



# Suicide among Veteran Cancer Survivors

**Rates, Methods, and Correlates, 2010-2020**

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## Disclaimer

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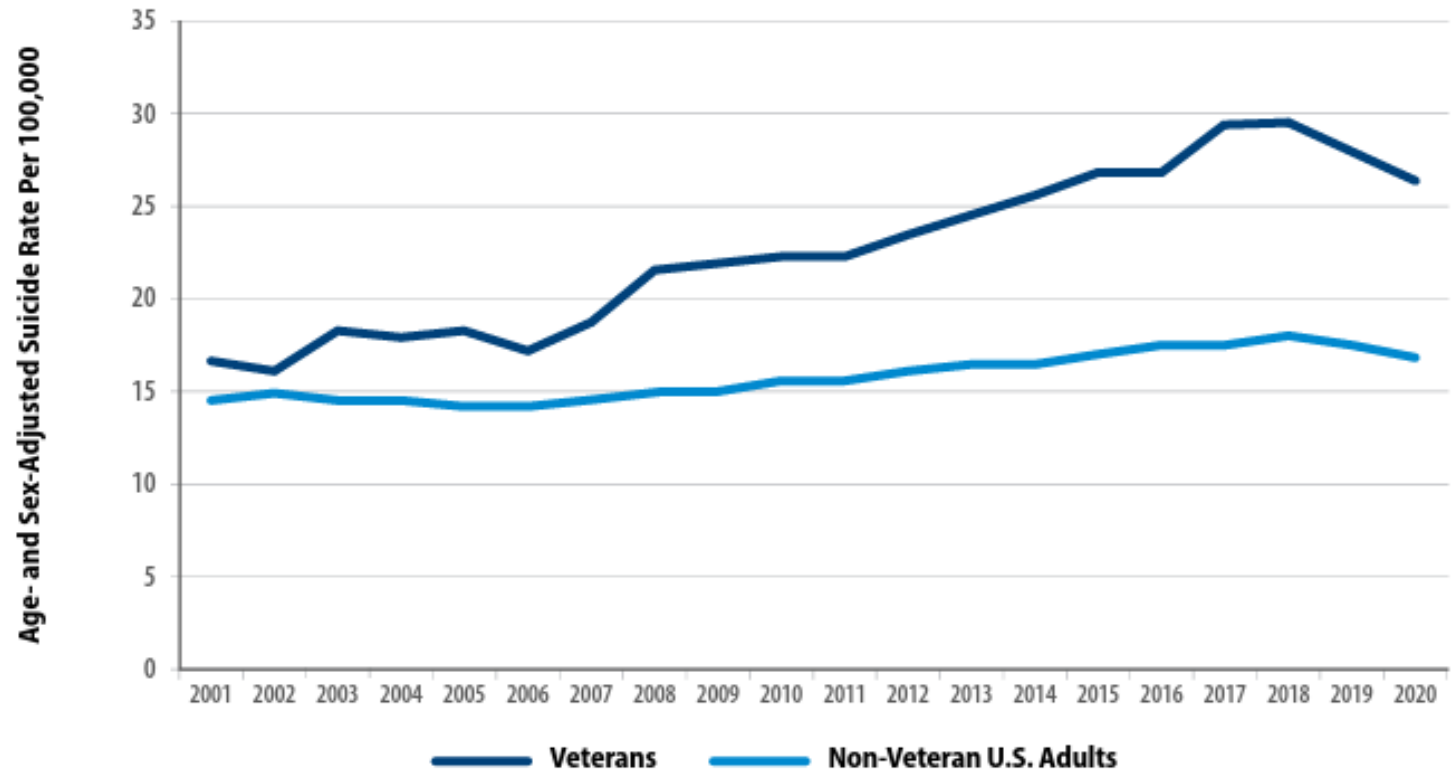
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# Background

# Suicide Among Veterans

- Suicide among Veterans continues to be a major public health problem
  - Age- and sex-adjusted suicide rates among Veterans are more than 50% greater than that of the general population<sup>1</sup>





