Original Investigation

Incidence of Suicide in Patients With Head and Neck Cancer

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IMPORTANCE Suicide rates among patients with cancer in the US are significantly higher than those of the general population. To our knowledge, large cohort studies examining suicide rates among patients with head and neck cancer have not been performed.

OBJECTIVE To identify incidence rate, trends, and risk factors of suicide in patients with cancer of the head and neck.

DESIGN, SETTING, AND PARTICIPANTS This was a retrospective cohort study of geographic areas served by the Surveillance, Epidemiology, and End Results (SEER) program. In total, 350 413 cases of patients with head and neck cancer were recorded within the SEER registry between 1973 and 2011. Data analyses were performed in 2014. Incidence data were calculated from the subset of that population that had the cause of death category coded as "suicide and self-inflicted injury."

EXPOSURES Patients diagnosed as having a primary cancer of the head and neck region.

MAIN OUTCOMES AND MEASURES Influence of demographic factors, anatomic site of tumor, disease stage, and time since diagnosis on risk for suicide.

RESULTS Among 350 413 SEER registry patients with head and neck cancer, observed for 2 263 376 person-years, 857 suicides were identified with an age-, sex-, and race-adjusted suicide rate of 37.9/100 000 person-years. In contrast, the US general population suicide rate was 11.8 per 100 000 person-years. Suicide rates were higher in those treated with radiation alone (standardized mortality ratio [SMR], 5.12; 95% CI, 3.83-6.41) compared with those treated with surgery alone (SMR, 2.57; 95% CI, 1.66-3.49). The highest suicide risk was seen in patients with cancers of the hypopharynx (SMR, 13.91; 95% CI, 11.78-16.03) and larynx (SMR, 5.48; 95% CI, 4.14-6.81).

CONCLUSIONS AND RELEVANCE Patients with head and neck cancer have more than 3 times the incidence of suicide compared with the general US population. Furthermore, suicide rates were highest among those with cancers of the larynx and hypopharynx.

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Suicide is a significant cause of death in most Western countries and is the 10th leading cause of death in the United States.[1] In patients with cancer, the risk for suicide is even higher; patients with cancer in the United States have nearly twice the incidence of suicide as the US general population.[2,3] While affective illness and alcoholism are the most important determinants of suicide in the physically healthy population, vulnerability to suicide in patients with cancer is influenced by a number of other factors, including psychosocial and psychosomatic effects of advanced illness, pain, organic mental syndromes, and preexisting psychopathologic abnormalities.[4] Most recently, Misono et al[2] used the Surveillance, Epidemiology, and End Results (SEER) database to evaluate the incidence of suicide in persons with any type of cancer. Using data up to 2002, they found that cancers of the lung and bronchus, stomach, oral cavity and pharynx, and larynx were associated with the highest rates of suicide.

Despite the strong evidence of increased risk of suicide among patients diagnosed as having cancer, to our knowledge, an in-depth analysis of suicide in patients with head and neck cancer has yet to be performed. Both the pathologic findings and the treatment of head and neck cancers, which includes radiation, surgery, and chemotherapy, can have adverse effects on patients' daily quality of life (QOL). Distortions of voice, hearing, taste, chewing, swallowing, and breathing may produce psychological distress for decades after successful treatment. New treatment modalities for head and neck cancer have been introduced and popularized since 2002, including transoral robotic surgery (TORS) and intensity-modulated radiation therapy (IMRT). To our knowledge, the impact of these tech-

niques on suicide risk of patients with head and neck cancer has not been investigated.

In this study, we examined suicide rates exclusively among patients with cancers of the head and neck and included more recent data from the SEER database. Suicide rates were calculated and compared with the rates of suicide in the US general population. Rates were adjusted for patient demographics and disease characteristics to identify risk factors for suicide in this patient population.

Methods

Patient Population

The SEER Program was used to identify patients with cancer in the head and neck region (nasal cavity, nasal sinuses, nasopharynx, oral cavity, oropharynx, salivary glands, hypopharynx, larynx, and thyroid gland). SEER collects cancer incidence and survival data from multiple cancer registries throughout the United States. These registries cover approximately 28% of the US population, with appropriate representation of most ethnicities in the United States. The SEER database contains patients' demographics (age, sex, race, marital status), cancer staging, course of treatment, follow-up status, and mortality data, which allows for various classifications and analyses of the survival data.[5] The US general population mortality data for 1973 to 2011 was accessed through the SEER program, which obtains data from the US Census Bureau.

