure and the same post-transplant heart-related care, aside from additional HCV-related care.

Model parameterization

Transition probabilities, costs and health utilities were attached to each disease stage (Table 1). We assumed all patients who received HCV-viremic hearts were treated with 12 weeks of DAAs with 95% primary and retreatment cure rates.

Transplant probabilities: UNOS data on median WL times until transplant accounting for competing risks of death from 2017 were used to estimate the monthly probability of receiving a HT (Table 1) for wait-listed patients on IDT (average 3.8 months on WL until transplant) and with VADs (average 8.4 months on WL until transplant). We assumed that willingness to accept any heart (HCV-viremic or HCV-negative) would increase the probability of transplant by increasing the number of eligible organs for transplant, by increasing the transplant probabilities for cohorts willing to receive HCV-positive organ rates by 4.9%, equating to the proportion of HCV-viremic organs among all heart donors in the U.S based on 2018 UNOS data. As such, consistent with other studies examining the impact of accepting HCV donor organs²⁵, we calculated the overall transplant probability for those willing to accept any heart as $= 1 - (1 - \text{transplant probability}) / (1 + \text{HCV viremic organ prevalence})$

Disease transition probabilities: Transition probabilities for patients on the HT wait list were obtained from previously published studies and cost analyses of heart failure^{26–34}. All individuals experienced age-specific background (non-transplant, non-HCV related) mortality based on data from the US Centers for Disease Control. Transplant-related mortality rates were estimated based on UNOS survival data by month. Because UNOS survival data reflects all-cause mortality, we calculated the transplant-specific mortality by subtracting the background mortality expected for a patient aged 50. We confirmed our model-generated survival matched reported OPTN data (Supplementary Figure S1)³. Transition probabilities for HCV disease progression were obtained from prior studies and cost analyses^{35–42}.

Costs: Costs of heart failure care while on the wait list (including the cost of VAD implantation), transplantation, and post-transplant care were obtained from previously published clinical trials and cost analyses^{33,43–58}. These costs reflect a payer mix representing the mixed insurance status of the population, including Medicare and private insurance as well as costs from the National Inpatient Sample and clinical trial data, in line with previous economic evaluations of HT interventions in the U.S. We assumed a \$39,600/treatment cost for HCV DAA therapy based on recent wholesale acquisition cost for a 12-week course of glecaprevir/pibrentasvir, a commonly used agent due to lowest cost, pan-genotypic activity, and minimal drug-drug interactions¹⁹. Health state costs, including those for untreated HCV disease stages, were taken from previous economic evaluations and inflated to 2018 USD using hospital and related services component of the Consumer Price Index^{36,59–61}.

Utilities: For each health state, including those for heart failure^{31,33,50,52,55,62} and liver disease^{63–65}, we assigned health-related quality-of-life weights which were obtained from previously published studies and cost analyses. For post-transplant health states with subsequent liver disease, the decrement of the liver disease state was subtracted from the post-transplant state (combined health utility = heart transplant utility – (1-liver disease utility)).

Model Outcomes

Costs (in 2018 USD\$) and U.S. based health utilities were attached to each stage and discounted at 3% per year. For each scenario, we estimated total costs and total quality-adjusted life years (QALYs). Incremental cost-effectiveness ratios (difference in costs divided by the difference in QALYs) were calculated comparing cohorts of those willing to accept any heart compared to only HCV negative hearts, and assessed for cost-effectiveness under a willingness-to-pay (WTP) threshold of \$100,000 per QALY gained⁶⁶.

Sensitivity analyses:

We performed several one-way and multivariate sensitivity analyses to test model assumptions on cost-effectiveness, focusing on those that were most likely to affect costs, WL time, and health outcomes associated with willingness to receive an HCV-viremic heart. Due to variability in transplant time by blood type, we performed one-way sensitivity analyses examining specific blood types (Table S1). We also examined the impact of variability in transplant WL times by geographical region, by adjusting the national transplant probabilities by a region-specific ratio (Region-specific-probability / National probability) based on 2017 UNOS data (Table S2). We examined the impact of variations in HCV prevalence among organ donors (2.5% or 10% compared to 4.9% at baseline), lower DAA SVR (90% compared to 95%), or doubled DAA cost (\$80,000 compared to \$39,600). We also examined the impact of variations on the baseline cohort age (40 to 65 years, compared to 50 at baseline). While early data have not demonstrated significant differences in mortality, graft function, rejection, or fibrosing hepatitis among recipients of HCV-viremic compared to HCV-negative organs^{20–24,67–75}, we performed a sensitivity analysis to evaluate the potential for negative outcomes in patients receiving hearts from HCV-viremic donors by incrementally varying the post-transplant mortality and costs in this group by a relative 1–10% compared to those receiving HCV-negative hearts. Finally, we undertook a probabilistic sensitivity analysis where we varied all model input parameters simultaneously to determine uncertainty in the ICER (sampling distributions in Table 1), plotting the proportion of simulations which fell under various WTP thresholds.

