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Population-based retrospective study to investigate preexisting and new depression diagnosis among head and neck cancer patients

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ABSTRACT

This study aimed to estimate the pre-cancer prevalence and post-cancer incidence of depression in older adult head and neck cancer patients. Using SEER-Medicare files, cancer was identified from SEER data and depression diagnosis was identified using Medicare claims. Of 3533 head and neck cancer patients, 10.6% were diagnosed with depression during the two years prior to cancer diagnosis, and an additional 8.9% developed depression in the year following cancer diagnosis. This study supports the critical need of screening for depression throughout cancer diagnosis and treatment, as well as a preventative approach in depression development in the older head and neck cancer patient population.

1. Introduction

Head and neck cancers (HNC)[1] have been said to be more emotionally traumatic than other types of cancers [1,2]. There are a number of factors shared between depression and HNC, including substance use and other poor lifestyle behaviors, which put this particular cancer population at risk for experiencing depression [1]. Additionally, HNCs can be especially distressing because they can affect patients' communication and functioning, and may cause severe disfigurement [3,4]. Treatment options for HNC, such as radiation therapy, have also been associated with increased emotional distress in HNC patients, potentially as a result of the side-effects of treatment [5]. Recent data demonstrates a higher incidence of depression in patients receiving radiation as the primary modality compared with surgery in a randomized trial [6]. These findings suggest that the long-standing view of disfigurement as the primary cause of emergent depression may need to be reconsidered in order to understand how psychiatric illnesses impacts patient quality of life and survival.

The effects of depression in HNC patients can be severe. Studies have shown that HNC patients are at higher risk for suicide compared to other cancers and the general population [7], and may have poorer quality of life and survival [8,9]. Further, research on other cancer sites has shown that poor mental health may lead to less frequent screening and later stage at [10,11]. However, even with the shared associations of substance use and high emotional cost, there are still knowledge gaps in the literature surrounding depression and HNC.

Though HNC patients may be at increased risk for depression, currently there is no precise estimate of depression in this population. Previous studies, which have been mostly small-scale, have reported the prevalence to range from 9 to 54% [3]. This wide range may be due to differences between these studies such as sociodemographic characteristics, cancer site and staging, and the time at which depression was measured. Additionally, many have used self-reported depression from various inventories with different cut-offs for the definition of depression, making it difficult to make cross-study comparisons. There is limited information on the effect that preexisting depression may have on cancer stage at the time of HNC diagnosis. Further, lack of

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[1] HNC: Head and neck cancer.

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longitudinal research has resulted in a limited understanding of depression development and outcomes among HNC patients.

There is a clear need to explore the role of depression in HNC outcomes. To our knowledge, there are no population-based studies that have examined rates of depression in HNC patients at multiple time-points or the implications of preexisting depression on cancer stage at diagnosis. The specific aims of the study were to: (1) estimate the prevalence of depression two years before cancer diagnosis in an older adult head and neck cancer population using Surveillance, Epidemiology, and End Results (SEER)[2]—Medicare linked data, (2) estimate the incidence of depression one year after cancer diagnosis, and (3) compare stage of HNC by depression status.

2. Materials and methods

2.1. Study sample

The sample consisted of individuals diagnosed with HNC from 2004 to 2005 who were linked to Medicare data. HNC was identified by International Classification of Disease for Oncology, Version 3 (ICD-O3)[3] codes: 000–009 (lip), 021–023, 030–031, 039–041, 048–050, 058–062, 068–069 (oral cavity), 019–020,024, 028–029, 051–052, 090–091, 098–103, 108–109, 140, 142, 148 (oropharynx); 110–113, 118–119 (nasopharynx), 129–132, 138–139 (hypopharynx), and 320–323, 328–329 (larynx). Individuals had to have HNC as their only cancer diagnosis and be 67 years of age or older at diagnosis in order to ensure a minimum of two years of Medicare enrolment prior to cancer diagnosis. Individuals had to be continuously enrolled in Medicare Parts A and B for 24 months prior to HNC diagnosis until December of 2010 or their death, and could not be enrolled in a health maintenance organization (HMO)[4] during this same time period to avoid incomplete claims records [11,12].