This study did not involve interaction with human participants or the use of any personal identifying information. Hence, institutional review board approval was not required by Rutgers New Jersey Medical School.

Patient Selection Criteria

The cohort used in this study was obtained from the SEER 18 registries, which spanned from 1973 to 2011 and covered 18 cancer registry sites around the United States. From this registry, all patients with a cancer in the head and neck region were included. Patients were classified according to cancer of 7 anatomical sites based on the "primary site-labeled" class, which includes the larynx (glottis, supraglottis, subglottis, laryngeal cartilage, larynx), hypopharynx (pyriform sinus, posterior cricoid region, aryepiglottic fold, hypopharynx), nasopharynx (nasopharynx and walls), oral cavity and oropharynx (external lip, mucosa of lip, commissure of lip, lip, tongue, lingual tonsil, gum, floor of mouth, hard palate, soft palate, palate, uvula, cheek mucosa, vestibule of mouth, retromolar area, tonsillar fossa, vallecula, epiglottis, pharynx, oropharynx), salivary glands (parotid gland, submandibular gland, sublingual gland), nasal cavity and sinuses (accessory sinus, sphenoid sinus, ethmoid sinus, frontal sinus, maxillary sinus), and thyroid gland.

Patient Characteristics

Using the SEER program, patient data were obtained for sex, age, race, marital status, year of diagnosis, primary site of cancer, cause of death, survival time, cancer staging, course of treatment (radiation only, surgery only, both, or neither), and status at follow-up. Patients were considered to have committed suicide only if the cause of death on record was entered as "suicide and self-inflicted injury." Patients' marital status was classified as married, unmarried (which included single, widowed, or divorced), and unknown. Based on the TNM staging derived from the *AJCC Cancer Staging Manual*, 6th and 7th editions, the stage of the cancer at presentation was classified as localized (N0M0), regional (N+), distant (M1), or unknown (blank). Patients who survived less than 1 month after diagnosis were encoded in the SEER program as having a survival time of 0; these patients were assigned a survival time of 1 half-month in accordance with standard epidemiological calculations. Data analyses were performed in 2014.

Statistical Methods

Tables were created to compare survival time of patients with cancer based on different characteristics (eg, age, sex, race) using Microsoft Excel (Microsoft Corp). Suicide rates were then calculated per 100 000 person-years by dividing the number of suicides in each category by the total survival time (person-years) accumulated by the patients in the category. In the SEER database, the suicide rate of patients with cancer of a certain category was then compared with the US population suicide rate in that category, as collected by the National Center for Health Statistics, accessed through the SEER program. This was then used to obtain the standardized mortality ratio (SMR). For categories such as stage of presentation, year of diagnosis, cancer site, time since diagnosis, and radiation therapy and/or surgical therapy, the suicide rate in the US general population was used for comparison.

Results

A total of 857 suicides were identified among 350 413 persons with head and neck cancer observed for 2 263 376 person-years, giving an age-, sex-, and race-adjusted suicide rate of 37.9 per 100 000 person-years. The corresponding suicide rate in the general US population was 11.8 per 100 000 person-years. This produced an SMR of 3.21 (95% CI, 2.18-4.23). For all patients with head and neck cancer in the SEER registries, regardless of cause of death, the range of survival time was 0 to 38.92 years, and the mean survival time was 5.61 years.

Demographic Factors Associated With Increased Suicide Rates

For the population as a whole, suicide rates trended downward over the 40 years covered in the SEER data. Suicide rates were statistically significantly higher in male patients and those with later stage disease. White race and unmarried status were also associated with high rates of suicide, although these were not statistically significant (**Table 1**). The **Figure** shows suicide rates by age at diagnosis and anatomic sites; for all patients, those diagnosed at ages 60 to 79 years had the highest rate of suicide. In addition, patients who received only radiation had approximately double the suicide rate of those who received only surgery.

