

Risk of Suicidal Self-directed Violence Among US Veteran Survivors of Head and Neck Cancer

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IMPORTANCE Head and neck cancer (HNC) survivors are about twice as likely to die by suicide compared with other cancer survivors.

OBJECTIVE To examine the associations between precancer mental health and pain and postcancer receipt of mental health, substance use disorder (SUD), or palliative care services with risk of suicidal self-directed violence (SSDV).

DESIGN, SETTING, AND PARTICIPANTS This retrospective cohort study used the Veterans Health Administration data of 7803 veterans with a diagnosis of HNC (stage I-IVB) who received cancer treatment between January 1, 2012, and January 1, 2018. Data were analyzed between May 2020 and July 2021.

EXPOSURES Presence of precancer chronic pain and SUD diagnoses, and postcancer SUD, mental health, or palliative care treatment. Exposures were defined using *International Classification of Diseases, Ninth Revision* and *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision* codes in Veterans Health Administration administrative data.

MAIN OUTCOMES AND MEASURES Documented SSDV event, including suicide attempt or death by suicide, after HNC diagnosis.

RESULTS Among the cohort of 7803 veterans (7685 [98.4%] male; mean [SD] age, 65 [10.7] years), 72 (0.9%) had at least 1 documented SSDV event following their cancer diagnosis, and 51 (0.7%) died by suicide. Four adjusted modified Poisson regression analyses identified that precancer chronic pain (incidence rate ratio [IRR], 2.58; 95% CI 1.54-4.32) or mood disorder diagnoses (IRR, 1.95; 95% CI, 1.17-3.24) were associated with higher risk of postcancer SSDV. Those who had at least 1 documented mental health (IRR, 2.73; 95% CI, 1.24-6.03) or SUD (IRR, 3.92; 95% CI, 2.46-6.24) treatment encounter in the 90 days following HNC diagnosis were at higher risk for SSDV. A palliative care encounter within 90 days of postcancer diagnosis was associated with decreased risk of SSDV (IRR, 0.49; 95% CI, 0.31-0.78).

CONCLUSIONS AND RELEVANCE In this cohort study, a high proportion of HNC survivors with an SSDV event died from their injuries. Identification of risk factors for SSDV among HNC survivors may help direct additional resources to those who are at high risk. Referral to palliative care appears to be an important component of supportive oncologic care to reduce the risk of SSDV.

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Suicide is the 10th leading cause of death among US adults,¹ and cancer survivors have twice the risk of death by suicide compared with those without cancer.² Results from the Surveillance, Epidemiology, and End Results database found that survivors of head and neck cancer (HNC) are more than twice as likely to die by suicide compared with survivors of other cancer types (63.4 vs 23.6 suicides per 100 000 person-years) and 3 times as likely compared with the general population.³ Despite recent advances in cancer care that have improved overall survival, the risk of death by suicide among survivors of HNC has increased 27% in recent years.³ Individuals within 5 years of their HNC diagnosis are at the highest risk of death by suicide.⁴

Survivors of HNC have high rates of pain during and after cancer treatment,^{5,6} high substance use before and after treatment,⁷ and mental health (MH) comorbidities.⁸ In addition, survivors of HNC have a high degree of disease and treatment burden such as difficulty swallowing, eating, and speaking, which causes functional impairment and psychological distress.⁹ The combination of these clinical characteristics places individuals with HNC at higher risk for death by suicide.^{10,11} Other nonmodifiable individual-level clinical and sociodemographic factors have been associated with incidence of suicide among survivors of HNC, including late-stage disease, being single or divorced, White race, and pharyngeal involvement.^{12,13}

Little is known about modifiable risk factors, including how health services use modifies suicide risk in survivors of HNC. Research in veterans with late-stage lung cancer showed engagement in palliative care services decreased the risk of death by suicide.¹⁴ Data are needed to understand how use of services such as MH treatment, substance use disorder (SUD) treatment, or palliative care may be associated with a reduction in suicide risk among survivors of HNC.

In this cohort study, we examined the associations between precancer clinical risk factors as well as postcancer use of palliative care and MH or SUD treatment with risk of suicidal self-directed violence (SSDV) events (including suicide attempt or death by suicide) among a large national cohort of US veteran survivors of HNC. We hypothesized that chronic pain and comorbid MH and/or SUD diagnoses before cancer would independently increase risk of SSDV. We also hypothesized that use of palliative care and MH or SUD treatment would be associated with a reduction in the likelihood of having an SSDV event.