2.2. Depression identification and statistical analysis

From this group, diagnosis of depression was identified using ICD-9-CM codes from Medicare claims data. ICD-9-CM codes for depression included the following: 300.4 (dysthymic disorder); 296.2–296.24, 296.3–296.34 (major depression single or recurrent episode); 309.0, 309.1(adjustment disorder with depressive symptoms or prolonged depressive reaction); 311 (depressive disorder not otherwise classified); 296.5–296.54 (bipolar I disorder, most recent episode or current depressed); 298.0 (depressive type psychosis); 301.10 (affective personality disorder, unspecified); 301.12 (chronic depressive personality disorder); and 301.13 (cyclothymic disorder). To be included in the preexisting depression group, subjects had to have at least one inpatient, outpatient, or carrier claim diagnosis of depression within the 24 months prior to HNC diagnosis. To be considered part of the post-HNC depression group, participants could not have been diagnosed with depression before cancer diagnosis and had to have a depression diagnosis within the year following cancer diagnosis. Individuals diagnosed with cancer at death or autopsy were excluded from all analysis of post-HNC depression because there was no possibility of depression development.

All sociodemographic information was taken from SEER data, with education and income based on census tract. Receipt of radiation as part of the initial course of treatment was included as a dichotomous variable. Medical comorbidity was measured using an adaptation of the Charlson Comorbidity Index (CCI)[5] developed for Medicare data, utilizing diagnostic codes based on the Deyo method [13–15]. Diagnostic codes from inpatient, outpatient, and carrier claims during the 12 months prior to cancer diagnosis were used to calculate the index score. Stage of cancer diagnosis was taken from the derived SEER Summary Stage.

Chi-square and *t*-tests were carried out to examine demographic differences between those with and without depression, both before and after cancer diagnosis. Forward selection was used to fit the multivariable logistic regression model to examine factors associated with depression at both time points. All data were analyzed using SAS version 9.3. This study was approved by the University of Nebraska Medical Center Institution Review Board.

3. Results

From 2004 to 2005, 12,175 individuals were diagnosed with HNC. Of these, 2951 individuals were excluded because HNC was not their only cancer diagnosis, and 4315 were excluded for being under the age of 67 at the time of HNC diagnosis. Another 151 individuals were removed for not being continuously enrolled in Medicare Parts A and B during the study period, and 1225 were removed for being enrolled in an HMO at some point during the study period. This left 3533 individuals in the final sample.

3.1. Prevalence and incidence of depression

In total, 375 (10.6%) individuals were diagnosed with depression during the two years prior to HNC diagnosis. Table 1 shows the characteristics of the sample by preexisting depression status. The groups differed significantly by gender, with a higher percentage of females in the depressed group (45.9% vs. 32.5%). The groups also differed by race, with 89.9% of the depressed group being Non-Hispanic White, compared to 83.5% of the non-depressed group. Additionally, the groups differed by marital status, with 40.5% of depressed subjects being married vs. 52.0% of non-depressed subjects. Conversely, 34.1% of depressed patients were widowed compared to 24.5% of the non-depressed group. Finally, in the pre-HNC depression group, 20.3% of individuals had a CCI score of one or more, compared to 6.3% of the non-depressed group.

To examine incident depression, we eliminated individuals with pre-existing depression and those diagnosed with HNC at death or autopsy, leaving 3157 individuals. Of these, 281(8.9%) had a depression diagnosis within the year following HNC diagnosis. Table 2 shows the characteristics of subjects by post-HNC depression status. Again, there were significant differences in gender, with 40.6% of the depressed group being female vs. 31.7% of the non-depressed group. The groups also differed by age, with 35.2% of the depressed group being 70–74 years old compared to 27.8% of the non-depressed group. There were differences in receipt of radiation, with 69.8% of the depressed group receiving radiation compared to 45.7% of the non-depressed group. Finally, there were differences in stage of cancer at diagnosis, with 19.2% of the depressed group diagnosed with distant stage vs. 13.3% of the non-depressed group.

3.2. Multivariable analysis

Table 3 shows the multivariable logistic regression examining factors associated with depression prior to cancer diagnosis. The odds of having depression prior to cancer diagnosis differed significantly by gender, with females having 1.59 (95% CI = 1.26, 2.02) times the odds of pre-HNC depression compared to men after

[2] SEER: Surveillance, Epidemiology, and End Results.
[3] ICD-O3: International Classification of Disease for Oncology, 3rd Edition.
[4] HMO: Health maintenance organization.
[5] Charlson Comorbidity Index.