



2022 SCSG LIVER SYMPOSIUM

DECEMBER 17 - 18, 2022

THE RITZ CARLTON, LAGUNA NIGUEL

The background of the slide features a scenic coastal town built on a hillside overlooking the ocean. The town is densely packed with houses and buildings, and the foreground shows a cluster of tall palm trees. The water is a clear blue, and the sky is bright.

Demystifying the MELD Exception for HCC

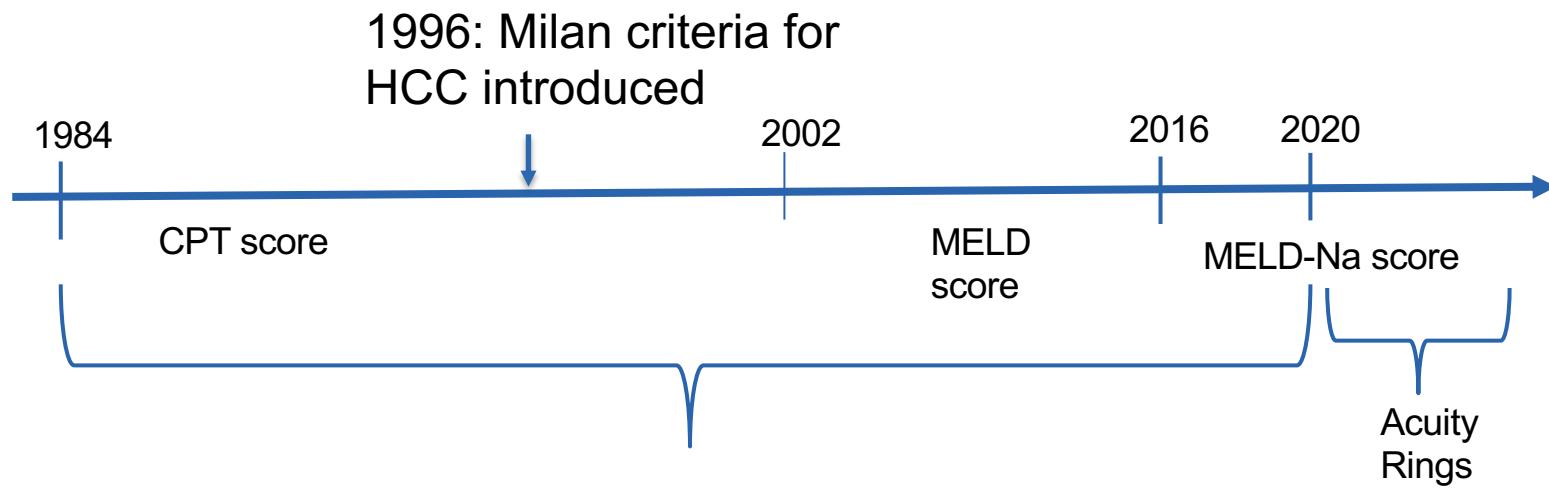
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December 18, 2022