Tumor Sites Associated With Increased Suicide Rates

Patients with tumors of each head and neck cancer site, except for the thyroid gland, had higher suicide rates than the general US population. Rates were highest in patients with cancers of the hypopharynx (164.2 per 100 000 person-years; SMR, 13.91; 95%

Table 1. Incidence of Suicide Among Patients With Head and Neck Cancer in the SEER Database by Demographic and Tumor Characteristics

Characteristic	No. (%)		Suicides per 100 000 Person-years[a]	SMR (95% CI)[a,b]
	Patients	Suicides		
Sex				
Male	188 701 (54)	757 (88)	69.34	3.67 (2.80-4.53)
Female	161 712 (46)	100 (12)	8.54	1.62 (0.53-2.71)
Race				
White	287 899 (82)	793 (93)	41.80	3.23 (2.25-4.20)
Black	32 011 (9)	25 (3)	15.74	2.67 (1.35-3.99)
Other	30 503 (9)	39 (5)	18.81	2.70 (1.48-3.92)
Marital status				
Married	200 658 (57)	483 (56)	35.35	2.99 (2.01-3.98)
Unmarried	130 865 (37)	320 (37)	41.44	3.51 (2.44-4.58)
Unknown	18 890 (5)	54 (6)	43.22	3.66 (2.57-4.75)
Stage at presentation				
Localized	156 238 (45)	376 (44)	32.67	2.77 (1.82-3.71)
Regional	136 013 (39)	354 (41)	46.70	3.95 (2.82-5.09)
Distant	27 829 (8)	60 (7)	40.94	3.47 (2.40-4.53)
Unstaged/unknown	30 333 (9)	67 (8)	31.74	2.69 (1.75-3.62)
Year of diagnosis				
1973-1980	30 367 (9)	148 (17)	40.70	3.45 (2.39-4.50)
1981-1990	43 662 (12)	213 (25)	44.83	3.80 (2.69-4.91)
1991-2000	73 358 (21)	220 (26)	34.05	2.88 (1.91-3.85)
2001-2011	203 026 (58)	276 (32)	35.45	3.00 (2.01-3.99)
Radiation and/or surgery				
Radiation only	74 623 (21)	217 (25)	60.44	5.12 (3.83-6.41)
Surgery only	125 790 (36)	292 (34)	30.37	2.57 (1.66-3.49)
Radiation and surgery	119 935 (34)	255 (30)	32.68	2.77 (1.82-3.72)
Neither	25 931 (7)	78 (9)	54.85	4.64 (3.42-5.87)
Unknown	4 134 (1)	15 (2)	73.25	6.20 (4.78-7.62)
All patients	350 413	857	37.86	3.21 (2.18-4.23)

Abbreviations: SEER, Surveillance, Epidemiology, and End Results; SMR, standardized mortality ratio.

[a] Adjusted to the age distribution in the population served by the SEER program.

[b] For the categories of sex and race, SMR reference population is the specific subcategory in the US population. For marital status, stage at presentation, year of diagnosis, and radiation and/or surgery treatment status, SMR reference population is the entire US population from 1973 to 2011.

CI, 11.78-16.03), larynx (64.7 per 100 000 person-years; SMR, 5.48; 95% CI, 4.14-6.81), and oral cavity and oropharynx (61.8 per 100 000 person-years; SMR, 5.23; 95% CI, 3.93-6.54).

Hypopharyngeal cancers were associated with the highest suicide rates in both men and women. In men, patients with nasopharyngeal cancers (87.3 per 100 000 person-years; SMR, 4.62; 95% CI, 3.65-5.59) had the second-highest rates, while for women the second-highest rates were seen among those with oral cavity and oropharyngeal cancers (18.4 per 100 000 person-years; SMR, 3.49; 95% CI, 1.90-5.09) (**Table 2**).

Suicide Risk Over Time

The greatest increase in suicide rates among all patients with head and neck cancer was seen in the first 5 years after diagnosis, with a subsequent decline over time. In patients with tumors of all sites except the thyroid gland and the nasal cavity and sinuses, suicide rates remained higher than that of the US general population for up to 10 years after diagnosis. Relative suicide risk remained high for longest with those with nasopharyngeal cancer, with an SMR of 3.26 (95% CI, 2.23-4.29) at more than 15 to 30 years after diagnosis. Hypopharyngeal cancer was associated with the highest initial suicide rate but was not significantly different from the general US population suicide rate after 10 years (SMR, 32.28; 95% CI, 29.04-35.52) (**Table 3**).