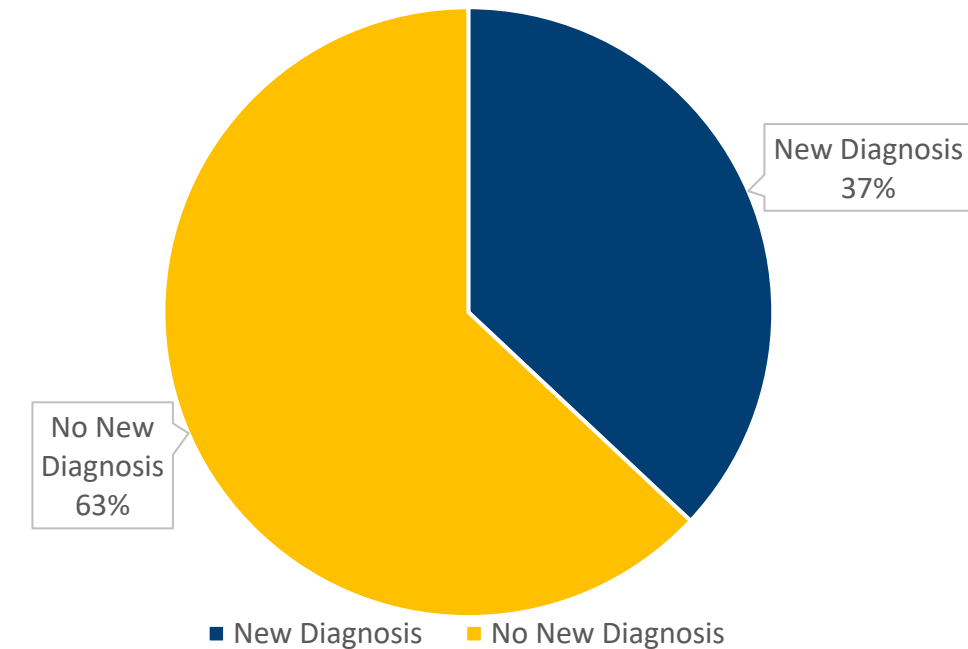
# Suicide risk in Veterans without mental health diagnoses

- Approximately 42% of all VHA-using Veterans who die by suicide have no documented mental health condition<sup>1</sup>
  - This proportion is even larger among those who do not use VHA services
- Though suicide rates among Veterans with a known mental health diagnosis declined from 2001 to 2020, rates among those without a MH diagnosis increased by 16% during this period<sup>1</sup>
- **It is essential to develop suicide prevention strategies to target Veterans without a MH diagnosis**

# Intersection between physical health and suicide risk

- Physical health conditions, including stroke, chronic pain, cardiovascular disorder, and cancer, are associated with increased risk for suicide among Veterans<sup>2</sup>
- When physical health conditions are comorbid with mental health conditions, Veterans are at especially high risk<sup>3</sup>

New Physical Health Diagnoses among VHA Primary Care Using Veterans Who Died By Suicide



