

Psychosocial Barriers and Their Impact on Hepatocellular Carcinoma Care in US Veterans: Tumor Board Model of Care

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Background: Psychosocial barriers, including low socioeconomic status, homelessness, alcohol and substance use disorders, and psychiatric disorders are prevalent in US veterans. Our study aims to identify the prevalence of psychosocial barriers in veterans diagnosed with hepatocellular carcinoma (HCC), and their impact on receipt of cancer care.

Methods: A retrospective cohort study was performed of all veterans diagnosed with HCC at the William S. Middleton Memorial Veterans' Hospital in Madison, Wisconsin, whose tumor care was coordinated through a multidisciplinary tumor board. Outcomes included receipt of any HCC-specific therapy and overall survival.

Results: From January 1, 2007, through December 31, 2016, 149 veterans were diagnosed with HCC. Substance use dis-

orders were reported in 124 (83%) patients, psychiatric illness was documented in 55 (37%) patients, 23 (15%) patients had incomes below the poverty threshold, and 7 (5%) were experiencing homelessness. The mean (SD) distance traveled for care was 207.1 (277.9) km; travel and lodging assistance were accessed by 50 (34%) and 33 (22%) veterans, respectively. Seventy-one patients (48%) had HCC exceeding T2 stage at diagnosis. Curative treatment was offered to 78 (52%) patients, with 127 (85%) receiving any HCC-specific care. Median survival from diagnosis was 727 days (95% CI, 488-966).

Conclusions: Psychosocial barriers were common in our veteran cohort. Individualizing care, and coordination of travel and lodging, assisted in enabling high rates of receipt of HCC-specific therapy and improving patient survival.

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Fed Pract. 2022;39(suppl 2).
Published online May 13.
doi:10.12788/tp.0272

Hepatocellular carcinoma (HCC) remains a major global health problem and is the third leading cause of cancer-related mortality worldwide.¹ Management of HCC is complex; as it largely occurs in the background of chronic liver disease, its management must simultaneously address challenges related to the patient's tumor burden, as well as their underlying liver dysfunction and performance status. HCC is universally fatal without treatment, with a 5-year survival < 10%.² However, if detected early HCC is potentially curable, with treatments such as hepatic resection, ablation, and/or liver transplantation, which are associated with 5-year survival rates as high as 70%.² HCC-specific palliative treatments, including intra-arterial therapies (eg, trans-arterial chemoembolization, radioembolization) and systemic chemotherapy, have also been shown to prolong survival in patients with advanced HCC. Therefore, a key driver of patient survival is receipt of HCC-specific therapy.

There is rising incidence and mortality related to HCC in the US veteran population, largely attributed to acquisition of chronic hepatitis C virus (HCV) infection decades prior.³ There is also a high prevalence of psychosocial barriers in this population, such as low socioeconomic status, homelessness, alcohol and substance use disorders, and psychiatric disorders which can neg-

atively influence receipt of medical treatment, including cancer care.^{4,5} Given the complexity of managing HCC, as well as the plethora of potential treatment options available, it is widely accepted that a multidisciplinary team approach, such as the multidisciplinary tumor board (MDTB) provides optimal care to patients with HCC.^{2,6} The aim of the present study was to identify in a population of veterans diagnosed with HCC the prevalence of psychosocial barriers to care and assess their impact and the role of an MDTB on receipt of HCC-specific care.

METHODS

In June 2007, a joint institutional MDTB was established for patients with primary liver tumors receiving care at the William S. Middleton Memorial Veterans' Hospital (WSMNVH) in Madison, Wisconsin. As we have described elsewhere, individual cases with their corresponding imaging studies were reviewed at a weekly conference attended by transplant hepatologists, medical oncologists, hepatobiliary and transplant surgeons, pathologists, diagnostic and interventional radiologists, and nurse coordinators.⁶ Potential therapies offered included surgical resection, liver transplantation (LT), thermal ablation, intra-arterial therapies (chemo and/or radioembolization), systemic chemotherapy,

stereotactic radiation, and best supportive care. Decisions regarding the appropriate treatment modality were made based on patient factors, review of their cross-sectional imaging studies and/or histopathology, and context of their underlying liver dysfunction. The tumor board discussion was summarized in meeting minutes as well as tumor board encounters recorded in each patient's health record. Although patients with benign tumors were presented at the MDTB, only patients with a diagnosis of HCC were included in this study.