Methods

Cohort

Using US Department of Veterans Affairs (VA) administrative data extrapolated from the Corporate Data Warehouse (CDW), we identified individuals who were diagnosed with a cancer in the head and neck region (ie, nasal cavity, nasal sinus, nasopharynx, oropharynx, oral cavity, hypopharynx, larynx) and had documented episodes of cancer care in the Veterans Health Administration (VHA) between January 01, 2012, and January 01, 2018. To create a cohort of patients who would be ex-

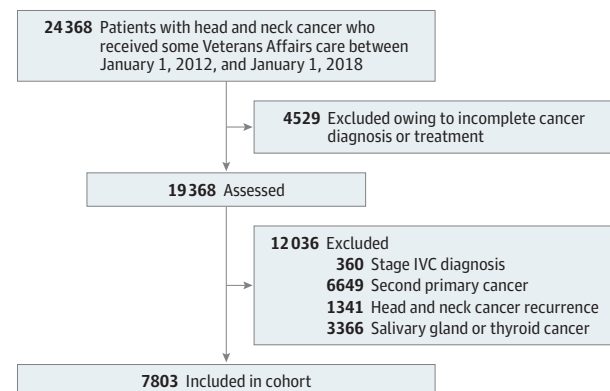
Key Points

Question Among survivors of head and neck cancer (HNC), which precancer characteristics and postcancer health services are associated with suicidal self-directed violence (SSDV) after cancer diagnosis?

Findings Among 7803 US veteran survivors of HNC, precancer chronic pain or mood disorders and postcancer mental health and substance use disorder treatment were associated with increased risk of SSDV. Use of postcancer palliative care was associated with decreased risk of SSDV.

Meaning Additional suicide prevention efforts should be directed toward survivors of HNC with precancer and postcancer risk factors for SSDV; palliative care may be an important component of supportive cancer care.

Figure 1. Cohort Flowchart



pected to have a longer survivorship, we excluded individuals diagnosed with stage IVC disease, who had a documented second primary cancer, or who had HNC recurrence in the 2 years following their index HNC diagnosis date (eTable 1 in the Supplement). We excluded those with salivary or thyroid primary site because these cancers are associated with different risk factors and treatment pathways. An overview of the sample selection is provided in Figure 1. This study was approved by the joint VA Portland Health Care System–Oregon Health & Science University institutional review board. A waiver of informed consent documentation and process was obtained for the following reasons: (1) this was determined to be a low-risk study; (2) it is not possible to obtain consent from those who have died, which comprised an essential population of the study; and (3) the potential risk of mailing consent (which contains personal identifiable information and protected health information, including social security numbers) to and from potential participants poses the risk of a breach of confidentiality. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines were followed.

Data Sources and Elements

Corporate Data Warehouse

The VA's CDW is a comprehensive, relational database that aggregates electronic health record data from VA clinics and hospitals nationally. Data about cancer diagnosis and treatment

were extracted from the CDW's oncology raw domain,¹⁵ and *International Classification of Diseases, Ninth Revision* and *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision* codes were used to identify MH and SUD diagnoses and treatment use (defined as at least 1 completed treatment encounter using a clinic stop code; eTable 1 in the Supplement). We identified palliative care use using the requested service name in the CDW consults table. We extracted pain scores, which are documented in CDW using the Numeric Rating Scale and ranging from 0 to 10, with 0 indicating no pain and 10 indicating the worst pain imaginable.¹⁶ Chronic pain was defined as having a Numeric Rating Scale score of 4 or more documented in 3 separate months within a single year.¹⁶⁻¹⁹ We obtained opioid prescription data for any opioid-based medication, except tramadol, including prescription names, doses, dates, and number of fills from CDW pharmacy data tables.²⁰ We extracted all aforementioned data for the 1 year prior to the HNC diagnosis (precancer) and the 2 years following the HNC diagnosis (postcancer).

Suicide Prevention Applications Network

Suicide Prevention Applications Network is a validated database that VA maintains for comprehensive records on suicide attempts, suicide behavior reports, suicide risk assessments, and other suicide-related clinical documentation submitted by suicide prevention coordinators.²¹ We obtained dates, means, and outcome (eg, death, hospitalization, outpatient MH treatment) of every SSDV attempt. All suicide-related behaviors are categorized using Centers for Disease Control and Prevention guidelines.²² We included veterans who had a suicide death or a self-directed violence event with suicidal intent as SSDV. Any documented SSDV event, at any time precancer or postcancer, in VA records was included in the data. Any SSDV events preceding the HNC diagnosis were considered pre-HNC SSDV events, and those following the HNC diagnosis were considered post-HNC SSDV events. Date of final Suicide Prevention Applications Network extraction was May 22, 2019.