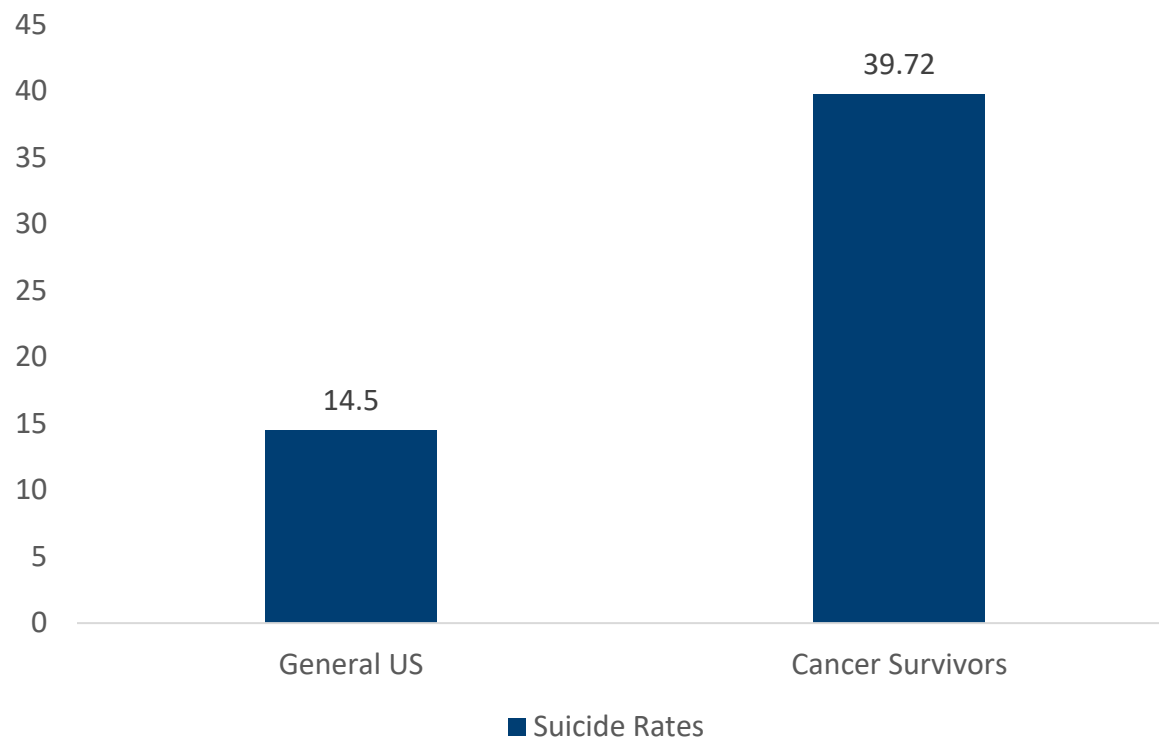


## Cancer among Veterans

- Veterans are at increased risk for developing cancer due to occupational and deployment-related exposures, such as Agent Orange, pesticides, burn pits, and cigarette smoke<sup>4-6</sup>
- Approximately 50,000 new cases of cancer are diagnosed within VHA each year<sup>7</sup>
- There are an estimated 450,000 living cancer survivors in VHA<sup>7</sup>
  - A cancer survivor is anyone living with, through, or beyond a cancer diagnosis

# Suicide among cancer survivors

Suicide Rates

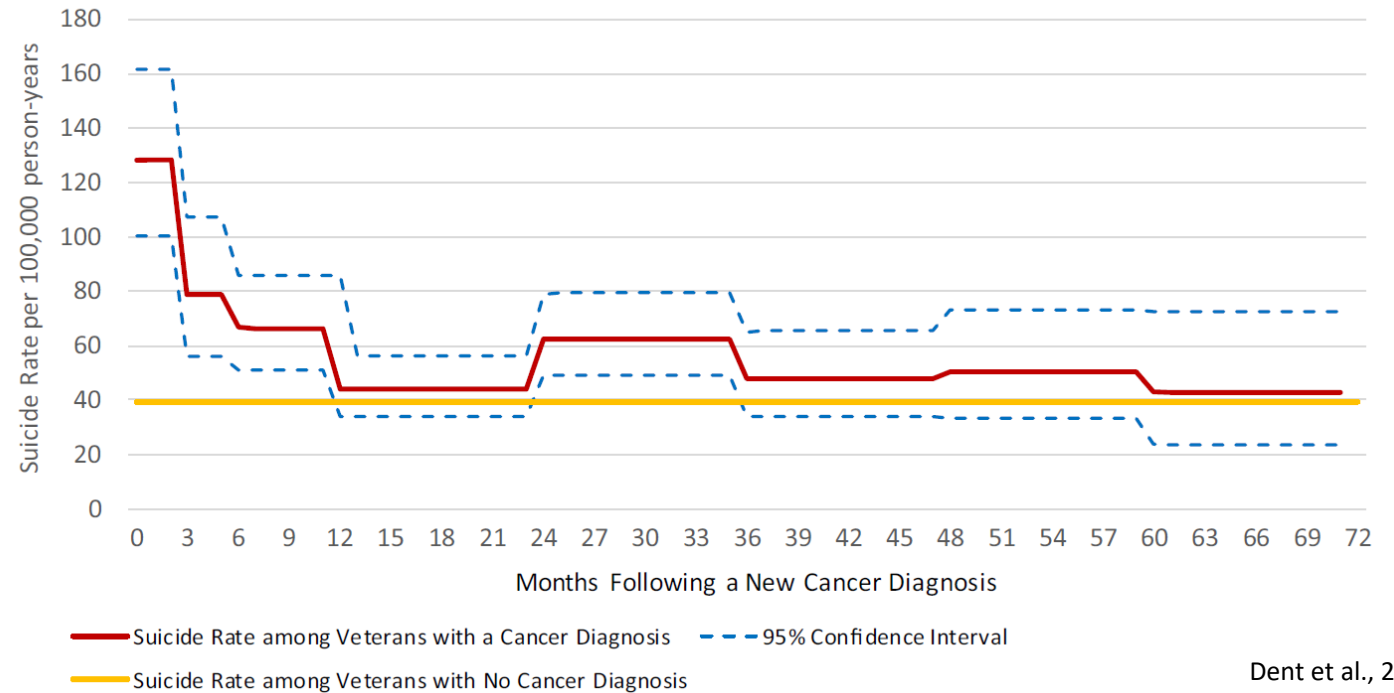


- In the general population, the suicide rate among cancer survivors is nearly triple that of the overall US population<sup>8,9</sup>
  - Though the year following cancer diagnosis is the highest risk time, suicide risk remains elevated for up to ten years following diagnosis<sup>8</sup>



# Suicide among Veteran cancer survivors

- There is limited data on suicide risk among Veteran cancer survivors
  - One study of VHA patients found that a new cancer diagnosis was associated with **47% increased risk for suicide** in up to seven year after diagnosis<sup>10</sup>
  - Among Veteran head and neck cancer survivors, the suicide rate was 203.9 in the two years following cancer diagnosis<sup>11</sup>