Faculty Disclosure

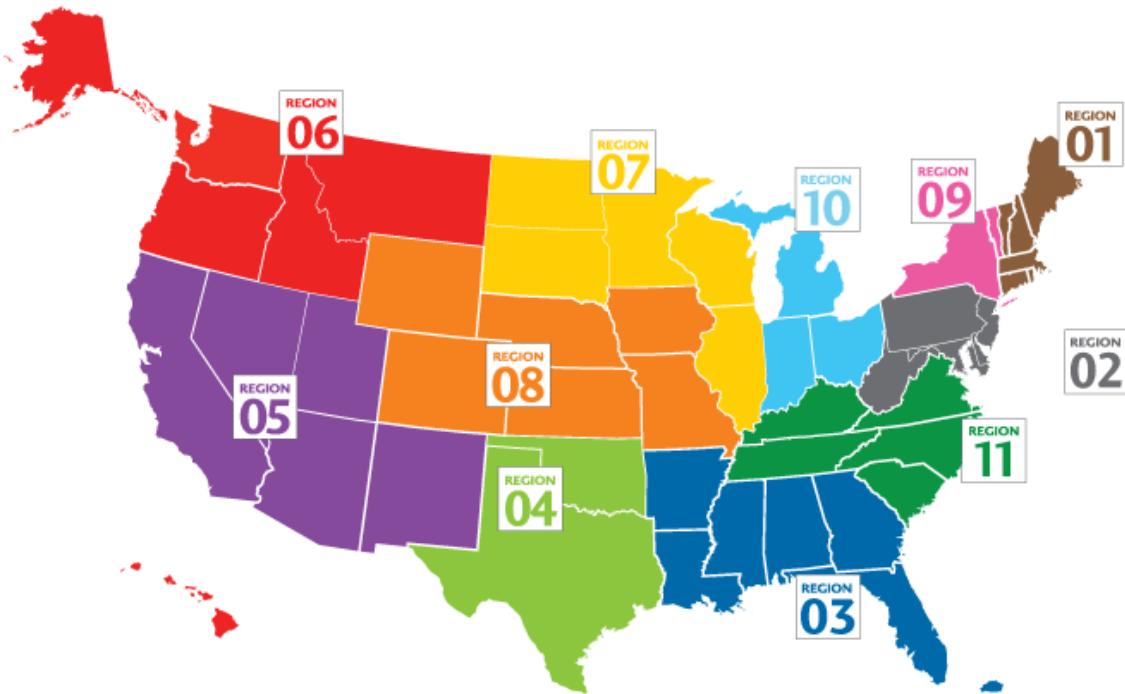
- Nothing to Disclose

Organ Allocation Timeline



Organs allocated in Donor regions and Donor Specific Areas

OPTN regions



Acuity Circles

150 & 250NM



Acuity Circle Organ Allocation

- Intended to lower the MMA_T across DSAs
- Acuity circles are concentric circles drawn around the donor hospital
- For Donation after brain death
 - Offers given first to highest severity
 - Status 1A and 1B
 - PELD/MELD ≥ 37
 - PELD/MELD 33-36
 - PELD/MELD 29-32
 - PELD/MELD 15-28
 - PELD/MELD <15
 - AC first offers organ to candidates within 150 nautical miles of the donor hospital
 - AC offers to candidates 150-250 nautical miles of the donor hospital
 - AC offers to candidates 250-500 nautical miles of the donor hospital