Suicide Data Repository

We obtained cause of death data, primarily death by suicide, from the US Department of Defense's Suicide Data Repository, which is populated by the National Death Index.²¹ The Suicide Data Repository has been used in health services research as a validated source for death by suicide.¹⁴

Centers for Medicare & Medicaid Services

Veteran Affairs maintains curated Centers for Medicare & Medicaid Services data for veterans 65 years and older who are also covered by Medicare. From these data we obtained Medicare Part D (outpatient pharmacy claims) to capture opioid medications obtained outside of VHA. Combined with the VA CDW pharmacy data, we calculated the total daily morphine milligram equivalent for opioid medications filled in VHA and outside of VA using standardized conversions.²³

Data Aggregation and Quality Assessment

Data from these sources were linked using scrambled social security numbers. We followed data quality assessment

guidelines.²⁴ Plausibility and correctness were assessed using examination of agreement between data elements and consultation with clinical and research experts in VA oncology electronic medical record data and Centers for Medicare & Medicaid Services or VA opioid prescription data. Data concordance and completeness were assessed by a trained data analyst (R.H.) with consultation from the principal investigator (S.M.N.). We sought consultation from the VA Portland Health Care System cancer registrar, which oversees data input for the VA's CDW oncology raw domain variables, following the Commission on Cancer's 2016 Facility Oncology Registry Data Standards manual.²⁵

Statistical Analysis

We examined frequencies and measures of central tendency for sociodemographic and clinical variables of interest 1 year prior and 2 years after HNC diagnosis. We conducted unadjusted bivariate comparisons to examine whether clinical variables of interest differed between those who did not have a SSDV event and those who did. We conducted modified Poisson regression analyses (a Poisson regression with robust error parameter estimates) to calculate incidence rate ratios (IRRs) for the dichotomous outcome.²⁶ We ran adjusted models that controlled for age, marital status, and sex, with each precancer risk factor: chronic pain (dichotomous), a documented alcohol use disorder (dichotomous), a documented mood disorder (dichotomous), and the presence of a precancer SSDV (dichotomous). The fully adjusted model included all precancer risk factors, as well as age, marital status, and sex to assess for independence. For these analyses, SPSS statistical software, version 26 (IBM Corp), was used. Covariates were chosen a priori based on literature and use of directed analytic graphs. All available data for the 2-year observation period were used in the models.

We ran 3 adjusted modified Poisson regression models examining the association between postcancer diagnosis supportive services use (ie, palliative care, MH and SUD treatment) and SSDV event. Modified Poisson models are useful for analyzing rare events when patients are followed for a variable length of time. Each model controlled for cancer stage, age, marital status, sex, and documented precancer use of palliative care, MH treatment, or SUD treatment, respectively. We dichotomized use of these services (any documented use vs no documented use) from a count variable, minimizing immortal time bias, because those with longer survival would be more likely to have higher service use counts. To further reduce immortal time bias, we only examined treatment encounters in the 3 months after HNC diagnosis. We only included treatment encounters occurring prior to the first SSDV event after the cancer diagnosis. We conducted a sensitivity analysis excluding those who were given immunotherapy. For all modified Poisson regression models, we calculated the average marginal effects using Stata, version 15 (StataCorp).

Results

A total of 7803 survivors of HNC were included in the cohort. The majority were male (n = 7685; 98.4%) and identified as

Table 1. Sociodemographic and Clinical Characteristics of Survivors of Head and Neck Cancer With and Without Suicidal Self-directed Violence (SSDV) Events