A database analysis was conducted of all veteran patients with HCC managed through the WSMMVH MDTB, since its inception up to December 31, 2016, with follow-up until December 31, 2018. Data for analysis included demographics, laboratory parameters at time of diagnosis and treatment, imaging findings, histopathology and/or surgical pathology, treatment rendered, and follow-up information. The primary outcome measured in this study included receipt of any therapy and secondarily, patient survival.

Discrete variables were analyzed with χ^2 statistics or Fisher exact test and continuous variables with the student *t* test. Multivariable analyses were carried out with logistic regression. Variables with a *P* < .05 were considered statistically significant. Analyses were carried out using IBM SPSS v24.0.

As a quality-improvement initiative for the care and management of veterans with HCC, this study was determined to be exempt from review by the WSMMVH and University of Wisconsin School of Medicine and Public Health Institutional Review Board.

RESULTS

From January 1, 2007, through December 31, 2016, 149 patients with HCC were managed through the MDTB. Baseline demographic data, Model for End-stage Liver Disease (MELD) score and Child-Turcotte-Pugh class, and baseline HCC characteristics of the cohort are shown in Tables 1 and 2.

There was a high prevalence of psychosocial barriers in our study cohort, including alcohol or substance use disorder, mental illness diagnosis, and low socioeconomic status (Table 3). The mean distance traveled to WSMMVH for HCC-specific care was 206 km. Fifty patients in the cohort utilized travel assistance and 33 patients accessed lodging assistance.

TABLE 1 Baseline Demographics (N = 149)

Variables	Results
Age, mean (SD), y	64 (8)
Sex ratio (male:female)	148:1
Race, No. (%)	
White	131 (88)
African American	8 (5)
Hawaiian	2 (1)
Native American	2 (1)
Etiology of chronic liver disease, No. (%)	
ALD	26 (17)
HCV	36 (24)
ALD and HCV	57 (38)
Nonalcoholic fatty liver disease	23 (15)
Other	7 (5)

Abbreviations: ALD, alcohol-associated liver disease; HCV, hepatitis C viral infection.

TABLE 2 Baseline Clinical and Hepatocellular Carcinoma Characteristics (N = 149)

Variables	Results
Total bilirubin, mean (SD), mg/dl	1.6 (2.7)
Model for End-stage Liver Disease score, mean (SD)	10.9 (5.4)
Child-Turcotte-Pugh class, No. (%)	
A	111 (74)
B	29 (19)
C	8 (5)
Serum α -fetoprotein, median (range), ng/mL	13.6 (1.3-110,955.0)
T2 tumor stage, No. (%)	78 (52)

HCC Treatments

There was a high rate of receipt of treatment in our study cohort with 127 (85%) patients receiving at least one HCC-specific therapy. Care was individualized and coordinated through our institutional MDTB, with both curative and palliative treatment modalities utilized (Table 4).

Curative treatment, which includes LT, ablation, or resection, was offered to 78 (52%) patients who were within T2 stage. Of these 78 patients who were potential candidates for LT as a curative treatment for HCC, 31 were not deemed suitable transplant candidates. Psychosocial barriers precluded consideration for LT in 7 of the 31 patients due to active substance use, homelessness in 1 patient, and severe mental illness in 3 patients. Medical comorbidities, advanced patient age, and patient preference accounted for the remainder.