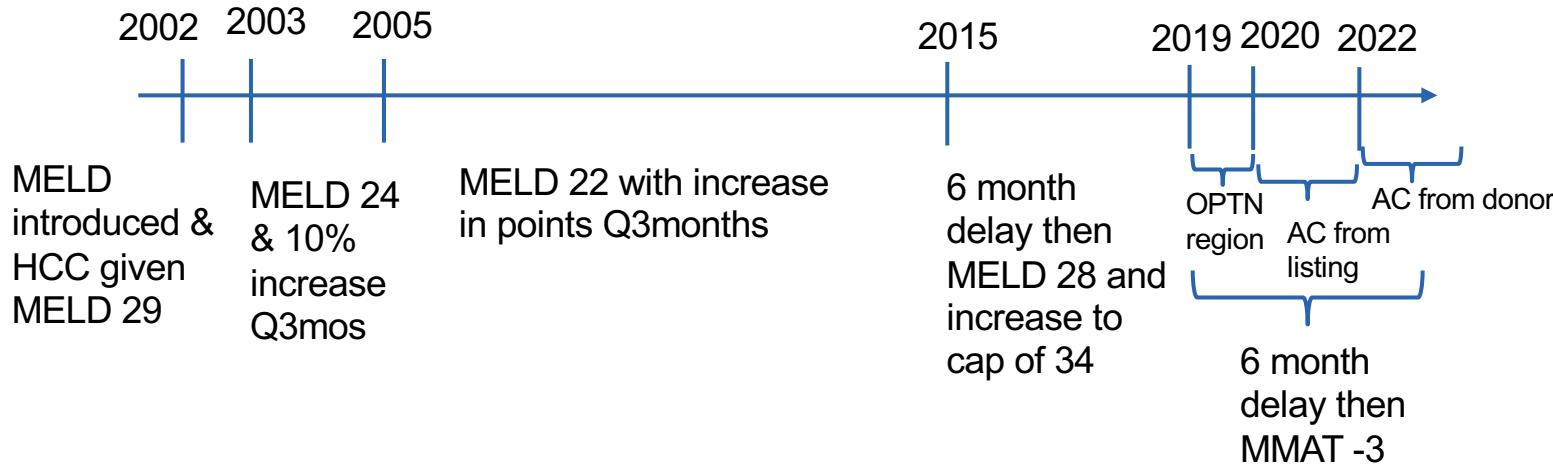
HCC Exception Policy

- During the CPT era of organ allocation, >45% of HCC patients on the transplant list did not receive an organ for up to 2 years
 - High mortality and wait list drop off due to HCC progression
- MELD introduced in 2002 with standard HCC exceptions
 - Exception was intended to equate the risk of tumor progression beyond stage 2 to death on the waitlist in a non-HCC patient over a similar time period
 - Stage 1 tumors ($\leq 2\text{cm}$) were given MELD 24 equating to 15% probability of progressing beyond stage 2 in 3 months
 - Stage 2 tumors were given a MELD 29 equating to a 30% probability of progressing beyond stage 2 at 3 months
 - After 3 months, each HCC patient was given a 10% increase in MELD score until they were transplanted, had disease progression or died

HCC Exception Policy

- In the first year of policy implementation the number of DDLT for HCC increased from 7% to 22
 - Wait time decreased from 2.3 years to 0.69 years
 - Policy now favored patients with HCC over those who did not have HCC
- April 2003, stage 1 HCC given a MELD exception of 20 and stage 2 HCC given a MELD of 24 with a 10% increase in score if patient remained on the list for >3 months
 - Decreased HCC transplants from 22% to 14%

HCC Exception Policy



HCC Exception Policy

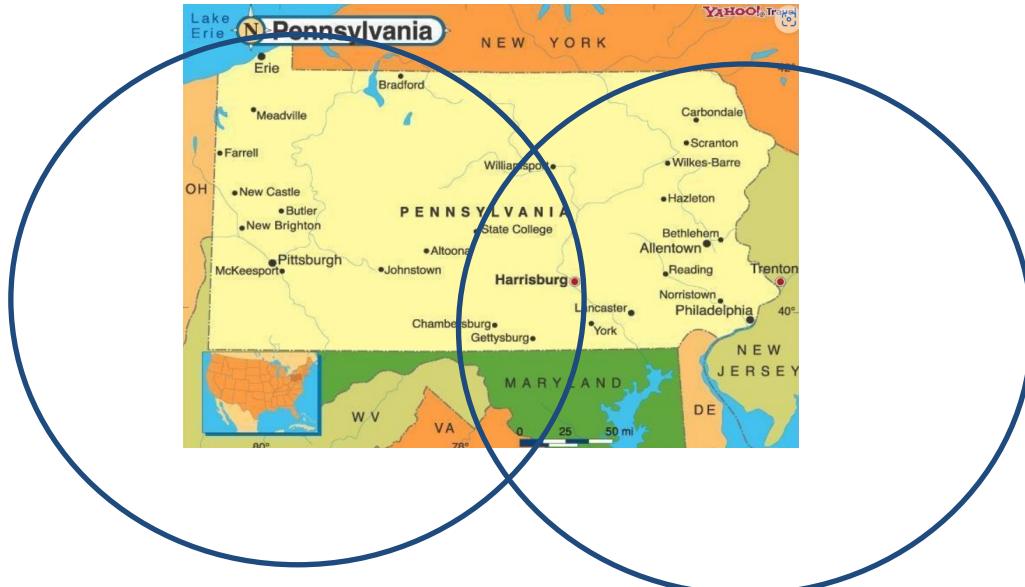
- Policy changed in June 2022
 - MMAt calculation now based on 150 NM radius surrounding each donor hospital
 - Previously calculated MMAt based on transplants performed within 250 NM
 - MMAt calculated based on cohort of recipients transplanted within 150 NM of the donor hospital over the prior 365 days.
 - If there are <2 transplant centers or <10 qualifying transplants performed within 150 NM, the circle size increases by 50 NM until one of the above criteria is met
 - DCD donors, living donor transplants, status 1a transplants or transplants done from donors >500 NM away are excluded
 - MMAt updated twice a year