RESULTS

Our simulations indicated that compared to those who only accepted HCV-negative donor hearts, patients who accepted any heart (HCV-viremic or HCV-negative), had an increase in survival of 0.14 life-years per patient, which translated to 0.11 QALYs gained per patient, due to reduction in WL time. This was associated with a lifetime increase in costs of \$9,418/patient. Overall, compared to only accepting HCV-negative hearts accepting any heart yielded an ICER of \$85,602/QALY gained and was cost-effective (Table 2).

Impact of varying transplant wait time by blood type or UNOS region

Accepting an HCV-viremic or negative heart remained cost-effective for sensitivity analyses examining impact of variations in assumptions regarding transplant wait times by blood type and UNOS region. When varying transplant time by blood type, accepting any heart (HCV-viremic or negative) remained cost-effective (ICER < \$100,000/QALY gained) for all types except for the blood type AB (borderline cost-effective at \$107,168/QALY gained)

compared to accepting only HCV-negative hearts (Figure 2). Clinical outcomes varied, from an increase in 0.09 life-years for blood type AB to 0.15 life-years for blood type O, due to differences in WL time which were shortest for blood type AB. Similarly, when examining impact of variations in assumptions regarding transplant wait times across UNOS regions, accepting any heart remained cost-effective compared to accepting only HCV-negative hearts in all regions (Figure 3). Clinical outcomes varied, from an increase in 0.13 life-years for regions 4, 8 and 11 (region 4 with shortest WL time of 5.4 months), to 0.15 life-years for regions 1, 3, 7 and 9 (region 1 with longest WL time of 14 months).

Impact of HCV prevalence among heart donors, SVR rate, and DAA costs

Accepting any heart remained cost-effective with a lower donor HCV-viremia prevalence of 2.5% (\$85,623/QALY gained, Figure S2). With an HCV-viremia prevalence of 10%, the ICER was \$85,561/QALY gained. When examining impact of a lower SVR rate of 90% at an HCV-viremia prevalence of 4.9%, accepting any heart remained cost-effective (ICER \$86,890/QALY gained). Accepting any heart was borderline cost-effective with a higher DAA cost of \$80,000 per treatment course (ICER \$98,094/QALY gained).

Impact of baseline cohort age

Accepting any heart was more cost-effective with lower baseline cohort ages, and remained cost-effective with a cohort age of 65 years (ICER \$94,160/QALY gained, Figure S3).

Impact of increased costs and mortality in patients receiving HCV-viremic hearts

Accepting any heart was more cost-effective (WTP <\$100,000/QALY) provided that receipt of an HCV- viremic organ was associated with a less than 7% relative increase in post-transplant mortality and associated post-transplant costs among those individuals compared to those who did not receive an HCV-viremic organ (Figure S4).

Probabilistic Sensitivity Analyses

Over 10,000 iterations, accepting any heart was cost-effective (mean ICER of \$90,530/QALY gained) over accepting an HCV-negative heart only, yielding an average gain of 0.1 QALYs per person (2.5–97.5% percentiles 0.1–0.1) at an average incremental cost of \$9,053 (2.5–97.5% percentiles \$6,279–\$11,904). At a willingness-to-pay threshold of \$100,000 accepting any heart was cost-effective for 75% of simulations (Figure S5).