Sociodemographic and clinical characteristics	No. (%)		
	Total cohort (n = 7803)	Without SSDV (n = 7731)	With SSDV (n = 72)
Age at diagnosis, mean (SD)	64.6 (10.7)	66.2 (9.1)	61.0 (9.1)
Sex			
Male	7685 (98.4)	7616 (98.5)	69 (95.8)
Female	118 (1.5)	115 (1.5)	3 (4.2)
Race ^a			
American Indian	68 (0.9)	68 (0.9)	0
Asian	11 (0.1)	11 (0.1)	0
Black	1098 (14.1)	1087 (14.1)	11 (15.3)
Pacific Islander	61 (0.8)	61 (0.8)	0
White	6179 (79.2)	6120 (79.2)	59 (81.9)
Marital status			
Divorced/separated	3253 (41.7)	3223 (41.7)	30 (41.7)
Married/domestic partnership	3116 (39.9)	3091 (40.0)	25 (34.7)
Single (never married)	849 (10.9)	835 (10.8)	14 (19.4)
Unknown/multiple statuses	69 (0.9)	69 (0.9)	0
Widowed	516 (6.6)	513 (6.6)	3 (4.2)
Mode of treatment ^b			
Surgery	2906 (37.2)	2884 (37.3)	22 (30.6)
Radiation	5166 (66.2)	5116 (66.2)	50 (69.4)
Chemotherapy	3284 (42.1)	3254 (42.1)	30 (41.7)
Immunotherapy	270 (3.5)	263 (3.4)	7 (9.7)
Histology			
Squamous cell carcinoma	7500 (96.1)	7431 (96.1)	69 (95.8)
Other	304 (3.9)	301 (3.9)	3 (4.2)
Cancer site ^c			
Pharynx	3436 (44.0)	3436 (44.4)	34 (47.2)
Larynx	2365 (30.3)	2365 (30.6)	21 (29.2)
Lip and oral cavity	1856 (23.8)	1856 (24.0)	17 (23.6)
Nasal cavity and paranasal sinuses	146 (1.9)	146 (1.9)	0 (0)
Stage of cancer			
I	2016 (25.8)	1999 (25.9)	17 (23.6)
II	941 (12.1)	934 (12.1)	7 (9.7)
III	1189 (15.2)	1177 (15.2)	12 (16.7)
IVA/IVB	3657 (46.9)	3621 (46.8)	36 (50.0)

^a Unknown category for race accounts for percentages not equal to 100.

^b Treatments are not mutually exclusive, so total percentage may exceed 100.

^c Categorization of cancer sites according to the American Joint Committee on Cancer staging system.²⁷

non-Hispanic White (n = 6179; 79.2%), and the mean (SD) age was 65 (10.7) years (Table 1²⁷). Regarding cancer stage of survivors, 2016 (25.8%) were diagnosed with stage I, 941 (12.1%) with stage II, 1189 (15.2%) with stage III, and 3657 (46.9%) with stage IVA or IVB. Radiation was the most common mode of treatment (n = 5166; 66.2%), followed by chemotherapy (n = 3284; 42.1%) and surgery (n = 2906; 37.2%). Treatments are not mutually exclusive. Squamous cell carcinoma was the most common tumor histologic finding (n = 7500; 96.1%); the most common primary tumor sites were pharyngeal (n = 3439; 44.0%) and laryngeal (n = 2365; 30.3%).

Of the total cohort, 5040 (64.6%) survivors had a documented MH or SUD diagnosis after their cancer diagnosis (Table 2). Mood disorders, including major depressive disorder, bipolar disorder, and dysthymia, were the most common MH diagnoses before (n = 1560; 20.0%) and after (n = 2046;

26.2%) HNC diagnosis. Nicotine use disorder was the most commonly diagnosed SUD before (n = 2355; 23.7%) and after (n = 2445; 24.6%) HNC diagnosis. The proportion of those who had any documented MH or SUD diagnosis increased for all diagnoses from the precancer period to the postcancer period (2198 [28.2%] vs 3401 [43.6%]). Of the total cohort, 2747 (35.2%) survivors experienced chronic pain in the 2 years following their cancer diagnosis compared with 1572 (19.6%) precancer.

Seventy-two individuals (0.9%) had at least 1 documented SSDV event following their cancer diagnosis; 51 of whom died by suicide. Patients were followed for a mean (SD) of 3.2 (2.1) years for a total of 25 015 person-years, yielding an incidence of 203.9 deaths and 287.8 SSDV events per 100 000 person-years. The most common means of SSDV were intentional self-poisoning with various substances (n = 28, 14 of

Table 2. Mental Health (MH) and Substance Use Disorder (SUD) Characteristics of Survivors of Head and Neck Cancer (HNC) Before and After Diagnosis With and Without Suicidal Self-directed Violence (SSDV) Events