Dent et al., 2023



# Cancer survivorship

- Cancer survivorship is the period of time from the end of treatment to the end of life
- Cancer survivors face many challenges after treatment ends
  - lasting physical symptoms and side effects
  - psychological impacts
  - change in social support
- The National Comprehensive Cancer Network (NCCN) recommends that cancer survivors are monitored and assessed for psychosocial distress and mental health symptoms during and after cancer treatment, particularly at points of transition (i.e., diagnosis, end of treatment)
- **VHA currently has no centralized cancer survivorship program or suicide prevention strategies or policies tailored for cancer survivors**



# Research Objectives

- Provide a better understanding of suicide risk among Veterans who received cancer care through VHA
  - Suicide rates
  - Suicide methods
  - Potential risk and protective factors



## Aims

- 1) Estimate the rate of suicide among Veterans with a history of a cancer diagnosis in the VA cancer registry and an age- and sex-matched control group.
- 2) Estimate the association between history of cancer and suicide among Veterans overall and stratified by demographic characteristics, including race/ethnicity, age group, and gender.
- 3) Among Veterans with a history of cancer, examine the association between demographic, military, and cancer-related risk factors and suicide.



# Methods



## Study Cohort

- N=439,667 Veterans with a diagnosis of a primary malignant neoplasm other than non-melanoma skin cancer who received at least some cancer treatment through VHA between 2010-2020
- Age, sex, and VHA use frequency matched non-cancer cohort
  - Randomly selected from cohort of all Veterans with no history of cancer who had documentation of care through VHA 2010-2020
  - Assigned an index date based upon first VHA encounter in the same month and year as diagnosis date of match

# Data Elements and Sources

Category	Target Variables	Source	Variable Use	Study Group
<b>Demographic &amp; Military Service</b>	Sex, Age, Race, Ethnicity, Marital Status, Rural/Urban Status, Branch, deployment history, date of separation from military service	VAIDR, CDW	Cohort Definition, Primary Aim 1: Stratification, Secondary & Exploratory Aims: Independent variables, Covariate adjustment	Cancer and non-cancer
<b>Cancer Diagnosis and Related Variables</b>	Cancer type, date of first diagnosis, pathological stage at diagnosis, treatment(s) received (including medications, surgery, radiation, and other treatments), date of last treatment received, treatment goal (palliative vs curative), secondary or recurrent cancer, date of diagnosis of secondary or recurrent cancer, current disease status	CDW	Cohort Definition Primary Aim 1 & 2: Stratification, Secondary & Exploratory Aims: Independent variables	Cancer only
<b>Suicide</b>	Suicide death (Underlying cause of death codes: X60, X61, X62, X63, X64, X65, X66, X67, X68, X69, X70, X71, X72, X73, X74, X75, X76, X77, X78, X79, X80, X81, X82, X83, X84, Y870, U03)	MDR	All Aims: Outcome	Cancer and non-cancer
<b>Mental Health &amp; Substance Abuse</b>	Severe Mental Illness, Any Mental Illness, Mood disorders, Anxiety, PTSD, Other Mental illness diagnoses, Alcohol Use Disorder, Substance Use Disorder	CDW	Secondary Aim: Independent Exploratory Aim: Mediator	Cancer and non-cancer



# Statistical Analyses

- Suicide rates were calculated overall and by time period for cancer and non-cancer groups
  - Time periods – 2010-2015, 2016-2020
  - Stratified by age
  - Rate ratios were computed comparing cancer and non-cancer groups
- Cox proportional hazard models to compare:
  - Veterans with and without history of cancer
  - Veterans with cancer by demographic and cancer-related characteristics
- Frequencies and proportions of suicide methods by cancer history and age