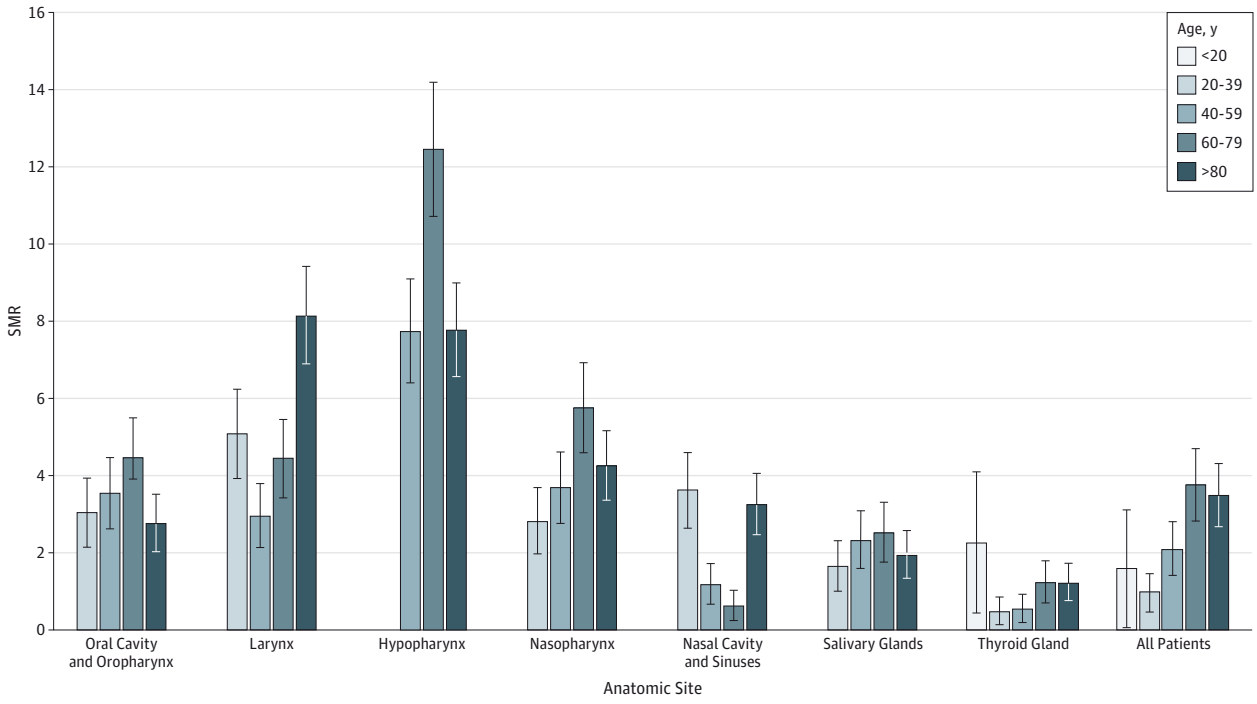
Suicide Risk With Radiation and/or Surgery

Radiation therapy without surgery was associated with a suicide rate of 60.4 per 100 000 person-years (SMR, 5.12; 95% CI, 3.83-6.41), while patients treated with surgery alone had a suicide rate of 30.4 per 100 000 person-years (SMR, 2.57; 95% CI, 1.66-3.49). Treatment with combined radiation and surgery had an SMR of 2.77 (95% CI, 1.82-3.72), and treatment with neither had an SMR of 4.64 (95% CI, 3.42-5.87) (**Table 4**).

Discussion

In our study, hypopharyngeal, laryngeal, and oral cavity and/or oropharyngeal cancers were associated with the highest rates of suicide. We found a nearly 12-fold higher incidence of suicide in patients with hypopharyngeal cancer and a 5-fold higher incidence in those with laryngeal cancer. This may be linked to these anatomic sites' intimate relationship with the ability to speak and/or swallow. Loss of these functions can dramatically lower patients' QOL. It is possible that the increased rates of tracheostomy dependence and dysphagia and/or gastrostomy tube dependence in these patients are exacerbating factors in the increased rate of suicide observed. As Nguyen et al[6] demonstrated, severe dysphagia (including cases in which patients are gastrostomy-tube de-

Figure. Suicide Rates in Persons With Head and Neck Cancer by Age at Diagnosis and Anatomic Site



Reference population is the general US population in corresponding age groups. SMR indicates standardized mortality ratio. Error bars indicate 95% CIs.