MH And SUD diagnoses and treatment encounters	No. (%)					
	Total cohort (n = 7803)		Without SSDV (n = 7731)		With SSDV (n = 72)	
	Before HNC diagnosis	After HNC diagnosis	Before HNC diagnosis	After HNC diagnosis	Before HNC diagnosis	After HNC diagnosis
MH and SUD diagnoses^a						
PTSD	926 (11.9)	1072 (13.7)	910 (11.8)	1053 (13.6)	16 (22.2)	19 (26.4)
Anxiety disorder	620 (8.0)	1055 (13.5)	608 (7.9)	1028 (13.3)	12 (16.7)	27 (37.5)
Mood disorder	1560 (20.0)	2046 (26.2)	1530 (19.8)	1995 (25.8)	30 (41.7)	51 (70.8)
Any MH diagnosis	1391 (17.8)	1907 (24.4)	1366 (17.7)	1867 (24.1)	25 (34.7)	40 (55.6)
Nicotine SUD	2355 (23.7)	2445 (24.6)	2326 (30.1)	2412 (31.2)	29 (40.3)	33 (45.8)
Alcohol SUD	1245 (12.5)	1356 (13.6)	1229 (15.9)	1330 (17.2)	16 (22.2)	26 (36.1)
Cannabis SUD	203 (2.0)	258 (2.6)	198 (2.6)	244 (3.2)	5 (6.9)	14 (19.4)
Opioid SUD	128 (1.3)	129 (1.3)	123 (1.6)	115 (1.5)	5 (6.9)	14 (19.4)
Any SUD diagnosis	2958 (37.9)	3133 (40.2)	2918 (37.7)	3084 (40.0)	40 (55.6)	49 (68.0)
MH and SUD treatment use						
Any MH visits	2198 (28.2)	3401 (43.6)	2157 (27.9)	3340 (43.2)	41 (56.9)	61 (84.7)
MH Treatment encounters, ^b median (IQR)	4.0 (1-10)	5.0 (1-12)	4.0 (1-10)	23.0 (4-62)	13.0 (3-30)	5.0 (1-11)
Time to first MH treatment encounter, mean (SD), ^d	NA	210.1 (220.4)	NA	208.7 (219.6)	NA	233.0 (237.4)
Any SUD treatment visits	399 (5.1)	435 (5.6)	388 (5.0)	411 (5.3)	11 (15.3)	24 (33.3)
Time to first SUD treatment encounter, mean (SD), ^d	NA	136.5 (167.2)	NA	137.3 (167.4)	NA	92.4 (151.4)
SUD Treatment encounters, ^b median (IQR)	7.0 (2-34)	4.0 (2-23)	7.0 (4-34)	4.0 (2-20)	10.0 (5-94)	16.5 (8-89)
Time to first palliative care encounter, mean (SD), ^d	NA	151.0 (173.7)	NA	149.2 (172.0)	NA	275.6 (242.4)
Pain variables						
Chronic pain	1572 (19.6)	2747 (35.2)	1495 (19.3)	2696 (34.9)	32 (44.4)	51 (70.1)
Prescription opioid MME, ^c mean (SD) (n = 6880)	50.4 (96.7)	88.8 (133.8)	50.5 (97.3)	77.9 (128.8)	42.6 (35.4)	121.6 (130.6)

Abbreviations: MME, morphine milligram equivalent; NA, not applicable; PTSD, posttraumatic stress disorder.

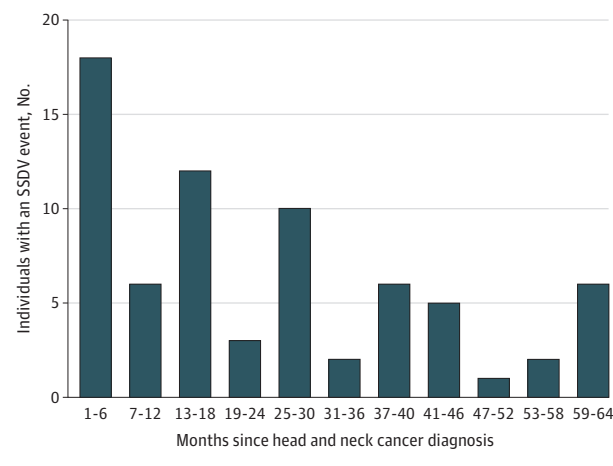
^aDiagnoses are not mutually exclusive, so total percentage may exceed 100.

^bThe MH and SUD treatment encounter medians and IQRs were calculated among those who had at least 1

encounter.

^cTotal MME was only calculated for those who were currently prescribed opioids.