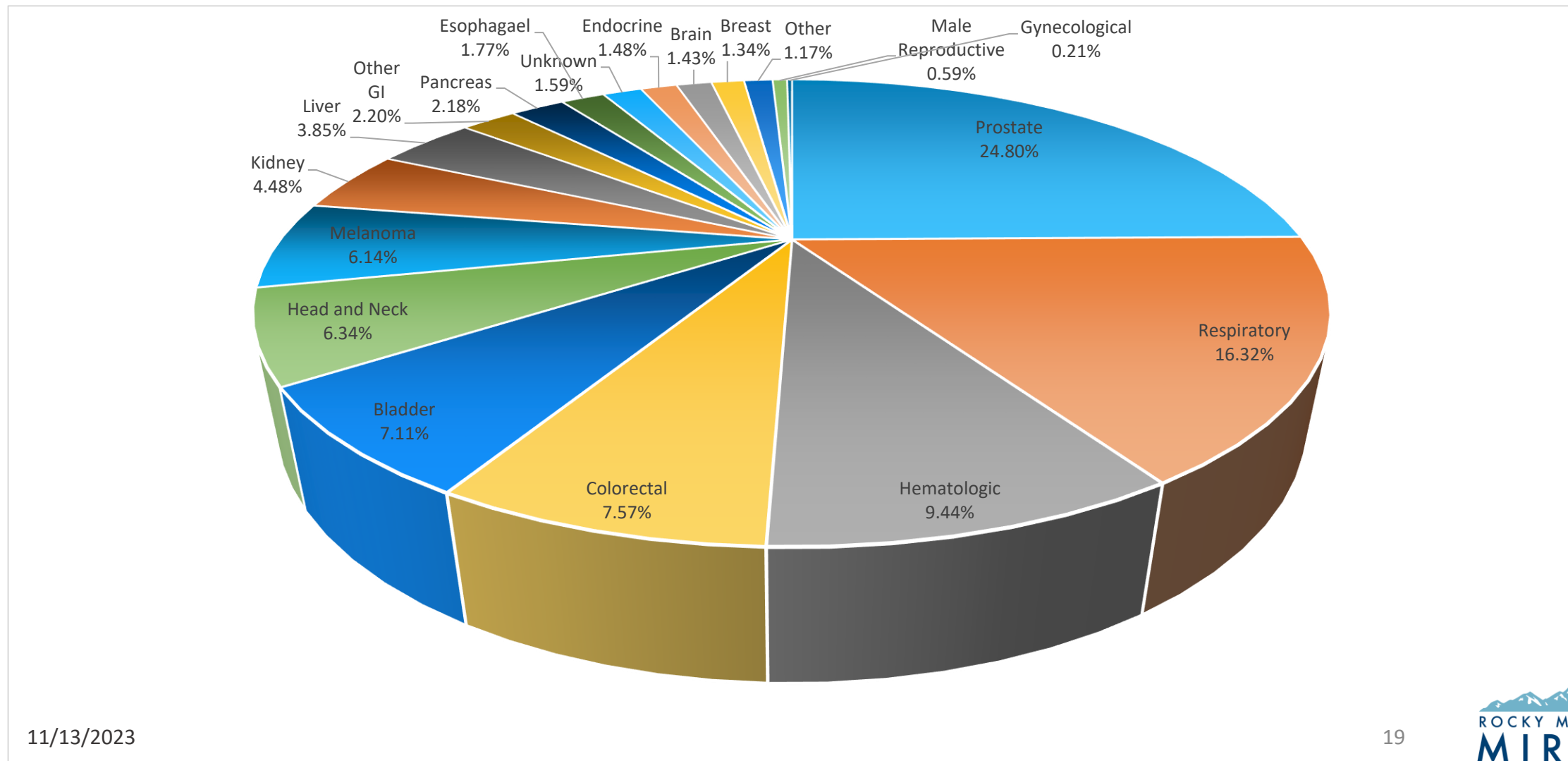
# Results

# Cohort Characteristics

	Overall (n=879,334)	Cancer (n=439,667)	No Cancer (n=439,667)
Age in years, M (SD)	67.20 (10.59)	67.54 (10.09)	66.85 (11.06)
	849,641 (96.62)	424,821 (96.62)	424,820 (96.62)
	29,693 (3.38)	14,846 (3.38)	14,847 (3.38)
	5,762 (0.66)	2,682 (0.61)	3,110 (0.71)
	4,947 (0.56)	1,504 (0.34)	3,443 (0.78)
	156,598 (17.81)	82,236 (18.70)	74,362 (16.91)
	6,498 (0.74)	2,797 (0.64)	3,701 (0.84)
	647,724 (73.66)	325,079 (73.94)	322,645 (73.39)
	57,760 (6.57)	25,363 (5.77)	32,397 (7.37)
	45,504 (5.17)	19,405 (4.41)	26,099 (5.94)
	807,690 (91.85)	409,000 (93.03)	398,690 (90.68)
	26,125 (2.97)	11,256 (2.56)	14,869 (3.38)
	500,247 (56.89)	235,171 (53.49)	265,076 (60.29)