Table 2. Suicide Rates by Anatomic Site of Cancer

	Overall		Men[a]		Women[a]	
Anatomic Site	Suicide Rate[b]	SMR (95% CI)[c]	Suicide Rate[b]	SMR (95% CI)[c]	Suicide Rate[b]	SMR (95% CI)[c]
Oral cavity and oropharynx	61.78	5.23 (3.93-6.54)	81.65	4.32 (3.38-5.25)	18.38	3.49 (1.90-5.09)
Larynx	64.71	5.48 (4.14-6.81)	75.78	4.01 (3.11-4.91)	16.27	3.09 (1.59-4.60)
Hypopharynx	164.23	13.91 (11.78-16.03)	200.47	10.60 (9.13-12.07)	49.03	9.32 (6.71-11.93)
Nasopharynx	60.33	5.11 (3.82-6.40)	87.31	4.62 (3.65-5.59)	4.85	0.92 (0.10-1.74)
Nasal cavity and sinuses	22.59	1.91 (1.12-2.70)	25.88	1.37 (0.84-1.90)	18.01	3.42 (1.84-5.01)
Salivary glands	34.71	2.94 (1.96-3.92)	63.65	3.37 (2.54-4.19)	7.63	1.45 (0.42-2.48)
Thyroid gland	9.89	0.84 (0.32-1.36)	26.07	1.38 (0.85-1.91)	5.10	0.97 (0.13-1.81)
All patients	37.86	3.21 (2.18-4.23)	69.34	3.67 (2.80-4.53)	8.54	1.62 (0.53-2.71)

Abbreviation: SMR, standardized mortality ratio.

[a] Sex-specific analysis adjusted for age and race distributions.

[b] Per 100 000 person-years.

[c] Reference population is the general US population from 1973 to 2011.

pendent) was most significantly associated with lower QOL scores. Even in patients who are able to swallow, dietary modification and prolonged eating times can lead to anger and low self-esteem.[7,8]

An inability to speak is also significantly associated with depression and a lower QOL.[6,9] This difficulty in communication may lead to social isolation and a lack of adherence to rehabilitation regimens.[10] Tracheostomy dependence, which is particularly evident in patients with cancer of the hypopharynx and larynx, can create additional difficulties in speech. The neck disfigurement, noise in breathing, and mucus production resulting from a tracheostomy may lead to further social isolation and has been associated with increased rates of depression. Even patients who have been decannulated have incomplete psychosocial recovery.[11]

Although radiation is an integral part of treating many head and neck cancers, it can be associated with significant morbidity that is associated with lower QOL. Machtay et al[12] showed that many patients were still gastrostomy tube–dependent and tracheostomy-dependent 1 or 2 years after combination chemotherapy and radiation therapy. Since laryngeal preservation therapy has become established, more patients are being treated with radiation; as a result, head and neck surgeons often have to perform salvage laryngectomies to prevent aspiration, aid in swallowing, and cure residual disease.[13] IMRT had been widely commercially available in many centers by 2003, and by 2005 more than 75% of radiation oncologists in the United States were using IMRT. Compared with standard radiation therapy, IMRT

Table 3. Suicide in Patients With Head and Neck Cancer by Site and Years Since Diagnosis

	Time Since Diagnosis, y				
Anatomic Site	0 to 5	>5 to 10	>10 to 15	>15 to 30	>30
Oral cavity and oropharynx					
Suicides, No.	262	71	30	31	2
Person-years accrued	131 133	177 595	131 535	174 360	26 393
SMR (95% CI)[a]	16.92 (14.57-19.26)	3.39 (2.34-4.43)	1.93 (1.21-2.84)	1.51 (0.81-2.21)	0.64 (0.19-1.10)
Larynx					
Suicides, No.	134	41	22	17	0
Person-years accrued	58 516	85 358	70 763	102 933	13 121
SMR (95% CI)[a]	19.39 (16.87-21.91)	4.07 (2.92-5.22)	2.63 (1.71-3.56)	1.40 (0.72-2.07)	NA
Hypopharynx					
Suicides, No.	47	8	1	0	0
Person-years accrued	12 327.67	9573.92	6229.58	5711.92	254.75
SMR (95% CI)[a]	32.28 (29.04-35.52)	7.08 (5.56-8.59)	1.36 (0.69-2.02)	NA	NA
Nasopharynx					
Suicides, No.	20	8	3	7	0
Person-years accrued	12 726	16 017	12 536	18 179	3531
SMR (95% CI)[a]	13.31 (11.23-15.39)	4.23 (3.06-5.40)	2.03 (1.21-2.84)	3.26 (2.23-4.29)	NA
Nasal cavity and sinuses					
Suicides, No.	4	1	0	1	0
Person-years accrued	6519	6898	5102	7268	776
SMR (95% CI)[a]	5.20 (3.90-6.50)	1.23 (0.6-1.86)	NA	1.16 (0.55-1.78)	NA
Salivary glands					
Suicides, No.	23	10	6	5	0
Person-years accrued	19 244	31 548	24 972	39 147	11 863
SMR (95% CI)[a]	10.12 (8.31-11.93)	2.68 (1.75-3.62)	2.03 (1.22-2.85)	1.08 (0.49-1.67)	NA
Thyroid gland					
Suicides, No.	47	25	11	17	3
Person-years accrued	125 609	251 958	194 983	342 452	126 245
SMR (95% CI)[a]	3.17 (2.15-4.18)	0.84 (0.32-1.36)	0.48 (0.08-0.87)	0.42 (0.05-0.79)	0.20 (0.05-0.46)

