

Health Insurance Affects Head and Neck Cancer Treatment Patterns and Outcomes

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Purpose: The purpose of this study is to examine the effect of insurance coverage on stage of presentation, treatment, and survival of head and neck cancer (HNC).

Materials and Methods: A retrospective study was conducted using the Surveillance, Epidemiology, and End Results (SEER) program to identify patients diagnosed with HNC. The primary variable of interest was insurance analyzed as a dichotomous variable: Patients were considered uninsured if they were classified as “uninsured” by SEER, whereas patients were considered insured if they were defined by SEER as “any Medicaid,” “insured,” or “insured/no specifics.” The outcomes of interest were cancer stage at presentation (M0 vs M1), receipt of definitive treatment, and HNC-specific mortality (HNCSM). Multivariable logistic regression modeled the association between insurance status and stage at presentation, as well as between insurance status and receipt of definitive treatment, whereas HNCSM was modeled using Fine and Gray competing risks. Sensitivity logistic regression analysis was used to determine whether observed interactions remained significant by insurance type (privately insured, Medicaid, and uninsured).

Results: Patients without medical insurance were more likely to present with metastatic cancer (adjusted odds ratio, 1.60; $P < .001$), were more likely to not receive definitive treatment (adjusted odds ratio, 1.64; $P < .001$), and had a higher risk of HNCSM (adjusted hazard ratio, 1.20; $P = .002$). Sensitivity analyses showed that when results were stratified by insurance type, significant interactions remained for uninsured patients and patients with Medicaid.

Conclusions: Uninsured patients and patients with Medicaid are more likely to present with metastatic disease, are more likely to not be treated definitively, and are at a higher risk of HNCSM. The treatment gap between Medicaid and private insurance observed in this study should serve as an immediate policy target for health care reform.

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J Oral Maxillofac Surg ■:1-7, 2016

There are approximately 48 million people (15.4%) in the United States without medical insurance coverage.¹ If uninsured, patients diagnosed with head and neck cancer (HNC) can face treatment costs ranging from \$14,000 to \$36,000.^{2,3} However, the hazards of being uninsured take effect long before financial costs are

incurred. Being uninsured decreases the likelihood of receiving adequate cancer surveillance and treatment, leading to later stages at presentation and potentially worse cancer outcomes.^{4,5}

The Patient Protection and Affordable Care Act (PPACA) aims to extend oncologic care to millions

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Presented at the Boston University Head and Neck Cancer Symposium, Boston, MA, April 28, 2014.

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Received July 28 2015

Accepted December 29 2015

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0278-2391/16/00021-5

<http://dx.doi.org/10.1016/j.joms.2015.12.023>

of patients with cancer.⁶ Although it has been suggested that expanding medical insurance coverage could improve cancer outcomes, large population-based studies are needed to project the potential effects of the PPACA.^{4,6}

The purpose of this study is to examine the effect of insurance coverage on stage of presentation, treatment, and survival of HNC. We hypothesize that uninsured patients are more likely to present with metastatic disease, are more likely to not be treated definitively, and are at a higher risk of HNCISM in comparison with insured patients and patients with Medicaid. In examining the effect of insurance coverage, we aim to stratify HNC patients by insurance status and 1) model the odds of presenting with metastatic disease, 2) model the odds of receipt of definitive treatment, and 3) model the odds of HNCISM.

Materials and Methods

STUDY DESIGN

To address the research purpose, we conducted a retrospective study using the Surveillance, Epidemiology, and End Results (SEER) program to identify patients diagnosed with HNC. The SEER program, sponsored by the National Cancer Institute, is an epidemiologic registry that publishes national cancer statistics. The registry is comprehensive in nature and captures approximately 97% of incident cancers through 17 tumor registries that encompass approximately 28% of the US population. The SEER program collects information on cancer incidence, prevalence, survival, mortality, and most recently, insurance status.⁷

The study population was composed of patients in the SEER registry presenting for evaluation and treatment of HNC between 2007 and 2010. To be included in the study sample, patients had to be diagnosed with cancer of the oral cavity, oropharynx, nasopharynx, hypopharynx, or larynx. Patients were excluded from the study cohort if they were enrolled into the registry before 2007 because 2007 represents the year data on insurance status were introduced. In addition, patients aged 65 years or older were excluded because SEER recommends exercising caution when using the insurance status variable among patients aged 65 years or older, given that many who are classified as “uninsured” are Medicare eligible.

STUDY VARIABLES

The primary variable of interest was insurance status. We analyzed insurance coverage as a dichotomous variable given that SEER does not provide information on the specific type of insurance coverage that patients have. In addition, it is our belief that the differences in outcomes between patients who have insurance and

those who do not are greater than the individual variations found in specific insurance types.⁸ Patients were considered uninsured if they were classified as “uninsured” by SEER, whereas patients were considered insured if they were defined by SEER as “any Medicaid,” “insured,” or “insured/no specifics.”

The outcomes of interest were cancer stage at presentation (M0 vs M1), receipt of definitive treatment, and HNC-specific mortality (HNCISM). For metastases, local involvement (M0) was compared with distant metastases (M1) as defined by the *AJCC Staging Manual* (sixth edition).⁹ HNCISM was determined according to the SEER database.

OTHER VARIABLES

Age at diagnosis and gender were determined as provided by the SEER database. Income was calculated as median household income, and level of education was categorized as percent of residents aged 25 years or older with at least a high school diploma; both were determined at the county level, by linking to the 2000 US Census. Residence type also was determined at the county level, by linking to the 2003 US Department of Agriculture rural-urban continuum codes.¹⁰ Race was classified as follows, as provided by the SEER dataset: non-Hispanic white; African American; non-black Spanish, Hispanic, or Latino; Asian or Pacific Islander; Native American; or other. Tumor stage (according to the TNM system, American Joint Committee on Cancer staging) and grade were determined as provided in the SEER dataset.⁸

STATISTICAL ANALYSIS

Cohort characteristic information was analyzed using the independent-samples *t* test and χ^2 test, as appropriate. Multivariable logistic regression was applied to measure the association between medical insurance status and presentation of metastatic disease. The multivariable model was adjusted for patient demographic data (age at diagnosis and gender) and socioeconomic factors (median household income, educational status, and residence type). After restriction of the cohort to patients with nonmetastatic disease, multivariable logistic regression was applied to determine whether there was an association between insurance status and receipt of definitive treatment for patients with nonmetastatic disease. The multivariable model was adjusted for patient demographic data (as listed earlier), socioeconomic factors (as listed earlier), and tumor characteristics (tumor site, T stage, and grade).¹¹

Fine and Gray competing-risks regression was then used to model the association between medical insurance status and death due to HNC among patients with nonmetastatic disease, after adjustment for the previously listed variables, as well as receipt of

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