HCC Exception Policy

- MMaT will apply to the exception score for any transplant candidate receiving offers from that donor hospital
- MELD exception candidates no longer have a single exception score relative to where their transplant program is registered
 - Score will fluctuate based on liver offers from donor hospitals

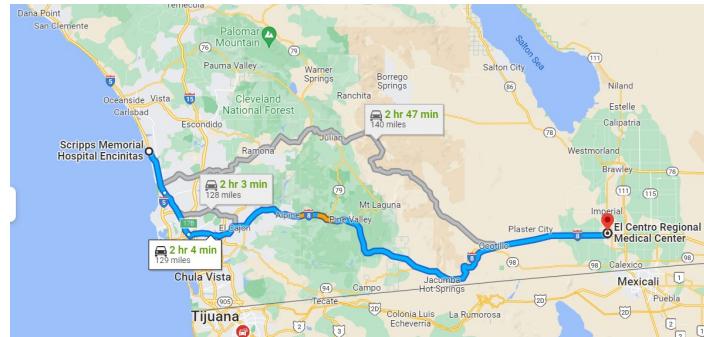
HCC Exception Policy

- Why?
 - To try and limit discrepancies in MELD exception scores between nearby centers
 - Pittsburgh MMaT 26
 - Philadelphia MMaT 30
 - Harrisburg is within 150 NM of both centers