Abbreviations: NA, not applicable; SMR, standardized mortality ratio.

[a] Reference population is the general US population from 1973 to 2011.

has been associated with improved QOL and increased cause-specific survival.[14,15] However, our data set shows the same incidence of suicide in patients well after 2005, many who presumably had received IMRT. There is likely a selection bias between those treated with radiation alone compared with those treated with surgery or with both surgery and radiation therapy. Patients with unresectable disease or significant comorbidities may undergo radiation therapy instead of surgery.

Most suicides occurred within the first 5 years of diagnosis. Following the first 5 years after diagnosis, there is a statistically significant decrease in the rate of suicide for every site (Table 3). This may be due to the acclimation to the anatomical and physiologic alterations following therapy as well as a lack of active treatment regimens.

Male sex is associated with a higher risk of suicide. In the general population, female sex is associated with a higher incidence of suicidal behavior, but male sex is associated with a higher incidence of completed suicide. This difference is attributed to more violent means of suicide attempts by men.[16] It is possible that the incidence of female suicidal behavior in patients with head and neck cancer is underrepresented in the SEER data because failed suicide attempts are not recorded.

Age is also a significant risk factor in suicide in patients with head and neck cancer. However, the increased risk in the older population may be influenced by more advanced disease or more significant medical comorbidities.

Psychological distress, and depression especially, is frequently observed in patients with cancer.[17-19] Routine screening may not be needed in every patient, but we have identified a certain subset of patients often seen by otolaryngologists as being at increased risk (those who are older, male, with cancers of the hypopharynx, or with history of radiation therapy). Therefore, screening for depression and suicidal ideation should be considered in this high-risk group for primary prevention of suicide. The Distress Assessment and Response Tool (DART), an electronic questionnaire, identified suicidal ideation in almost 6% of patients with cancer who responded; of these, more than 10% reported suicidal intention as well.[20] Other screening methods also report similar rates of identification, demonstrating the consistent effectiveness of these screening questionnaires.[21]

Many otolaryngologists may feel uncomfortable broaching the subject of depression with their patients. A commonly mistaken belief is that by asking about suicide, physicians may inadvertently cause psychological distress and motivate suicidal

Table 4. Suicide in Patients With Head and Neck Cancer by Site and Radiotherapy vs Surgical Therapy

