CLINICAL RESEARCH STUDY

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Racial, Social, and Clinical Determinants of Hepatocellular Carcinoma Surveillance

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ABSTRACT

OBJECTIVES: Less than 1 in 5 patients receive hepatocellular carcinoma surveillance; however, most studies were performed in racially and socioeconomically homogenous populations, and few used guideline-based definitions for surveillance. The study objective was to characterize guideline-consistent hepatocellular carcinoma surveillance rates and identify determinants of hepatocellular carcinoma surveillance among a racially and socioeconomically diverse cohort of cirrhotic patients.

METHODS: We retrospectively characterized hepatocellular carcinoma surveillance among cirrhotic patients followed between July 2008 and July 2011 at an urban safety-net hospital. Inconsistent surveillance was defined as at least 1 screening ultrasound during the 3-year period, annual surveillance was defined as screening ultrasounds every 12 months, and biannual surveillance was defined as screening ultrasounds every 6 months. Univariate and multivariate analyses were conducted to identify predictors of surveillance.

RESULTS: Of 904 cirrhotic patients, 603 (67%) underwent inconsistent surveillance. Failure to recognize cirrhosis was a significant barrier to surveillance use ($P < .001$). Inconsistent surveillance was associated with insurance status (odds ratio [OR], 1.43; 95% confidence interval [CI], 1.03-1.98), multiple primary care visits per year (OR, 2.63; 95% CI, 1.86-3.71), multiple hepatology visits per year (OR, 3.75; 95% CI, 2.64-5.33), African American race (OR, 0.61; 95% CI, 0.42-0.99), nonalcoholic steatohepatitis cause (OR, 0.60; 95% CI, 0.37-0.98), and extrahepatic cancer (OR, 0.43; 95% CI, 0.24-0.77). Only 98 (13.4%) of 730 patients underwent annual surveillance, and only 13 (1.7%) of 786 had biannual surveillance.

CONCLUSIONS: Only 13% of patients with cirrhosis receive annual surveillance, and less than 2% of patients receive biannual surveillance. There are racial and socioeconomic disparities, with lower rates of hepatocellular carcinoma surveillance among African Americans and underinsured patients.

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KEYWORDS: Cirrhosis; Disparities; Liver cancer; Surveillance; Underuse

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Hepatocellular carcinoma is the third leading cause of cancer-related death worldwide and the leading cause of death in patients with cirrhosis. Furthermore, its incidence is anticipated to continue increasing over the next 2 decades.[1] Prognosis for patients with hepatocellular carcinoma depends on the tumor stage, with curative options available only for patients diagnosed at an early stage.[2,3] Patients with early hepatocellular carcinoma achieve

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5-year survival rates of approximately 70% with resection and liver transplantation,[4] whereas patients with advanced hepatocellular carcinoma have a median survival of less than 1 year.[5]

The American Association for the Study of Liver Diseases and National Comprehensive Cancer Network recommend hepatocellular carcinoma surveillance at 6-month intervals in patients with cirrhosis.[6] Despite being efficacious and standard of care in patients with cirrhosis,[7,8] hepatocellular carcinoma surveillance has not been adopted into clinical practice. Whereas colon and breast cancer screening rates are greater than 60%, less than 20% of patients with cirrhosis undergo hepatocellular carcinoma surveillance.[9-11] However, a systematic review found most studies used operational definitions for hepatocellular carcinoma surveillance, for example, 1 ultrasound or alpha-fetoprotein in a 2-year period, and few reported guideline-adherent definitions.[11]

CLINICAL SIGNIFICANCE

- Less than 5% of patients with cirrhosis undergo guideline-consistent biannual surveillance for hepatocellular carcinoma.
- There are racial and socioeconomic disparities in hepatocellular carcinoma surveillance use, with lower surveillance rates among African Americans and underinsured patients.
- Receipt of hepatology subspecialty care is associated with significantly higher hepatocellular carcinoma surveillance rates.
- Potential exceptions to care, such as significant comorbid illnesses, may in part explain hepatocellular carcinoma surveillance underuse.

Hepatocellular carcinoma disproportionately affects socioeconomically disadvantaged populations, with higher age-specific rates and worse survival among racial/ethnic minorities and patients of low socioeconomic status than their counterparts.[12-14] Reasons for differences in survival are likely multifactorial, involving both medical and social factors. Although disparities in use rates have been well documented for other cancer screening modalities, such as mammography and colonoscopy,[15-18] less is known about patient-level factors associated with hepatocellular carcinoma surveillance.[11,19] Past hepatocellular carcinoma studies have been conducted in highly uniform populations, with most patients being male, white, and insured.[11] The aims of our study were to: (1) characterize guideline-consistent hepatocellular carcinoma surveillance rates among a cohort of patients with cirrhosis; (2) characterize surveillance rates among those with recognized cirrhosis; and (3) identify patient-level determinants of hepatocellular carcinoma surveillance among a racially and socioeconomically diverse cohort of patients with cirrhosis.

METHODS

Study Population

We conducted a retrospective cohort study of cirrhotic patients followed at Parkland Health and Hospital System, the safety-net system for Dallas County. Parkland is an integrated system with 11 primary care provider clinics in low-income neighborhoods, a multidisciplinary hepatology outpatient clinic, and a tertiary hospital—all sharing 1 electronic medical record system. Parkland provides inpatient and outpatient care for most cirrhotic patients and approximately 50% of hepatocellular carcinoma patients in Dallas.

For inclusion, patients were required to have 1 outpatient primary care provider clinic visit between July 2008 and July 2011, with continued follow-up through the last year of the study period (August 2010 to July 2011). Patients were identified by a set of International Classification of Diseases, 9th Revision codes, which are highly sensitive and specific for cirrhosis (456.0, 456.1, 456.2, 456.21, 567.23, 571.2, 571.5, 572.2, 572.3, and 572.4).[20] One author (AGS) adjudicated cases to confirm they met diagnostic criteria for cirrhosis, defined as Batts–Ludwig stage 4 fibrosis on liver biopsy or a cirrhotic-appearing liver on abdominal imaging with signs of portal hypertension (eg, varices, ascites, splenomegaly). This study was approved by the institutional review board of UT Southwestern Medical Center.

Data Collection

Patient demographics, clinical history, laboratory data, and imaging results were obtained through review of computerized medical records. Two authors (PK and MSN) extracted information using standardized forms, with a third investigator (AGS) available to resolve discrepancies.

Hepatocellular Carcinoma Surveillance Outcomes. Dates of all hepatocellular carcinoma surveillance testing with abdominal ultrasound between July 2008 and July 2011 were abstracted. We did not assess receipt of surveillance before July 2008 because the electronic medical record was not implemented at that time. Given that recognition of cirrhosis is an important mediator of surveillance underuse, we performed a subgroup analysis among patients who had recognized cirrhosis during the entire study period. Recognition of cirrhosis was defined as mention of pathologic, radiologic, or clinical signs of cirrhosis in providers' clinical notes.

We characterized patients on the basis of receipt of hepatocellular carcinoma surveillance, which was our primary outcome of interest, using 3 definitions. *Inconsistent surveillance* was defined as 1 abdominal ultrasound, for surveillance purposes, over the study period. Consistent *annual surveillance* was defined as at least 1 abdominal ultrasound