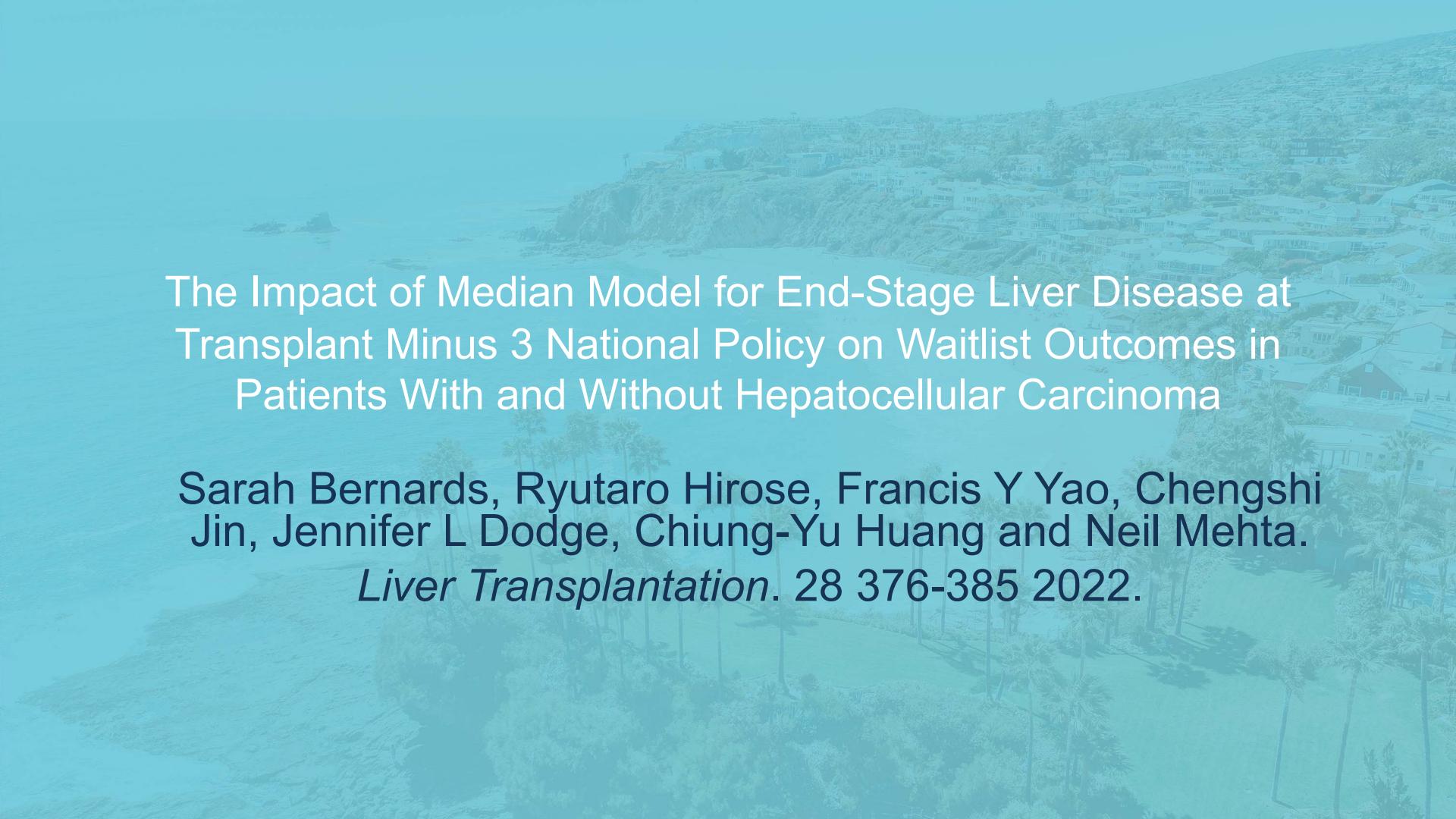
HCC Exception Policy

- Example
 - El Centro Regional Medical Center MMaT 31
 - Scripps Memorial Hospital Encinitas MMaT 35



HCC Exception Policy

- Example continued
 - Patient #1 listed at Scripps (MMaT 35) with an HCC MELD exception.
Blood group AB.
 - Patient #2 decompensated EtOH cirrhotic with a native MELD 29.
Blood group AB.
 - Donor identified in El Centro (MMaT 31)
 - Patient #1 MELD score is now 28, so patient #2 would get organ offer first
 - Donor identified at Scripps Memorial Encinitas (MMaT 35)
 - Patient #1 MELD score is now a 32, so patient #1 would get organ offer first

The background of the slide features a scenic landscape of a coastal town perched on a steep hillside. The town is densely packed with white buildings and houses, many with red roofs. The hillside is covered in green vegetation. In the foreground, there's a rocky coastline with some small rock formations in the water. The sky is clear and blue.

The Impact of Median Model for End-Stage Liver Disease at Transplant Minus 3 National Policy on Waitlist Outcomes in Patients With and Without Hepatocellular Carcinoma

Sarah Bernards, Ryutaro Hirose, Francis Y Yao, Chengshi Jin, Jennifer L Dodge, Chiung-Yu Huang and Neil Mehta.

Liver Transplantation. 28 376-385 2022.

Background

- Policy was previously to award 28 points after a 6 month wait and then increase MELD incrementally with a cap of 34
- Patients listed in UNOS regions with short wait times were significantly advantaged
- May 2019 a new policy was implemented
 - 6 month waiting period
 - Patient then awarded MMaT-3

Purpose

- To investigate the effect of MMAT -3 policy on waitlist outcomes including dropout and LT rates and predictors of waitlist dropout by wait region before and after policy change

Methods

- Retrospective cohort study of adults with and without HCC listed for liver transplant in the UNOS database
 - Excluded patients undergoing retransplantation or LDLT, listed status 1A or given a MELD exception for a reason other than HCC
 - Approximately 25,000 patients included
 - 3 cohorts
 - Pre-MMAT-3 cohort
 - 5/7/2017-5/18/2019
 - Post MMAT-3 cohort
 - 5/19/2019-3/7/2020
 - Post- acuity circles cohort – exploratory analysis
 - 3/8/2020-9/8/2020