DISCUSSION

We found important clinical and economic benefits among cohorts willing to accept HCV-viremic hearts for transplantation. Not only is SVR achievable for majority of patients infected with HCV, DAA therapy has opened the possibility of utilizing once discarded, but otherwise viable organs from HCV-infected donors for transplantation into HCV-negative recipients by allowing treatment in the early post-operative period. Early studies suggest this is clinically feasible and demonstrate excellent SVR rates even in the setting of immunosuppression^{21–24,70,73,74,76–80}. Accepting HCV-viremic organs may allow patients to be transplanted faster, and avoid not only complications and mortality of end-stage heart failure while on the WL, but avoid additional costs of medical treatment as well⁸¹. The

concerns of risk associated with HCV infection and the costs associated with DAA therapy have persisted during the early stages of this approach and may potentially limit widespread adoption. In our opinion, this is the first study to evaluate the cost-effectiveness of accepting HCV-viremic hearts for transplant into HCV-negative recipients, finding it cost-effective (ICER <\$100,000/QALY) and resulting in improvement of survival and reduction in WL time.

It is unknown what proportion of individuals on the HT waitlist would be willing to receive HCV-viremic hearts. However, it has been reported that between 29% and 82% of patients awaiting kidney transplant would accept HCV-positive kidneys under certain circumstances⁸². In a recent study evaluating transplantation of HCV-viremic hearts, 57% of identified candidates were willing to enroll²¹. More data are needed to assess willingness of heart failure patients to receive HCV-viremic organs, and what information can support their decision-making of the risks and benefits.

Our analysis has several limitations, mostly due to uncertainty in the model parameterization. First, we conservatively assumed that all patients receiving an HT from a HCV-viremic donor would acquire HCV infection. It is possible, that some may avoid HCV acquisition or spontaneously clear the disease on their own, thus improving outcomes after transplantation and improving cost-effectiveness. Second, we assumed DAA therapy would result in cure in 99% of patients overall after 1 or 2 treatment courses, based on prior studies using DAA therapy to treat HCV after kidney transplant^{6–18}. Early studies in HT, demonstrate 100% SVR rates thus far for donor-derived HCV^{20–24}. Nevertheless, sensitivity analyses with variations in SVR rates to as low as 90% demonstrated cost-effectiveness. Third, there is now clinical trial data showing feasibility of early shorter course of DAA therapy with similar SVR rates though long term follow-up is needed and the real-world applicability outside a clinical trial is pending; this may be even more cost effective or even cost-saving; however we did not test this in our model^{24,83,84}. Fourth, we assumed in our baseline model that patients who received an HCV-viremic heart and then successfully achieved SVR would have no negative consequences on further health outcomes. Thus far in early trials, there have been no reports of increased rates of rejection, increased infectious complications, or increased mortality among those receiving HCV-viremic organs^{20–24,67–75}. However, these outcomes are early and so in our sensitivity analysis we incrementally increased both costs and mortality to account for this possibility, finding that willingness to accept a heart was cost-effective provided it is not associated with a relative increase of more than 7% post-transplant mortality compared to those receiving HCV-negative hearts. Fifth, as the organ distribution system has recently changed (now six medical urgency statuses rather than three, and more distinction between various types of mechanical circulatory support), we were unable to assess precise effects within specific (and now outdated) staging groups and geographical regions. Nevertheless, our numerous sensitivity analyses indicated that our results were robust to variations in assumptions regarding WL time, blood type, and HCV-prevalence among donors, indicating that our results are likely to hold regardless of these changes. Sixth, our analysis uses a health care payer perspective, and neglects the broader potential societal benefits of this approach. For example, willingness to receive an HCV-viremic organ may result in reduction in transplant WL time, and therefore potential increases in economic productivity for those who receive a transplant earlier⁸¹. Including

these broader societal benefits could further improve cost-effectiveness. Finally, our analysis focused on the cost-effectiveness of these management strategies and neglects the budgetary impact. National data suggest that there are 300–500 unrealized opportunities for HCV-viremic organ donations, yet the numbers willing to accept an HCV-viremic heart are unknown^{17,85}. Future studies exploring the potential budgetary impact of use of these organs, which could avert substantial cost in pre-transplant management, is warranted but outside the scope of our analysis.

In conclusion, willingness to accept hearts from HCV-viremic donors among HCV-negative recipients followed by DAA therapy if an HCV-viremic heart is transplanted is a clinically useful and cost-effective strategy in heart transplantation among patients with end-stage heart failure.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

ACKNOWLEDGMENTS:

This work was supported in part by Health Resources and Services Administration contract 234–2005-37011C. The content is the responsibility of the authors alone and does not necessarily reflect the views or policies of the Department of Health and Human Services, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government. NM was supported by the National Institute for Allergy and Infectious Diseases and National Institute for Drug Abuse [grant number R01 AI147490] and the University of California San Diego Center for AIDS Research (CFAR), a National Institute of Health (NIH) funded program [grant number P30 AI036214]. JC was supported by the National Institute for Drug Abuse [grant number K01DA043421].