Figure 2. Time Between Head and Neck Cancer Diagnosis and First Documented Suicidal Self-directed Violence (SSDV) Event



whom died) or firearm discharge ($n = 33$, all of whom died). Almost half ($n = 32$; 44.4%) of SSDV events were more than 2 years after the diagnosis, though 18 (25.0%) individuals had an event within 6 months of their cancer diagnosis (Figure 2). For 67 (93.1%) individuals with a postcancer SSDV event, it was the first documented SSDV event in their medical history.

Survivors of HNC with an SSDV event had higher rates of precancer MH and SUD diagnoses (except alcohol and nicotine use disorder; Table 2). Among those who had a documented palliative care consult ($n = 2074$), MH treatment encounter ($n = 3401$), or SUD treatment encounter ($n = 435$), average days to first use of each of these services were examined (Table 2). Those with documented SUD treatment prior to their SSDV event ($n = 24$) had shorter time to SUD treatment (mean [SD], 92 [151] days) compared with those without documented SSDV ($n = 411$; mean [SD], 137 [167] days). Those who received palliative care and had documented SSDV ($n = 29$) had a longer time to first palliative care treatment (mean [SD], 276 [242] days) compared with those who did not have an SSDV event ($n = 2045$; mean [SD], 149 [172] days).

Several modified Poisson regression models were conducted to examine associations between precancer risk factors and a postcancer SSDV event (Table 3). In separate adjusted models, all risk factors showed an increase in risk of a SSDV event. In the fully adjusted model, the presence of a precancer mood disorder (IRR, 1.95; 95% CI, 1.17-3.24), precancer chronic pain (IRR, 2.58; 95% CI, 1.54-4.32), and precancer SSDV (IRR, 3.56; 95% CI, 1.15-11.02) all were independently associated with increased risk of a postcancer SSDV event. Marginal effects were calculated to assess the difference in predicted probability of the outcome associated with each of these risk factors (Table 3). For example, the probability of an SSDV event among veterans with an SSDV before their cancer diagnosis was 0.032 (32 veterans per 1000) and 0.009 (9 veterans per 1000) for those with no SSDV event before their cancer diagnosis.

Separate analyses examined the association between any MH treatment, palliative care, or SUD treatment encounter (preceding the SSDV event and occurring within 90 days of the HNC

diagnosis) and a SSDV event (Table 3). Postcancer use of MH treatment (IRR, 2.73; 95% CI, 1.24-6.03) and SUD treatment (IRR, 3.92; 95% CI, 2.46-6.24) were associated with a higher risk of a subsequent SSDV event. Use of palliative care was associated with decreased risk of SSDV (IRR, 0.49; 95% CI, 0.31-0.78). Results of sensitivity analyses, which excluded all who received immunotherapy, did not differ appreciably from primary analyses, with the exception of the palliative care model, which was no longer associated (eTable 2 in the Supplement).

Discussion

Identifying precancer and postcancer risk factors for SSDV is essential to direct prevention efforts in a population that experiences increasing rates of SSDV. The present cohort had an SSDV incidence of 203.9 deaths by suicide and 287.8 SSDV events per 100 000 person-years. This is about 4 times the incidence of suicide compared with veterans with any diagnosed substance use or mental health disorders²⁸ and 3 times higher than nonveteran HNC survivors.³ The presence of chronic pain, a mood disorder, or a self-directed violence event pre-HNC diagnosis were all independently associated with an increased risk of an SSDV event following HNC diagnosis. In addition, we found use of SUD and MH treatment within 90 days of the HNC diagnosis were associated with increased risk of a subsequent SSDV event. Use of palliative care in the 90 days following cancer diagnosis decreased the risk of a subsequent SSDV event.

Survivors of HNC have high symptom burden such as disfigurement and pain during speaking, swallowing, and eating, secondary to their disease and cancer treatment,⁹ all contributing to distress and poor quality of life. This study's findings are consistent with the high pain and psychological symptom burden following HNC treatment found in other studies.²⁹ The present findings also portray a unique picture of relatively high prevalence of precancer pain, SUD diagnoses, and MH comorbidities. We know from observational studies of those with HNC that high pain during survivorship and premorbid MH diagnoses place individuals with HNC at higher risk of death by suicide³⁰ compared with those with other types of cancer and the general population.^{4,5,7,30} The present findings corroborate the increased risk among those with pain and MH comorbidities³¹ but add to the literature in that we also examined a history of a precancer SSDV event.