TABLE 3 Baseline Psychosocial Characteristics

Variables	Results
Alcohol use disorder, No. (%)	98 (66)
Polysubstance use disorder, No. (%)	26 (17)
Mental health diagnoses, No. (%)	
Any	55 (37)
Posttraumatic stress disorder	13 (9)
Anxiety	15 (10)
Major depressive disorder	32 (21)
Other	10 (7)
Multiple	23 (15)
Homelessness, No. (%)	7 (5)
Income below poverty threshold, No. (%)	23 (15)
Private health insurance coverage, No. (%)	44 (30)
Service connection, mean (SD)	22 (35)
Medicare eligibility, No. (%)	73 (49)
Distance traveled to receive care, mean (SD), km	206 (206)
Travel assistance	50 (34)
Lodging assistance	33 (22)

TABLE 4 Hepatocellular Carcinoma Treatment

Treatments	No. (%)
Any	127 (85)
Curative (includes ablation, LT and/or resection)	78 (52)
Thermal Ablation (with or without LT)	65 (44)
Transarterial chemoembolization	56 (38)
Radioembolization	24 (16)
Hepatic resection	11 (7)
LT	21 (14)
Systemic chemotherapy	5 (3)
Other (SBRT, cryoablation)	5 (3)
Palliative/best supportive care	22 (15)

Abbreviations: LT, liver transplantation; SBRT, stereotactic body radiation therapy.

In a univariate analysis of the cohort of 149 patients, factors that decreased the likelihood of receipt of curative HCC therapy included T2 stage or higher at diagnosis and a diagnosis of depression, whereas provision for lodging was associated with increased likelihood of receiving HCC-specific care (Table 5). Other factors that influenced receipt of any treatment included

patient's MELD score, total bilirubin, and serum α -fetoprotein, a surrogate marker for tumor stage. In the multivariable analysis, predictors of receiving curative therapy included absence of substance use, within T2 stage of tumor, and Child-Turcotte-Pugh class A cirrhosis. The presence of psychosocial barriers apart from substance use did not predict a lower chance of receiving curative HCC therapy (including homelessness, distance traveled to center, mental health disorder, and low income).

Median survival was 727 (95% CI, 488-966) days from diagnosis. Survival from HCC diagnosis in study cohort was 72% at 1 year, 50% at 2 years, 39% at 3 years, and 36% at 5 years. Death occurred in 71 (48%) patients; HCC accounted for death in 52 (73%) patients, complications of end-stage liver disease in 13 (18%) patients, and other causes for the remainder of patients.

DISCUSSION

Increases in prevalence and mortality related to cirrhosis and HCC have been reported among the US veteran population.³ This is in large part attributable to the burden of chronic HCV infection in this population. As mirrored in the US population in general, we may be at a turning point regarding the gradual increase in prevalence in HCC.⁷ The prevalence of cirrhosis and viral-related HCC related to HCV infection will decline with availability of effective antiviral therapy. Alcoholic liver disease remains a main etiological factor for development of cirrhosis and HCC. Nonalcoholic fatty liver disease is becoming a more prevalent cause for development of cirrhosis, indication for liver transplantation, and development of HCC, and indeed may lead to HCC even in the absence of cirrhosis.⁸

HCC remains a challenging clinical problem.² As the vast majority of cases arise in the context of cirrhosis, management of HCC not only must address the cancer stage at diagnosis, but also the patient's underlying liver dysfunction and performance status. Receipt of HCC-specific therapy is a key driver of patient outcome, with curative therapies available for those diagnosed with early-stage disease. We and others have shown that a multidisciplinary approach to coordinate, individualize, and optimize care for these complex patients can improve the rate of treatment utilization, reduce treatment delays, and improve patient survival.^{6,9,10}

Patient psychosocial barriers, such as low socioeconomic status, homelessness, alcohol and substance use, and psychiatric disorders, are more prevalent among the veteran population and have the potential to negatively influence successful health care delivery. One retrospective study of 100 veterans at a US Department of Veterans Affairs (VA) medical center treated for HCC from 2009 to 2014 showed a majority of the patients lived on a meager income, a high prevalence of homelessness, substance use history in 96% of their cohort, and psychiatric illness in 65% of patients.¹¹ Other studies have documented similar findings in the veteran population, with alcohol, substance use, as well as other uncontrolled comorbidities as barriers to providing care, such as antiviral therapy for chronic HCV infection.¹²

Herein, we present a cohort of veterans with HCC managed through our MDTB from 2007 to 2016, for whom chronic HCV infection and/or alcoholic liver disease were the main causes of cirrhosis. Our cohort had a high burden of alcohol and substance use disorders while other psychiatric illnesses were also common. Our cohort includes patients who were poor, and even some veterans who lacked a stable home. This profile of poverty and social deprivation among veterans is matched in national data.¹³⁻¹⁵ Using a tumor board model of nurse navigation and multidisciplinary care, we were able to provide travel and lodging assistance to 50 (34%) and 33 (22%) patients, respectively, in order to facilitate their care.