Disclosures

NM has received unrestricted research grants and honoraria from Gilead and Merck unrelated to this work. SA serves as a consultant to Merck for work unrelated to this project.

Abbreviations

DAA	Direct-acting antiviral
HT	Heart transplant
HCV	Hepatitis C virus
IDT	Inotrope-dependent therapy
ICER	Incremental cost-effectiveness ratio
OPTN	Organ Procurement and Transplantation Network
QALY	Quality-adjusted life-year
SVR	Sustained virologic response
UNOS	United Network for Organ Sharing
VAD	Ventricular assist device

WL Waitlist

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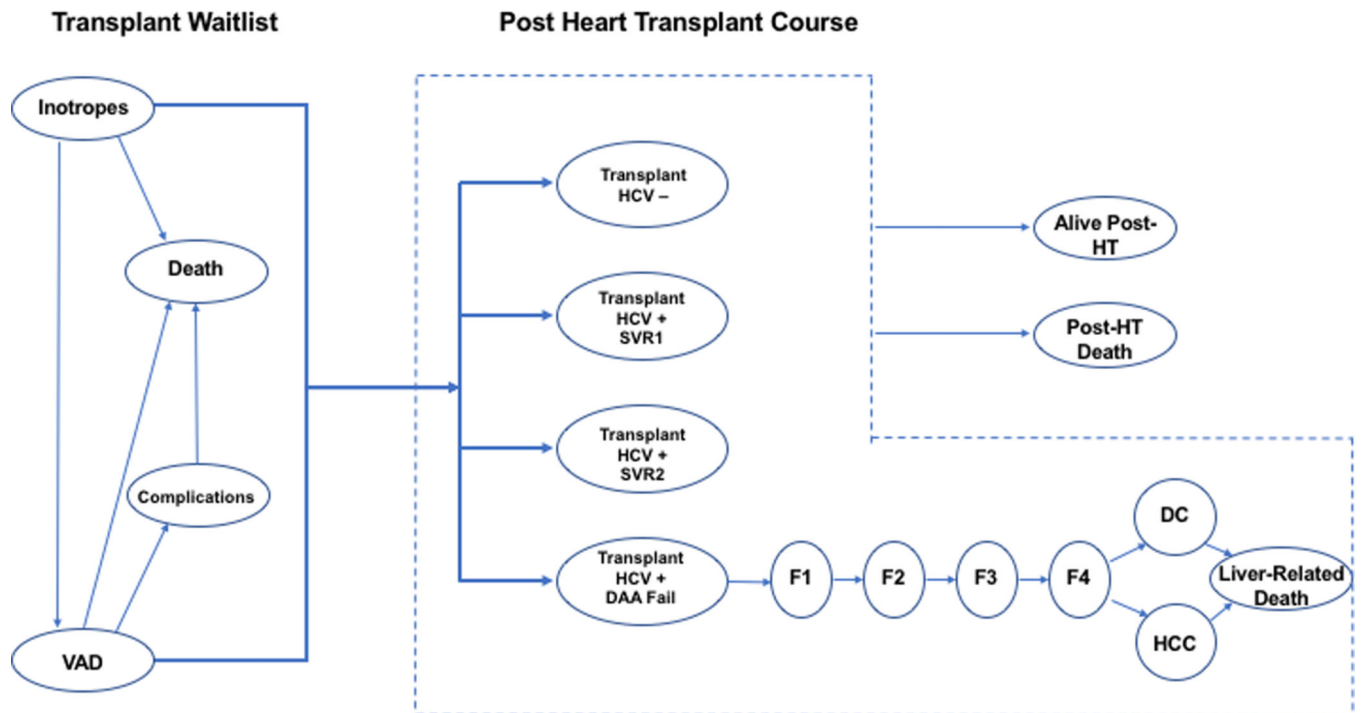