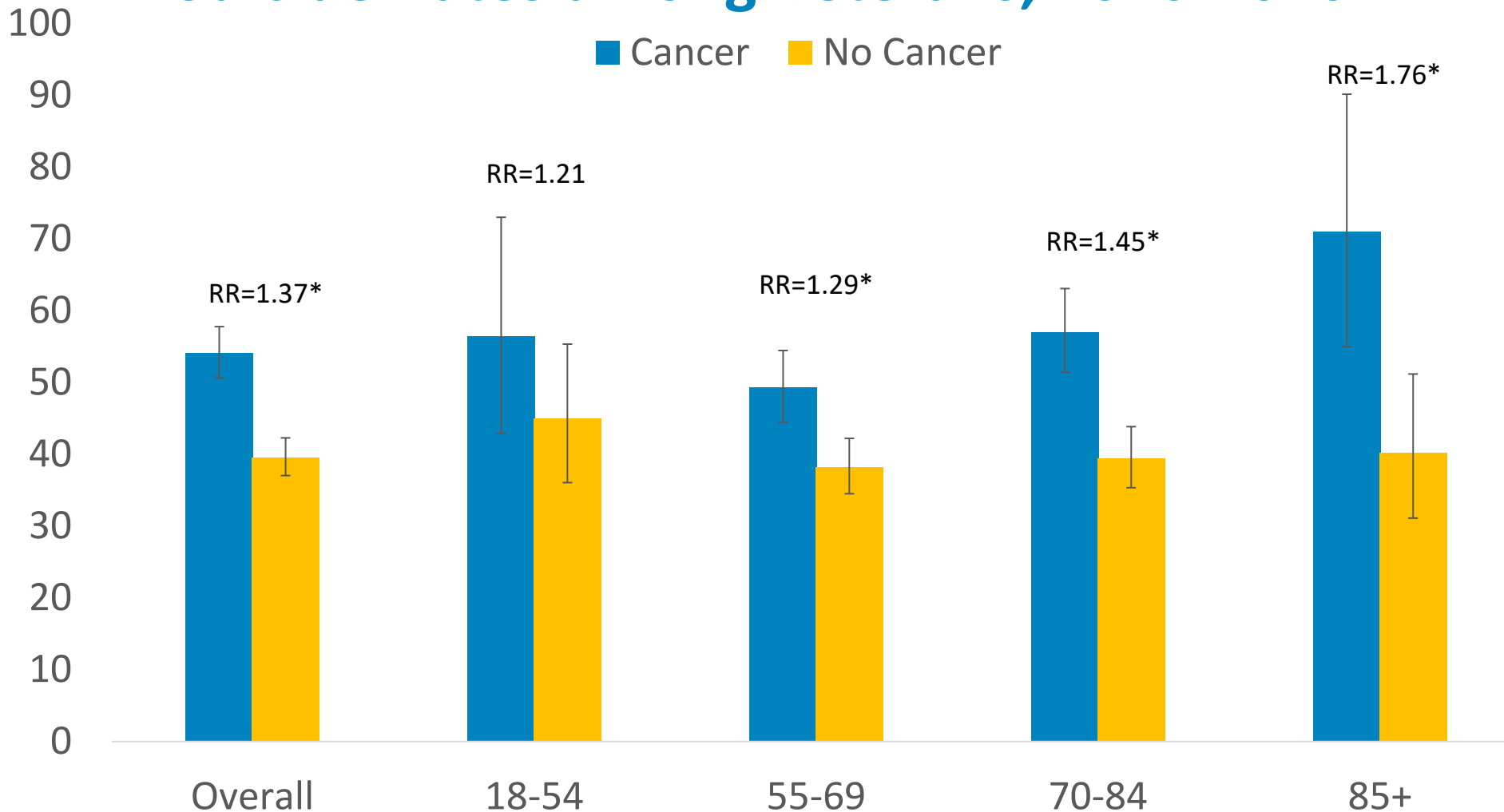
# Cancer Group: Cancer Sites Observed



# Cancer Group: Characteristics

	N (%)
<b>Stage at Diagnosis</b>	
Stage I	143,376 (32.66)
Stage II	91,913 (20.94)
Stage III	50,596 (11.52)
Stage IV	81,261 (18.51)
N/A	44,353 (10.10)
Unknown	27,519 (6.27)
<b>Treatments Received</b>	
Chemotherapy	115,581 (26.29)
Radiation	106,875 (24.31)
Surgery	164,835 (37.59)
<b>Received Multiple Treatment Types</b>	115,900 (26.36)
<b>Palliative Treatment Only</b>	63,674 (14.48)
<b>Cancer Recurrence</b>	236,001 (53.68)
<b>Time Since Diagnosis (years), M(SD)</b>	3.73 (3.13)
<b>Time Since Last Treatment (years), M(SD)</b>	0.53 (1.37)

## Suicide Rates among Veterans, 2010-2020



- Overall, suicide rates for Veteran cancer survivors were 37% higher than rates for Veterans without a history of cancer
- After adjusting for demographic and mental health covariates, the risk of suicide was still significantly higher for cancer survivors (37%)
- Most notable differences observed in older age groups

