Association Between Distance to a Radiology Center and HCC Surveillance Among Patients with Cirrhosis in Florida

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Introduction

Hepatocellular carcinoma (HCC) is a leading cause of morbidity and mortality in patients with cirrhosis, and HCC survival is directly correlated with stage at diagnosis. Current guidelines recommend HCC surveillance with an abdominal ultrasound every 6 months, but unfortunately many patients do not meet this threshold.[1]

Objective

Our aim was to determine whether distance to a radiology center, measured in travel time, was associated with HCC surveillance rates. A secondary aim was to determine if liver disease etiology, race, and severity of disease were associated with HCC surveillance rates.

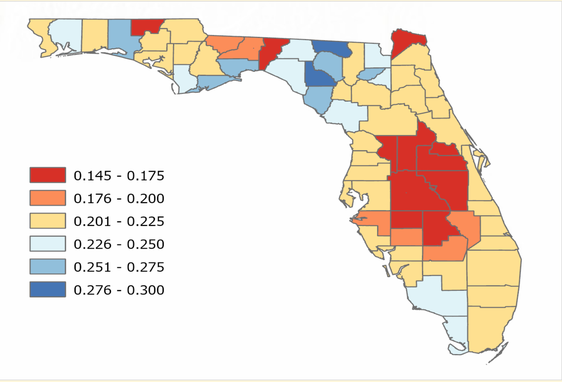
Methods

We included data on adult patients with cirrhosis within the OneFlorida Clinical Research Consortium from October 1, 2015- December 31, 2019. The primary outcome was a continuous measure of the percentage of time up to date with HCC surveillance (PTUDS) based on abdominal ultrasound (US), triple phase CT, and/or MRI with contrast. Travel time was calculated using ArcGIS geomodelling software as the estimated minimum travel time between the geographic centroid of patient's zip code and the nearest American College of Radiology-accredited center for US, CT, and/or MRI. Linear regression models were fit with PTUDS as the outcome; all covariates with a $p<0.05$ were included in the final multivariable model.

Results

Among 25,299 patients with cirrhosis (median follow-up=4.1 years), the median PTUDS was 10.0% (interquartile range 0-29.9%). Variables found to have a statistically significant association with PTUDS are displayed in Table 1. Travel time, hepatic encephalopathy at baseline, and ascites at baseline were associated with increased PTUDS. Patients with alcohol-related liver disease, nonalcoholic steatohepatitis, and cryptogenic cirrhosis had lower PTUDS compared with patients with HCV.

	Variable	Beta Coefficient, 95% CI	P-Value
	Travel Time	**0.0016 (0.0012-0.0020)**	**< 0.001**
Liver Disease Etiology	Hepatitis C Virus	Reference	-
	Hepatitis B Virus	**0.0246 (0.0019-0.0473)**	**0.034**
	Wilson's Disease	0.0137 (-0.571-0.0845)	0.704
	Hemochromatosis	0.0067 (-0.0220-0.0354)	0.647
	a1-Antitrypsin Deficiency	**0.0673 (0.0200-0.1145)**	**0.005**
	Alcohol-Related Liver Disease	**-0.0720 (-0.0801- -0.0639)**	**< 0.001**
	Primary Biliary Cholangitis	-0.0037 (-0.0261- 0.0186)	0.745
	Autoimmune Hepatitis	-0.0193 (-0.0406- 0.0019)	0.075
	Primary Sclerosing Cholangitis	0.0123 (-0.0462- 0.0708)	0.680
	Nonalcoholic Steatohepatitis	**-0.0835 (-0.0917- -0.0752)**	**< 0.001**
	Unknown/Cryptogenic	**-0.01566 (-0.1664- -0.1467)**	**< 0.001**
Race	White/Caucasian	Reference	-
	American Indian/Alaskan	-0.0207 (-0.0871- 0.0457)	0.541
	Asian	**0.0531 (0.0258- 0.0805)**	**< 0.001**
	Black	**0.0171 (0.0082- 0.0260)**	**< 0.001**
	Native Hawaiian/Pacific Islander	-0.0075 (-0.1109- 0.0959)	0.887
	Multiple Race	**-0.0474 (-0.0781- -0.0168)**	**0.002**
	Refuse to answer	**0.0904 (0.0212- 0.1596)**	**0.010**
	No information	**0.0575 (0.0283- 0.0866)**	**< 0.001**
	Other	0.0050 (-0.0048- 0.0148)	0.318
	Unknown	**-0.0591 (-0.0837- -0.0346)**	**< 0.001**
Disease Severity	**Hepatic Encephalopathy at Baseline**	**0.0431 (0.0328- 0.0534)**	**< 0.001**
	Ascites at Baseline	**0.0638 (0.0551- 0.0724)**	**< 0.001**



Discussion

Travel time to the nearest radiology center is not associated with lower HCC surveillance rates while race, etiology of liver disease, and disease severity do appear to variably influence surveillance. By establishing factors associated with currently suboptimal surveillance rates, we can create targeted interventions to improve surveillance and, ultimately, patient outcomes.

References

1. Yang JD, Mannalithara A, Piscitello AJ, et al. Impact of surveillance for hepatocellular carcinoma on survival in patients with compensated cirrhosis. *Hepatology.* 2018;68(1):78-88.