Figure 1. Model schematic showing the flow of patient pre- and post-heart transplant. The model simulates cohorts on inotrope dependent therapy (IDT) and with ventricular assist devices (VAD) in two scenarios: (1) accept HIV-viremic or HCV-negative heart, and (2) accept only HCV-negative heart. Patients willing to accept any heart had a higher likelihood of receiving a heart transplant (HT). Patients receiving HCV-viremic hearts were treated with 12 weeks of DAAs. Patients could either achieve SVR after one course of DAA (SVR1), achieve SVR after a second course of DAA (SVR2) or fail both courses of therapy. If patients failed the second course of DAAs, they developed chronic HCV infection and progressed to liver fibrosis (METAVIR fibrosis stages F1-F4), decompensated cirrhosis (DC), hepatocellular carcinoma (HCC), and liver-related mortality.

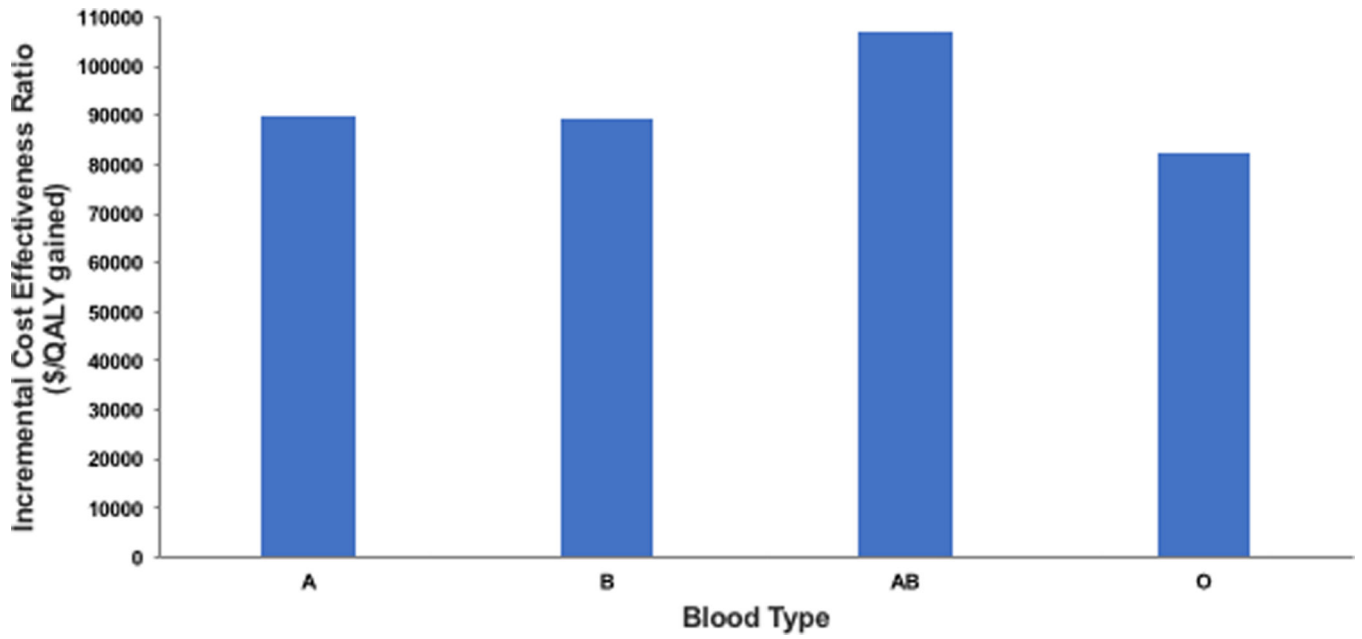


Figure 2. Incremental cost-effectiveness ratios for cohorts accepting any heart (HCV-viremic or negative only HCV-negative hearts, by blood type (A, B, AB, or O).