There are several clinical implications of these findings. Palliative care was associated with lower risk of a subsequent SSDV event. This is similar to a recent study of veterans that found reduced risk of death by suicide among those with advanced stage lung cancer who received palliative care.¹⁴ Taken together, these findings suggest that there may be important and unique components of palliative care, such as the combination of pain management, mental health and spiritual support, social work, and nutrition that offer the range of wrap-around services needed to support those survivors of HNC who have severe symptom and emotional burden.³² It is important to acknowledge that heterogeneity exists as to how palliative care teams receive referrals within and outside of VA,

Table 3. Association of Precancer Risk Factors and Postcancer Use of Mental Health, Substance Use Disorder, or Palliative Care Treatment With Postcancer Suicidal Self-directed Violence (SSDV) Events in Survivors of Head and Neck Cancer^a

Precancer risk factor	Adjusted IRR (95% CI)	Predicted probability of postcancer SSDV average marginal effects (95% CI)		
		Risk factor	No risk factor	Difference
Alcohol substance use disorder	0.89 (0.50 to 1.58)	0.008 (0.004 to 0.013)	0.009 (0.007 to 0.012)	-0.001 (-0.006 to 0.004)
Mood disorder diagnosis	1.94 (1.17 to 3.24)	0.014 (0.009 to 0.020)	0.007 (0.005 to 0.010)	0.007 (0.001 to 0.013)
Chronic pain	2.58 (1.54 to 4.32)	0.017 (0.011 to 0.024)	0.007 (0.005 to 0.009)	0.011 (0.004 to 0.018)
Precancer SSDV	3.56 (1.15 to 11.02)	0.032 (-0.003 to 0.067)	0.009 (0.007 to 0.011)	0.023 (-0.012 to 0.058)
Service use within 90 d after cancer diagnosis				
Mental health treatment	5.04 (2.60 to 9.76)	0.041 (0.016 to 0.067)	0.008 (0.006 to 0.010)	0.033 (0.008 to 0.059)
Palliative care	0.49 (0.31 to 0.78)	0.005 (0.003 to 0.007)	0.010 (0.008 to 0.120)	-0.005 (-0.008 to -0.002)
Substance use disorder treatment	3.92 (2.46 to 6.24)	0.020 (0.014 to 0.026)	0.005 (0.003 to 0.007)	0.015 (0.009 to 0.021)

Abbreviation: IRR, incidence rate ratio.

^a The precancer risk factor model controlled for age, marital status, and sex.

Service use models included cancer stage and precancer use of that service, in addition to age, sex, and marital status.

which may enhance generalizability of the present findings to other health care systems. Also, other supportive services such as cancer rehabilitation may have some overlapping services provided to palliative care. Relatedly, multidisciplinary care models have been found to enhance survival³³ and quality of life,^{29,34} and these care models, in collaboration with palliative care, may work synergistically to lengthen survival.

Patients who are engaged in MH or SUD treatment appear to be more likely to have a subsequent SSDV. Those with more severe MH and SUD challenges may be more likely to engage in treatment and also may be at increased risk for SSDV. Thus, use of these services might be an opportunity for identification of high-risk individuals. While distress screening is recommended by several national guidelines,^{35,36} screening related to suicide is less commonly a part of cancer care. The Suicidal Behaviors Questionnaire-Revised³⁷ is an appropriate screening tool for suicidality among survivors of HNC and could be incorporated into oncology clinics and used earlier in the cancer treatment trajectory.³² Prior work has identified a screening and follow-up workflow protocol, including assessment and treatment, for those with HNC who have positive screening results.³⁸ Robust evidence suggests that increasing screening does not increase likelihood of acting on suicidal thoughts,³⁹ though screening must occur in the context of a clinical infrastructure to support follow-up MH care.

Determining the best timing to screen for suicidal ideation is important. Prior work found that those with HNC were at highest risk for suicidal ideation between 6 months and 5 years postdiagnosis.⁴⁰ Similarly, results from this study suggest that the majority of the cohort had their first SSDV event within 2 years of their cancer diagnosis (with a peak at 6 months). For the majority of those with SSDV, the event following the cancer diagnosis was the first event in their medical record, suggesting that the HNC diagnosis and/or treatment played a role in precipitating the SSDV event. Prior work indicates that the combination of stressful life events, perceived burdensomeness of adverse effects, and chemical changes caused by the combination of steroids, chemotherapy, and other medications may exacerbate MH crises³⁴ and increase acquired capability for suicide.³⁵ Importantly, SSDV in the present cohort often resulted in death because in-

dividuals used highly lethal means such as firearms and medication overdose. Because SSDV (and death by suicide) can occur sometime after acute phase treatment of HNC, facilitating long-term follow-up MH support and regularly screening may help mitigate suicide risk over time.

