

# Trends in Utilization of Stereotactic Body Radiation Therapy for Hepatocellular Carcinoma: A National Cancer Database Analysis

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**Categories:** Gastroenterology, Radiation Oncology

**Keywords:** hepatocellular carcinoma, sbrt, stereotactic body radiation therapy

## How to cite this abstract

Tang J, Guha C, Garg M K, et al. (November 02, 2017) Trends in Utilization of Stereotactic Body Radiation Therapy for Hepatocellular Carcinoma: A National Cancer Database Analysis. Cureus 9(11): a208

## Abstract

**Objectives:** With improved localization and imaging, utilization of stereotactic body radiation therapy (SBRT) to provide localized treatment for hepatocellular carcinoma (HCC) was adopted with many major centers reporting excellent local control. The National Cancer Data Base (NCDB) is a hospital cancer registry that accounts for new cancer diagnosed in the United States annually. We conducted an analysis of NCDB to evaluate utilization rate of SBRT for non-metastatic HCC.

**Methods:** From the NCDB, we identified patients from 2004 to 2014 with non-metastatic hepatocellular carcinoma. Patients who were treated with palliative intent were excluded. Treatment patterns were characterized, odds ratios (OR) were used to define predictors of SBRT utilization in univariate analysis, and logistic regression was used for multivariate analysis. Kaplan-Meier method and log-rank were used to evaluate predictors of overall survival (OS) in univariate analysis and Cox-regression in multivariate analysis. All statistical tests were two-sided with  $p < 0.05$  defined as statistically significant.

**Results:** 74,710 non-metastatic HCC patients were identified. Of these patients, 44% were stage I, 28% were stage II, and 28% were stage III. There was an overall increase in adoption of SBRT for non-metastatic HCC from 0.2% of overall cases in 2004 to 1.5% in 2014. However, only about 1% ( $n=764$ ) of the non-metastatic HCC diagnosed were treated with SBRT over the 10-year period. Predictors for utilization of SBRT in univariate analysis showed that stage I was more likely to receive SBRT than stage II (OR 1.3,  $p < 0.001$ ) and stage III (OR 2.2,  $p < 0.001$ ). Patients were more likely to receive SBRT at an academic institution than other facility types (OR 1.5,  $p < 0.001$ ), if they have insurance (OR 1.9,  $p < 0.01$ ), or better co-morbidities as indicated by Charlson-Deyo score (OR 1.37,  $p < 0.001$ ). In multivariate analysis, these predictors maintained similar OR and statistical significance ( $p < 0.01$ ) with the exception of insurance ( $p = 0.12$ ). When looking at overall survival, patients who received chemotherapy along with SBRT had better OS than those who received SBRT alone (median survival of 29 (95% CI 23-39) vs 22 (95% CI 19.5-25.5) months,  $p < 0.01$ ). In a multivariable analysis adjusting for stage and co-morbidities, the OS advantage with the addition of chemotherapy to SBRT was still maintained (HR 0.7, 95% CI 0.59-0.90,  $p < 0.01$ ).

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### Abstract

Published 11/02/2017

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Conclusions: SBRT comprised of a small percentage of treatment modality for hepatocellular carcinoma, but the utilization rate in the United States is increasing. Furthermore, patients who received combined modality treatment had improved overall survival. These results are promising and may warrant further investigation with prospective clinical trials evaluating multimodality management of non-metastatic HCC utilizing SBRT.