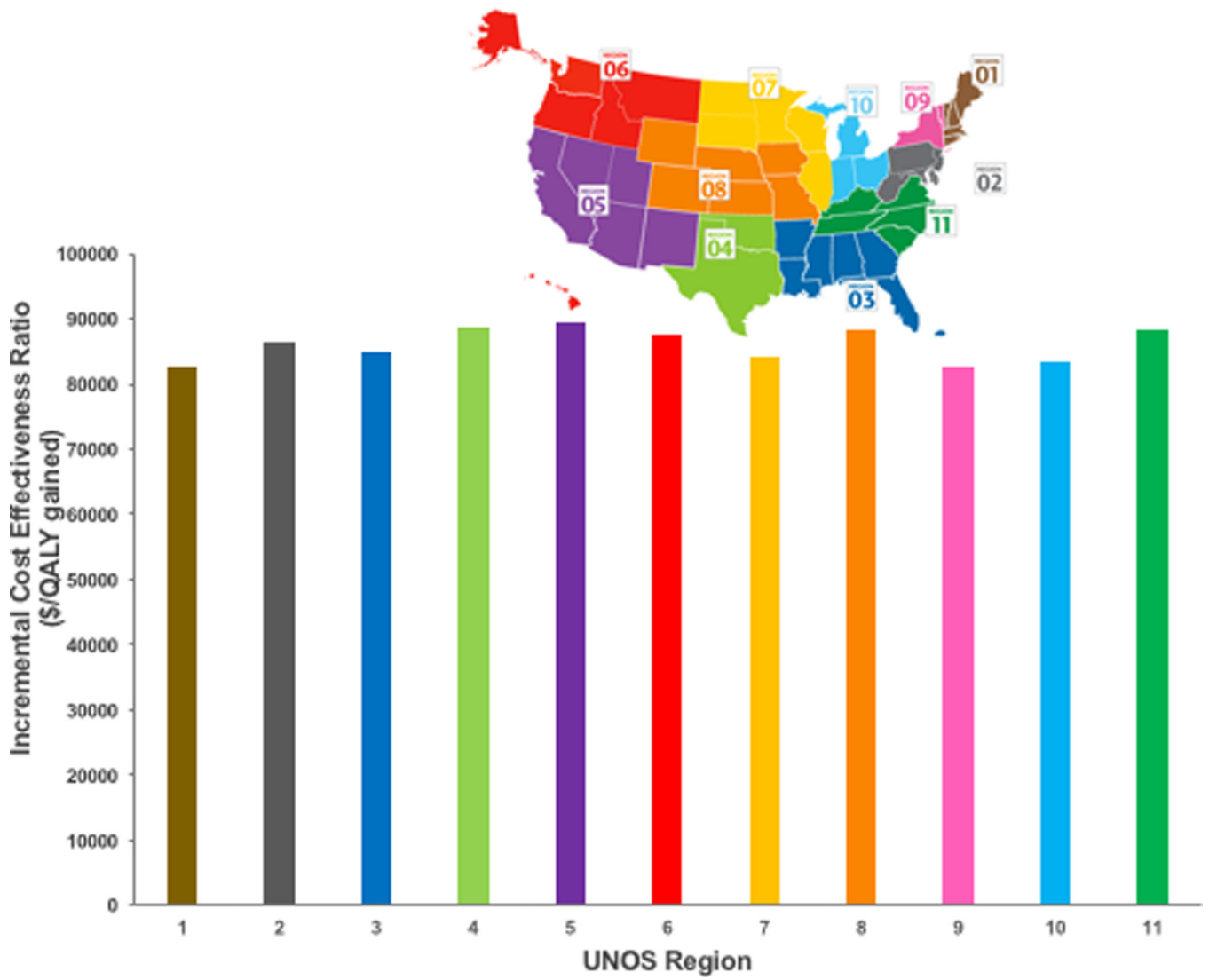


Figure 3. Incremental cost-effectiveness ratios for cohorts accepting any heart (HCV-viremic or negative) compared to accepting only HCV-negative hearts, by transplantation wait list times across UNOS Regions Subpanel shows the corresponding region associated with UNOS Region number.

Table 1.

Model parameterization for the base-case and probabilistic sensitivity analysis.