# Suicide Rates by Cancer Site

Cancer Site	Average Annual Suicide Rate per 100,000
Esophageal	181.70 (117.60, 268.25)
Pancreas	173.90 (103.09, 274.90)
Male Reproductive	114.50 (62.58, 192.06)
Head and Neck	105.40 (86.77, 126.80)
Respiratory	103.20 (87.01, 121.61)
Liver	79.34 (52.72, 114.67)
Colorectal	50.87 (39.65, 64.28)
Melanoma	49.52 (37.97, 63.48)
Bladder	49.43 (37.98, 63.24)
Hematologic	48.17 (37.89, 60.38)
Kidney	42.84 (29.84, 59.58)
Brain	42.75 (20.50, 78.62)
Endocrine	36.35 (28.78, 129.30)
Prostate	32.44 (27.89, 37.53)

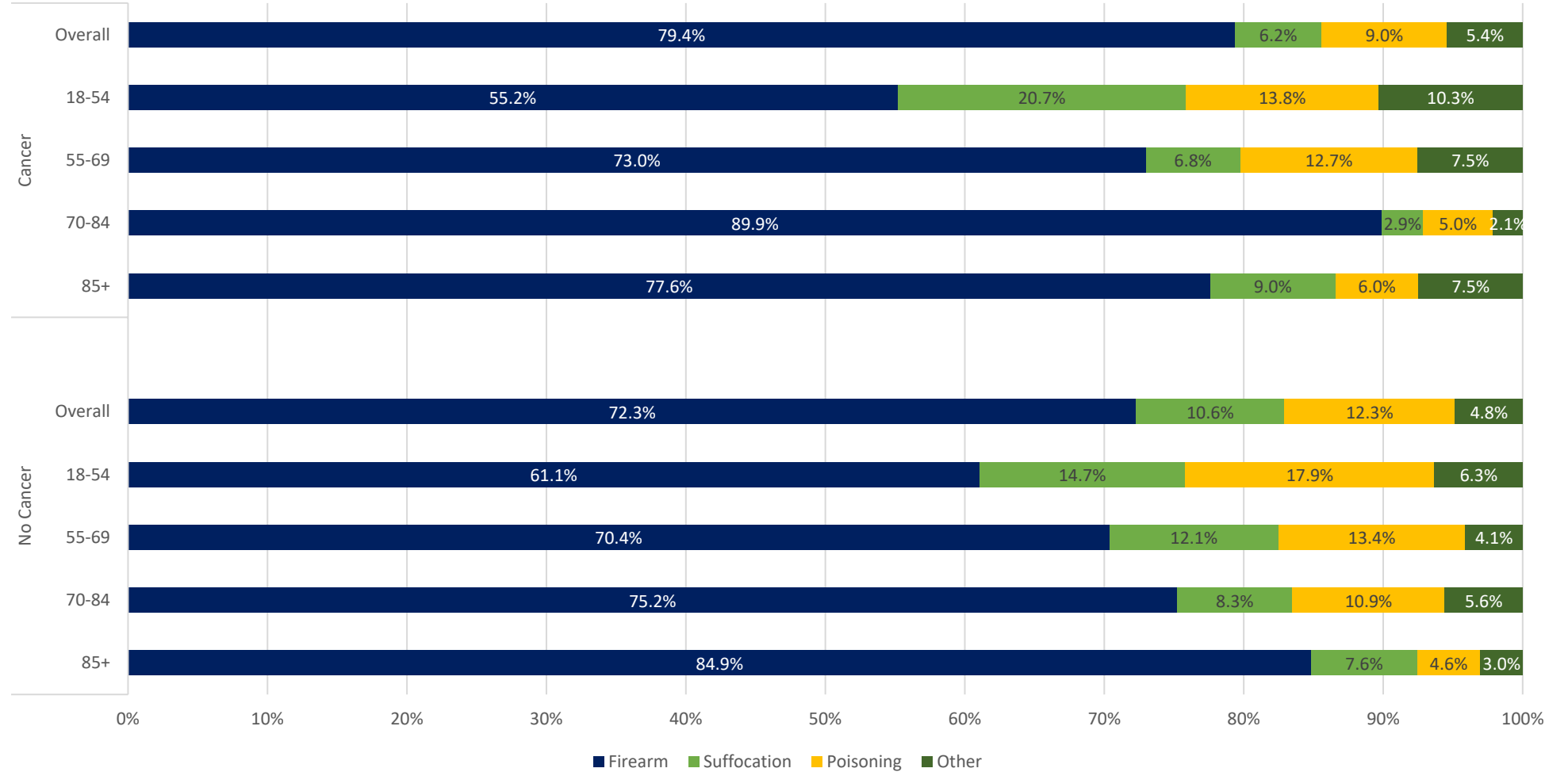
## Suicide rates were especially high for:

- Esophageal
- Pancreatic
- Male Reproductive
- Head and Neck
- Respiratory
  - Notably, lung cancer is one of the four most common cancers diagnosed in Veterans



### Suicide Methods Among Veterans with and without a History of Cancer, 2010-2020

- Overall, Veteran cancer survivors were **more likely to use firearms** as a method of suicide than Veterans without cancer
- **Approximately 90%** of Veteran cancer survivors aged 70-84 used a firearm
- Veteran cancer survivors were **slightly less likely** to use poisoning or suffocation



## Association with Demographic Characteristics and Suicide among Cancer Survivors

	Unadjusted Hazard Ratio	95% CI
<b>Age at Diagnosis</b>	1.02	1.01, 1.02
<b>Assigned Sex</b>		
Male	3.80	1.97, 7.32
<b>Race</b>		
American Indian/Alaskan Native	0.64	0.24, 1.72
Asian	0.57	0.14, 2.27
Black/African-American	0.26	0.20, 0.35
Native Hawaiian/Pacific Islander	0.94	0.42, 2.11
Unknown/Missing	1.58	1.26, 1.99
<b>Ethnicity</b>		
Hispanic or Latino	0.28	0.15, 0.50
Unknown/Missing	1.91	1.37, 2.65
<b>Service Connected</b>	0.65	0.57, 0.74

Male Veterans and older Veterans had **higher** suicide risk.

Black and Hispanic/Latino Veterans and those who are service connected had **lower** suicide risk.





## Association with Cancer Characteristics and Suicide among Cancer Survivors

	Unadjusted Hazard Ratio	95% CI	p-value
<b>Cancer Stage at Diagnosis</b>			<.0001
Stage II	1.05	0.87, 1.26	
Stage III	1.64	1.31, 2.04	
Stage IV	2.48	2.04, 3.02	
N/A	1.26	0.98, 1.62	
Unknown	1.61	1.23, 2.11	
<b>Received Chemotherapy</b>	1.22	1.04, 1.42	.012
<b>Received Surgery</b>	0.50	0.40, 0.62	<.0001
<b>Multiple Treatment Modalities</b>	0.69	0.54, 0.87	.002
<b>Palliative Treatment Only</b>	2.07	1.63, 2.61	<.0001
<b>Cancer Recurrence</b>	2.64	2.14, 3.26	<.0001
<b>Time Since Last Treatment</b>	0.94	0.87, 1.01	.082

- Veterans with higher stage cancers, who received chemotherapy or only palliative treatment, and who had a cancer recurrence had a **higher** risk of suicide
- Those who received surgery and multiple treatment modalities had a **lower** risk of suicide.
- There was no association with time since last treatment encounter and suicide risk



# Discussion



## Next Steps

- Analyses are ongoing:
  - Adjusted models examining correlates of suicide risk among cancer survivors
  - Evaluate mediation by mental health diagnosis
    - Do new mental health diagnoses mediate observed associations between cancer characteristics and suicide?



# Conclusions

- Overall, Veteran cancer survivors are at significantly increased risk for suicide compared to Veterans with no history of cancer
- Risk is especially pronounced in older Veterans
  - Drivers of suicide among younger Veterans are likely different than in older Veterans (e.g., social determinants vs. physical health)
- Certain types of cancer differentially increase risk (e.g., esophageal, pancreatic)
- Veteran cancer survivors predominantly use firearms as a method of suicide



# Implications

- Veteran cancer survivors are at even greater risk for suicide than Veterans without a history of cancer and the general population of cancer survivors
  - Future research to understand lived experiences and drivers of risk in this population is critical to designing effective suicide prevention strategies
- Suicide prevention screening and lethal means counseling for Veteran cancer survivors across the cancer continuum is needed



## Future Directions

- Gender differences in suicide rates among Veteran cancer survivors
  - Aging population of women Veterans
- Identification of psychosocial drivers of suicide risk in this population
- Lived experience with and rates of non-fatal suicidal self-directed violence in this population



# Acknowledgements

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## Supporting Providers Who Serve Veterans

The Suicide Risk Management Consultation Program (SRM) provides free consultation and resources for any provider in the community or VA who serves Veterans at risk for suicide.

Request a consult: [srmconsult@va.gov](mailto:srmconsult@va.gov)

*#NeverWorryAlone*

[www.mirecc.va.gov/visn19/consult](http://www.mirecc.va.gov/visn19/consult)



Risk assessment



Lethal means safety counseling



Conceptualization of suicide risk



Best practices for documentation



Strategies for how to engage  
Veterans at high risk



Provider support after a suicide  
loss (Postvention)



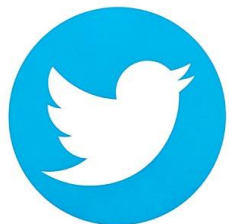


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