Results

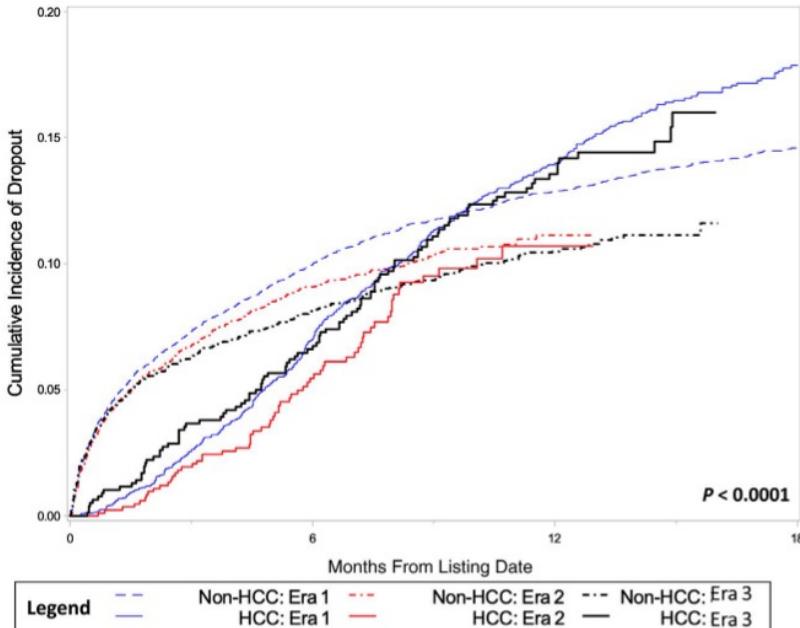


FIG. 1. Cumulative incidence of waitlist dropout for patients with and without HCC both before and after MMAT-3 and AC policy changes.

Results

Era, HCC Status, Wait Region	LT		Waitlist Dropout	
	Incidence per Person-Year (95% CI)	1-Year Cumulative Incidence (95% CI)	Incidence per Person-Year (95% CI)	1-Year Cumulative Incidence (95% CI)
Overall				
Era 1				
HCC	0.67 (0.64-0.71)	51.4% (49.4%-53.3%)	0.20 (0.18-0.21)	14.0% (12.7%-15.3%)
Non-HCC	1.12 (1.09-1.15)	52.3% (51.4%-53.2%)	0.27 (0.25-0.28)	12.9% (12.2%-13.5%)
Era 2				
HCC	0.72 (0.68-0.77)	47.4% (41.7%-52.8%)	0.20 (0.18-0.23)	10.7% (8.2%-13.6%)
Non-HCC	0.77 (0.74-0.79)	55.7% (54.0%-57.4%)	0.19 (0.18-0.20)	11.1% (10.2%-12.1%)
Era 3				
HCC	0.67 (0.60-0.74)	49.3% (45.5%-53.0%)	0.19 (0.16-0.23)	13.6% (11.2%-16.2%)
Non-HCC	1.50 (1.43-1.56)	60.1% (58.5%-61.7%)	0.26 (0.23-0.28)	10.5% (9.5%-11.5%)
Longer wait regions				
Era 1				
HCC	0.53 (0.49-0.56)	41.5% (39.1%-43.8%)	0.19 (0.17-0.21)	14.5% (13.0%-16.1%)
Non-HCC	0.94 (0.91-0.98)	45.9% (44.6%-47.1%)	0.29 (0.27-0.30)	14.6% (13.7%-15.4%)
Era 2				
HCC	0.64 (0.59-0.69)	42.7% (35.1%-50.1%)	0.21 (0.18-0.23)	10.6% (7.5%-14.3%)
Non-HCC	0.61 (0.59-0.64)	48.2% (46.1%-50.4%)	0.19 (0.18-0.21)	12.7% (11.4%-14.2%)
Era 3				
HCC	0.53 (0.46-0.60)	41.5% (36.9%-46.1%)	0.19 (0.15-0.23)	13.8% (10.8%-17.1%)
Non-HCC	1.25 (1.18-1.32)	54.6% (52.5%-56.7%)	0.27 (0.24-0.31)	12.0% (10.7%-13.5%)
Shorter wait regions				
Era 1				
HCC	1.09 (1.01-1.17)	73.0% (69.8%-75.9%)	0.21 (0.18-0.25)	12.8% (10.7%-15.1%)
Non-HCC	1.40 (1.35-1.45)	61.2% (59.8%-62.7%)	0.24 (0.22-0.26)	10.5% (9.6%-11.4%)
Era 2				
HCC	0.95 (0.85-1.06)	55.4% (47.0%-63.0%)	0.19 (0.14-0.23)	10.9% (7.0%-15.8%)
Non-HCC	1.08 (1.03-1.13)	67.3% (64.5%-69.9%)	0.19 (0.17-0.21)	8.6% (7.5%-9.9%)
Era 3				
HCC	0.98 (0.83-1.13)	62.9% (56.5%-68.6%)	0.20 (0.13-0.27)	13.3% (9.5%-17.7%)
Non-HCC	1.95 (1.83-2.07)	68.5% (65.9%-70.9%)	0.23 (0.19-0.27)	8.1% (6.7%-9.6%)