Parameter		Base	Sample distribution for probabilistic sensitivity analysis	References
HCV-viremic organ prevalence among heart donors (%)		4.9%	Uniform (min=2.5, max= 7.3)	
Monthly Transition Probabilities				
Inotropes	VAD	0.0084	Sampled annual rate uniformly +/- 50% (min=0.051, max=0.152)	27,28
	Transplant (HCV Negative organ)	0.2330	Sampled WL time in months uniformly +/- 50% (min=1.9; max=5.7) and converted to TP	3
	Death	0.0740	Sampled annual rate uniformly +/- 50% (min=0.461; max=1.384)	33,34
VAD	Complications/Delist	0.0760	Sampled annual rate uniformly +/- 50% (min=0.474; max=1.423)	31,33
	Transplant (HCV Negative organ)	0.1123	Sampled WL time in months uniformly +/- 50% (min=4.2, max=12.6) and converted to TP	3
	Death	0.009	Sampled annual rate uniformly +/- 50% (min=0.054, max=0.163)	31,33,86
Complications	Death	0.64	Sampled annual rate uniformly +/- 50% (min=6.13, max=18.390)	33
Transplant Yr1	Death	0.0076	Sampled annual rate uniformly +/- 50% (min=0.077, max=0.096)	3,87
Transplant Yr2+	Death	0.0020	Sampled annual rate uniformly +/- 50% (min=0.023, max=0.025)	3,87
F0	F1	0.0109	Sampled annual rate from Beta ($\alpha=446.989$, $\beta=2906.45$), converted to monthly TP	36,42
F1	F2	0.0074	Sampled annual rate from Beta ($\alpha=394.323$, $\beta=3971.41$), converted to monthly TP	36,42
F2	F3	0.0109	Sampled annual rate from Beta ($\alpha=2.852$, $\beta=44.384$), converted to monthly TP	36,42
F3	F4	0.0105	Sampled annual rate from Beta ($\alpha=666.175$, $\beta=4584.86$), converted to monthly TP	36,42
CC	DC	0.0055	Sampled annual rate from Beta ($\alpha=33.587$, $\beta=487.785$), converted to monthly TP	36,39
CC	HCC	0.0017	Sampled annual rate from Beta ($\alpha=12.959$, $\beta=617.161$), converted to monthly TP	36,37
DC	Liver Death	0.0151	Sampled annual rate from Beta ($\alpha=8.5332$, $\beta=26.132$), converted to monthly TP	38,39
DC	HCC	0.0058	Sampled annual rate from Beta ($\alpha=18.953$, $\beta=263.478$), converted to monthly TP	39-41
HCC	Liver Death	0.0742	Sampled annual rate from Beta ($\alpha=7.597$, $\beta=6.016$), converted to monthly TP	38,39,50,52
Health State Utilities				
Inotropes		0.53		33,50,52
VAD		0.72		31,33,52,55
Complications		0.63		33,62
Heart Transplant		0.76		33,52
F0-F2		0.53		64,65,88

Parameter	Base	Sample distribution for probabilistic sensitivity analysis	References
F3-F4	0.42		64,65,88
DC	0.21		64,65,88
HCC	0.21		64,65,88
Costs (2018 USD\$)			
Inotrope therapy (monthly)	5668	Uniform +/- 50% point value	33,50,51
VAD Index Hospitalization	307593	Uniform +/- 50% point value	33,44,45,49,53,55,58
Post-VAD care (monthly)	14136	Uniform +/- 50% point value	33,47,48,55,56
VAD Complication (one-time cost)	21800	Uniform +/- 50% point value	33,45,46,53,54
Heart Transplant Index Hospitalization	251232	Uniform +/- 50% point value	33,49
Post-Transplant Care (monthly)	13337	Uniform +/- 50% point value	33,48,56
DAA 12-week course	39600	Uniform +/- 50% point value	19,89
Chronic HCV F0-F2 (monthly)	252	Uniform +/- 50% point value	59,61
Chronic HCV F3 (monthly)	453	Uniform +/- 50% point value	59,61
Compensated Cirrhosis/F4 (monthly)	854	Uniform +/- 50% point value	36
Decompensated Cirrhosis (monthly)	2906	Uniform +/- 50% point value	36,60
HCC (monthly)	4637	Uniform +/- 50% point value	36,60

VAD=ventricular assist device; METAVIR F0-F4; CC=compensated cirrhosis; DC=decompensated cirrhosis; HCC=hepatocellular carcinoma

Table 2.

Cost effectiveness analysis results for cohorts accepting any heart (HCV-viremic or negative) compared to accepting only HCV-negative hearts.

Strategy	Cost (2018 \$USD)	Incremental Cost	Quality-adjusted life-years (QALYs)	Incremental QALYs	ICER (\$/QALY gained)
Accept HCV Negative Heart Only	\$589,467		6.6		
Accept any heart (HCV RNA positive or negative)	\$598,885	\$9,418	6.7	0.11	\$85,602

ICER: Incremental cost-effectiveness ratio