Limitations

We note several limitations to this study. First, the cohort comprised veterans who did not have an HNC recurrence or second primary cancer in the 2 years following their index HNC diagnosis; this may limit generalizability of the findings to those with more severe, recurrent, or second primary cancer. In addition, the composition of the cohort may limit generalizability to nonveterans, female patients, or those not receiving health care in VA. Second, these data are based on documented events in VA administrative data, so it is possible that service use, especially treatment obtained outside of VA, would not be documented and would artificially lower estimated use rates. It is possible that SSDV events may be underreported and death by suicide may be misclassified as another cause of death. Finally, there are limitations to the use of *International Classification of Diseases* codes as a proxy for the presence of an MH or SUD diagnosis, which may affect the accuracy of the prevalence estimate.

Conclusions

Results of this cohort study demonstrate that survivors of HNC are at high risk for self-directed violence and death by suicide. The findings offer insights into precancer MH, SUD, and pain clinical characteristics as well as how use of postcancer services are associated with SSDV. Identification of precancer and postcancer risk factors can enhance SSDV screening and prevention efforts, potentially improving HNC survival. Palliative care service use is associated with a decrease in postcancer SSDV and should be considered an important component of comprehensive cancer care. Additional research might examine the relationship between palliative care and decreased risk of SSDV to elucidate what components of palliative care may reduce SSDV risk.

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Invited Commentary

Lethal Suicidal Acts Among Head and Neck Cancer Survivors The Tip of a Distress Iceberg

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Patients treated for head and neck cancer (HNC) often experience inordinate amounts of stress. These cancers occur more frequently in populations with limited resources and high rates of mental illness—even before a life-altering cancer diagnosis and the toxic effects of treatments take their toll. Considering these circumstances, it is perhaps unsurprising, but no less concerning, that in this issue of *JAMA Otolaryngology-Head & Neck Surgery* Nugent and colleagues¹ found a high rate of suicidal self-directed violence (SSDV) in this population. Importantly, this study highlights that factors beyond depression are associated with suicidal outcomes, including pain and supportive care services. Nonetheless, considering the high burdens on this population, these rare suicidal outcomes likely represent the tip of the iceberg—the most severe manifestation of very common survivorship distress.

To capture the scope of the problem and identify risk factors for suicidal violence in the HNC population, Nugent and colleagues¹ use multiple linked data repositories within the Veterans Health Administration (VHA). This study benefits from a robust, longitudinal data source within a comprehensive health care system. Granular data that is not available in other large data sets add useful clinical details such as pain scores, opioid pharmacy records, and mental health and palliative care encounters. Even more critically, the VHA has emphasized suicide avoidance, allowing these investigators to use prospectively collected, detailed data on suicidal outcomes and risk assessments. The authors effectively leverage these sources with appropriate statistical techniques to expand our understanding of this problem beyond the data available in single

institution reviews or cancer registry studies.²⁻⁴ Still, there remains substantial work to be completed to design and implement effective interventions to reduce suicide and address the larger population's unmet needs.

Based on prior literature, suicide is twice as likely among cancer survivors compared with the general population² and 3 times more common among HNC survivors compared with other patients with cancer.³ The current study¹ confirms several well-established risk factors for suicide that are overrepresented in the HNC population, including male sex, substance use, chronic pain, and mental health disorders.⁵ Veterans themselves are a high-risk group for suicidal outcomes. The study by Nugent and colleagues¹ found a 0.9% rate of SSDV events among veterans with HNC, which is consistent with single-institution studies examining all HNC survivors, but with notably higher mortality rate than civilians (0.7% vs 0.4%).² Though suicide is relatively rare, distress is common and affects both oncologic outcomes and long-term quality of life. A majority of HNC survivors (63%) report emotional distress 6 months after treatment—nearly 3 times more than other oncology populations, and 50% report depression during treatment.⁶ Financial, social, medical, and legal stressors are often prevalent in the HNC population at baseline and then exacerbated by the cancer diagnosis and treatment.^{5,6} Even with high levels of distress, few individuals turn to suicide. When they do, the authors¹ highlight an extremely high mortality rate among those with a SSDV event (71%).

As a retrospective, observational study restricted to the veteran population, these results have important limitations. The VHA data provides a valuable data source but may limit the generalizability of results owing to the unique aspects of the vet-