Anatomic Site	Patients, No.[a]	Suicides, No.[a]	Survival Time (Person-years)[a]	Suicide Rate[b]	SMR (95% CI)[c]
Oralcavityandoropharynx					
Radiation only	34 030	93	121 407	76.60	6.49 (5.03-7.94)
Surgery only	42 608	169	320 383	52.75	4.47 (3.26-5.67)
Radiation and surgery	29 578	81	156 263	51.84	4.39 (3.19-5.58)
Neither	12 095	44	37 173	118.37	10.02 (8.22-11.83)
Unknown	1882	9	5790	155.44	13.16 (11.09-15.23)
Larynx					
Radiation only	23 627	68	132 410	51.36	4.35 (3.16-5.54)
Surgery only	9403	48	71 503	67.13	5.68 (4.32-7.04)
Radiation and surgery	16 208	75	109 526	68.48	5.80 (4.42-7.17)
Neither	4354	19	12 830	148.09	12.54 (10.52-14.56)
Unknown	924	4	4422	90.46	7.66 (6.08-9.24)
Hypopharynx					
Radiation only	5088	25	13 470	185.60	15.72 (13.45-17.98)
Surgery only	911	5	3626	137.88	11.67 (9.73-13.62)
Radiation and surgery	3329	21	14 629	143.55	12.16 (10.17-14.14)
Neither	1431	4	1788	223.77	18.95 (16.46-21.43)
Unknown	269	1	585	170.89	14.47 (12.30-16.64)
Nasopharynx					
Radiation only	7503	27	43 184	62.52	5.29 (3.98-6.61)
Surgery only	461	1	2792	35.82	3.03 (2.04-4.03)
Radiation and surgery	1519	6	10 633	56.43	4.78 (3.53-6.02)
Neither	1650	3	5369	55.88	4.73 (3.49-5.97)
Unknown	243	1	1011	98.91	8.38 (6.72-10.03)
Nasal cavity and sinuses					
Radiation only	1667	1	8198	12.20	1.03 (0.45-1.61)
Surgery only	1110	3	4986	60.17	5.09 (3.81-6.38)
Radiation and surgery	2379	2	7724	25.89	2.19 (1.35-3.04)
Neither	783	0	5053	0.00	NA
Unknown	116	0	603	0.00	NA
Salivary glands					
Radiation only	1202	3	12 235	24.52	2.08 (1.25-2.90)
Surgery only	7561	16	46 430	34.46	2.92 (1.94-3.89)
Radiation and surgery	8222	21	49 516	42.41	3.59 (2.51-4.67)
Neither	1558	4	16 733	23.90	2.02 (1.21-2.84)
Unknown	176	0	1858	0.00	NA
Thyroid gland					
Radiation only	1506	0	28 146	0.00	NA
Surgery only	63 736	50	511 709	9.77	0.83 (0.31-1.35)
Radiation and surgery	58 700	49	431 927	11.34	0.96 (0.40-1.52)
Neither	4060	4	63 259	6.32	0.54 (0.12-0.95)
Unknown	524	0	6207	0.00	NA

Abbreviations: NA, not applicable; SMR, standardized mortality ratio.

[a] Among persons with head and neck cancer in the populations served by the SEER program.

[b] Per 100 000 person-years.

[c] Reference population is the general US population from 1973 to 2011.

ideation. However, screening has not been found to have iatrogenic effects on suicide.[22,23] Many surgeons may also feel inadequately trained to screen for suicidality. Referral to a mental health professional may be a reflex response for many physicians, especially surgeons. However, patient noncompliance with these referrals is a well-documented problem, and they may often be inadequate in preventing suicides.[24]

Patients expressing feelings of hopelessness, helplessness, social isolation, guilt, or other signs of depression should be asked to elaborate; identification of a suicide plan should raise concern for imminent suicidal attempts.[25] When the physician's clinical judgment determines that the patient poses a risk to his or her own life, confidentiality can and should be breached for referral to a mental health emergency department.

Despite the efficacy of antidepressants in the general population, studies have failed to find any benefit over placebo in patients with cancer with depression.[26] These patients should be treated by a multidisciplinary approach with mental health professionals, primary care physicians, cancer nurses, and otolaryngologists. This is especially important when suicidal ideation is present and interventions such as cognitive behavioral therapy and multidisciplinary collaboration can be lifesaving.[27,28]

The findings from this study should be interpreted with the knowledge of several limitations associated with the SEER database. First, an inherent problem with SEER when evaluating for suicide is the possible misclassification of the cause of death. Second, comorbidities could not be ascertained from the SEER database. Substance abuse, including alcohol dependence and tobacco use, and psychiatric illness may also be linked to an increase in suicide rates in patients with head and neck cancer. It has been well established that smoking and drinking are linked to head and neck cancer, especially that of the larynx and hypopharynx, which may explain the increased suicide rate in this population as opposed to rates in patients with thyroid or salivary gland cancers. Finally, radiation therapy is often administered in conjunction with chemotherapy for many head and neck cancers. The SEER database does not report the use of chemotherapy, so this may be a confounder within the data set that cannot be addressed.

Conclusions

Suicide rates among patients with head and neck cancer are significantly higher than that of the general population. In particular, patients with hypopharyngeal and laryngeal cancer are at highest risk. While there is a considerable body of research that examines survival outcomes for patients with head and neck cancer, additional research and effort should also be devoted to the psychological toll that the cancer, treatments, and resulting morbidity have on patients.

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