Results

TABLE 3. Multivariate Time-Dependent Proportional Hazards Model for Waitlist Dropout Attributed to Death or Delisting

Predictor	CHR (95% CI)	P Value
HCC (versus non-HCC)	1.21 (1.07-1.37)	0.002
Postpolicy era (versus prepolicy era)	0.91 (0.83-0.99)	0.03
HCC* postpolicy era	<i>1.30 (1.09-1.55)</i>	<i>0.004</i>
Shorter wait region (versus longer)	1.01 (0.93-1.09)	0.89
Age at listing (per decade)	1.55 (1.49-1.62)	<0.001
Male sex (versus female)	0.96 (0.90-1.04)	0.33
African American (versus Caucasian)	1.26 (1.08-1.46)	0.004
Hispanic (versus Caucasian)	1.20 (1.09-1.32)	<0.001
MELD-Na score at listing		
16-20 (versus <15)	1.43 (1.28-1.60)	<0.001
21-25 (versus <15)	2.26 (1.99-2.57)	<0.001
>25 (versus <15)	8.55 (7.54-9.70)	<0.001
Child-Turcotte-Pugh class B at listing (versus A)	1.14 (1.00-1.29)	0.051
Child-Turcotte-Pugh class C at listing (versus A)	1.85 (1.60-2.20)	<0.001

*Interaction between etiology and policy era specifically reflecting: (HR of HCC versus non-HCC in postpolicy era)/(HR of HCC versus non-HCC in prepolicy era) (in italics).

Results

TABLE 4. Multivariate Time-Dependent Cause-Specific Proportional Hazards Model for Waitlist Dropout Attributed to Death or Delisting Among Patients With HCC

Predictor	CHR (95% CI)	P Value
Postpolicy era (versus prepolicy era)	1.00 (0.79-1.27)	0.98
Shorter wait region (versus longer)	1.18 (0.97-1.43)	0.10
Age at listing (per decade)	1.34 (1.17-1.54)	<0.001
Male sex (versus female)	1.50 (1.22-1.84)	<0.001
MELD-Na score at listing		
16-20 (versus <15)	1.55 (1.17-2.05)	0.002
21-25 (versus <15)	2.24 (1.46-3.42)	<0.001
>25 (versus <15)	3.30 (1.68-6.48)	<0.001
Child-Turcotte-Pugh class B at listing (versus A)	1.51 (1.26-1.81)	<0.001
Child-Turcotte-Pugh class C at listing (versus A)	2.26 (1.66-3.09)	<0.001
AFP at listing (ng/mL)		
21-100 (versus <20)	2.20 (1.80-2.70)	<0.001
>100 (versus <20)	2.84 (2.25-3.59)	<0.001
Listing total tumor diameter (per cm)	1.14 (0.97-1.34)	0.12

Conclusions

- Policy change of a 6 month wait in 2015 was shown to reduce differences in wait list dropout between HCC pts and those without nationally, but regional differences remained
- Probability of waitlist dropout decreased after the MMAT-3 policy change
 - 10% decrease dropout in candidates without HCC in a competing events regression analysis
- Post policy change, waitlist dropouts are nearly identical in patients with and without HCC
- Cumulative incidence analysis showed a prepolicy probability of transplant within 1 year of 41.5% in long wait regions and 73% in shorter wait regions. After the policy, the probabilities are 42.7% and 55.4% showing the gap is closing

Conclusions

- Post policy change, patients with HCC were 57% more likely to experience wait list dropout as compared with patients without HCC
 - Has the pendulum swung too far?
 - Should exception points take into account severity of underlying liver disease
 - HCC and MELD-Na 21-25 are 2x more likely to dropout than those with HCC and MELD-Na<15