Our data demonstrate that the impact of psychosocial barriers on our capacity to deliver care varies with the nature of the treatment under consideration: curative vs cancer control. For example, active substance use disorder, homelessness, and severe established mental illness were often considered insurmountable when the treatment in question was LT. Nevertheless, despite the high prevalence in our study group of barriers, such as lack of transport while living far from a VA medical center, or alcohol use disorder, a curative treatment with either LT, tumor ablation, or resection could be offered to over half of our cohort. When noncurative therapies are included, most patients (85%) received HCC-specific care, with good relative survival.

Our reported high receipt of HCC-specific care and patient survival is in contrast to previously reported low rates of HCC-specific care in a national survey of management of

TABLE 5 Univariable and Multivariable Analyses of Treatment

Variables	Results	P value
Univariable analyses, hazard ratio (95% CI)		
Curative HCC treatment		
>T2 stage at diagnosis	0.02 (0.01-0.06)	< .001
Diagnosis of depression	0.29 (0.09-0.94)	.05
Lodging provision	3.59 (1.50-8.61)	.003
Multivariable analysis, hazard ratio (95% CI)		
Absence of substance abuse	7.1 (1.4-37.0)	.02
≤ T2 stage of tumor	10.1 (2.5-40.0)	.001
Child-Turcotte-Pugh class A cirrhosis	9.41 (2.4-36.3)	.001
Any HCC treatment, mean difference (95% CI)		
Model for End-Stage Liver Disease score	-2.08 (-3.85 to -0.31)	.02
Total bilirubin, mg/dl	-0.84 (-1.72 to 0.03)	.06
Serum α-fetoprotein, ng/mL	-5856 (-9581 to -2154)	.004

1296 veteran patients infected with HCV who developed HCC from 1998 to 2006. In this population, HCC-specific treatment was provided to 34%.¹⁶ However our data are consistent with our previously published data of patients with HCC managed through an institutional MDTB.⁶ Indeed, as shown by a univariate analysis in our present study, individualizing care to address modifiable patient barriers, such as providing provisions for lodging if needed, was associated with an increased likelihood of receiving HCC-specific care. On the other hand, advanced tumor stage (> T2) at diagnosis and a diagnosis of depression, which was the most common psychiatric diagnosis in our cohort, were both associated with decreased likelihood of receiving HCC-specific care. Clinical factors such as MELD score, total bilirubin, and serum AFP all affected the likelihood of providing HCC-specific care. In a multivariate analysis, factors that predicted ability to receive curative therapy included absence of substance use, T2 stage of tumor, and Child-Turcotte-Pugh class A cirrhosis. This is expected as patients with HCC within T2 stage (or Milan criteria) with compensated cirrhosis are most likely to receive curative therapies, such as resection, ablation, or LT.²

CONCLUSIONS

Our study demonstrates a high burden of psychosocial challenges in veterans with HCC. These accounted for a significant barrier to receive HCC-specific care. Despite the presence of these patient barriers, high rates of HCC-specific treatment are attainable through individualization and coordination of patient care in the context of a MDTB model with nurse

navigation. Provision of targeted social support to ameliorate these modifiable factors improves patient outcomes.

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The authors report no actual or potential conflicts of interest with regard to this article.

Disclaimer

The opinions expressed herein are those of the authors and do not necessarily reflect those of *Federal Practitioner*, Frontline Medical Communications Inc., the US Government, or any of its agencies.

Ethics and consent

This study was determined to be exempt from review by the William S. Middleton Memorial Veterans' Hospital and University of Wisconsin School of Medicine and Public Health Institutional Review Board.

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