Examining Factors that May Contribute to Increased Suicide Risk for Veterans

John F. McCarthy, PhD, MPH
Director, Data and Surveillance, Suicide Prevention
Director, Serious Mental Illness Treatment Resource and Evaluation Center (SMITREC),
Office of Mental Health and Suicide Prevention

Department of Veterans Affairs

My Experiences with Veteran Suicide Analytics

2004: Suicide risks among all VHA patients with depression.

2007: Suicide risks among all VHA patients.

2014: Suicide prediction algorithm for VHA patients.

2016: First annual report on Veteran suicide (Completed 7 to date).

VA has prioritized suicide research, evaluation and surveillance.
Findings inform clinically-based and community-based prevention efforts.

We have worked to investigate broadly and quickly,
however data sources are not uniformly available for all Veterans.
For example, we know much more about suicide risk factors
among Veterans who receive VHA care than among
Veterans who do not receive VHA care.

Suicide Rates Veterans, Compared to Non-Veteran US Adults

Age- and sex-adjusted suicide rates for Veterans were 57.3% higher than for non-Veteran US adults in 2020.

Suicide has many causes and the increased rate among Veterans may reflect factors related to entry into military service and to experiences prior to, during, and after military service.

Among Veterans, suicide rates are associated with many factors, including demographic, social, diagnostic, contextual, service branch, service exposures, housing, and health care utilization indicators. Further work is needed on community, occupational, and economic factors.

Veteran Population* and Recent Receipt of VHA Care

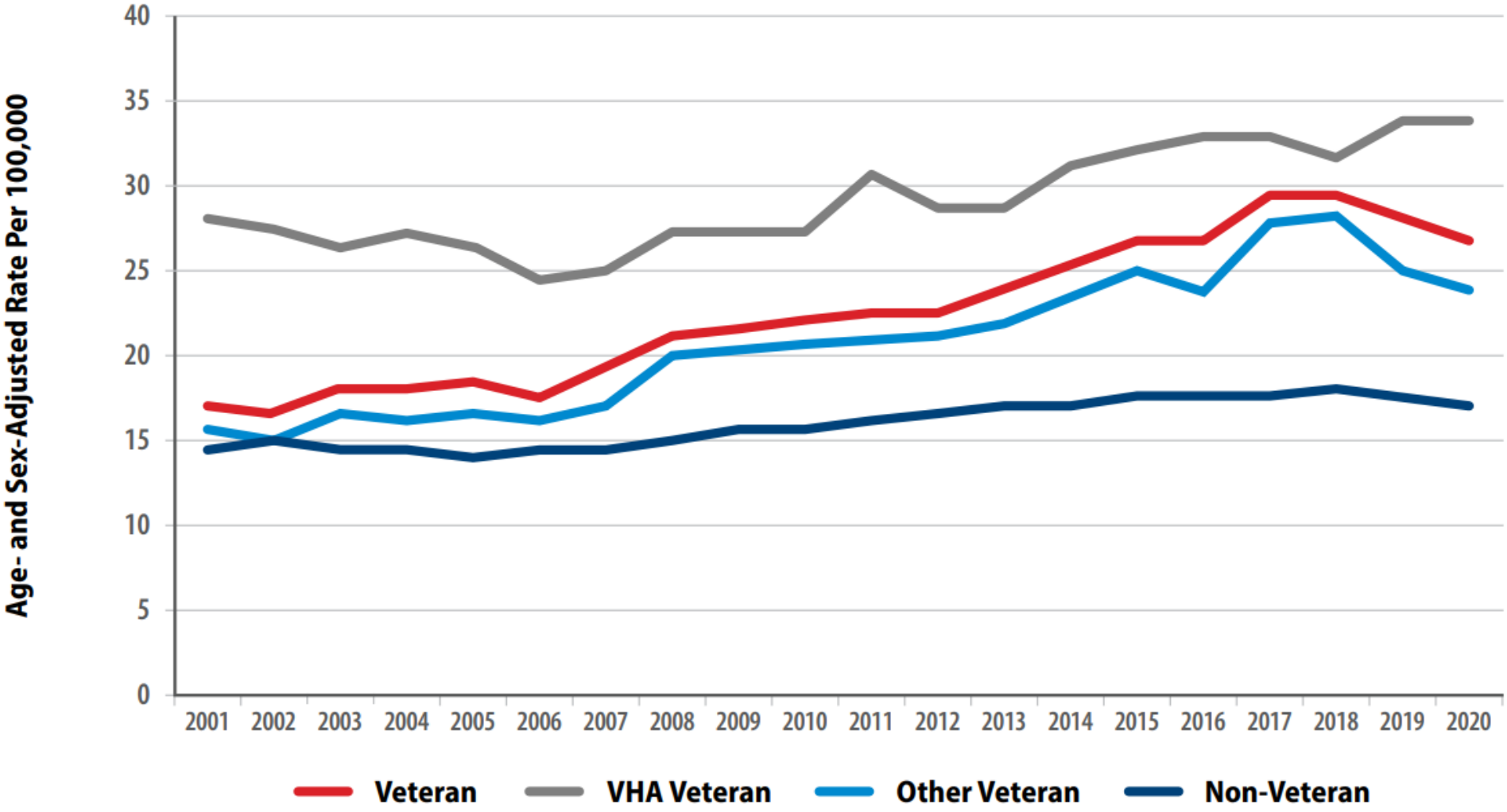
	2001	2020	
All Veterans	25,733,000	19,403,000	↓
Veteran Men	24,112,000	17,403,000	↓
Veteran Women	1,621,000	2,000,000	↑
Recent Veteran VHA Users**	3,834,295	5,944,883	↑
Other Veterans***	21,834,281	13,397,918	↓

* Per the Data Appendix of the 2022 National Veteran Suicide Prevention Annual Report, available here

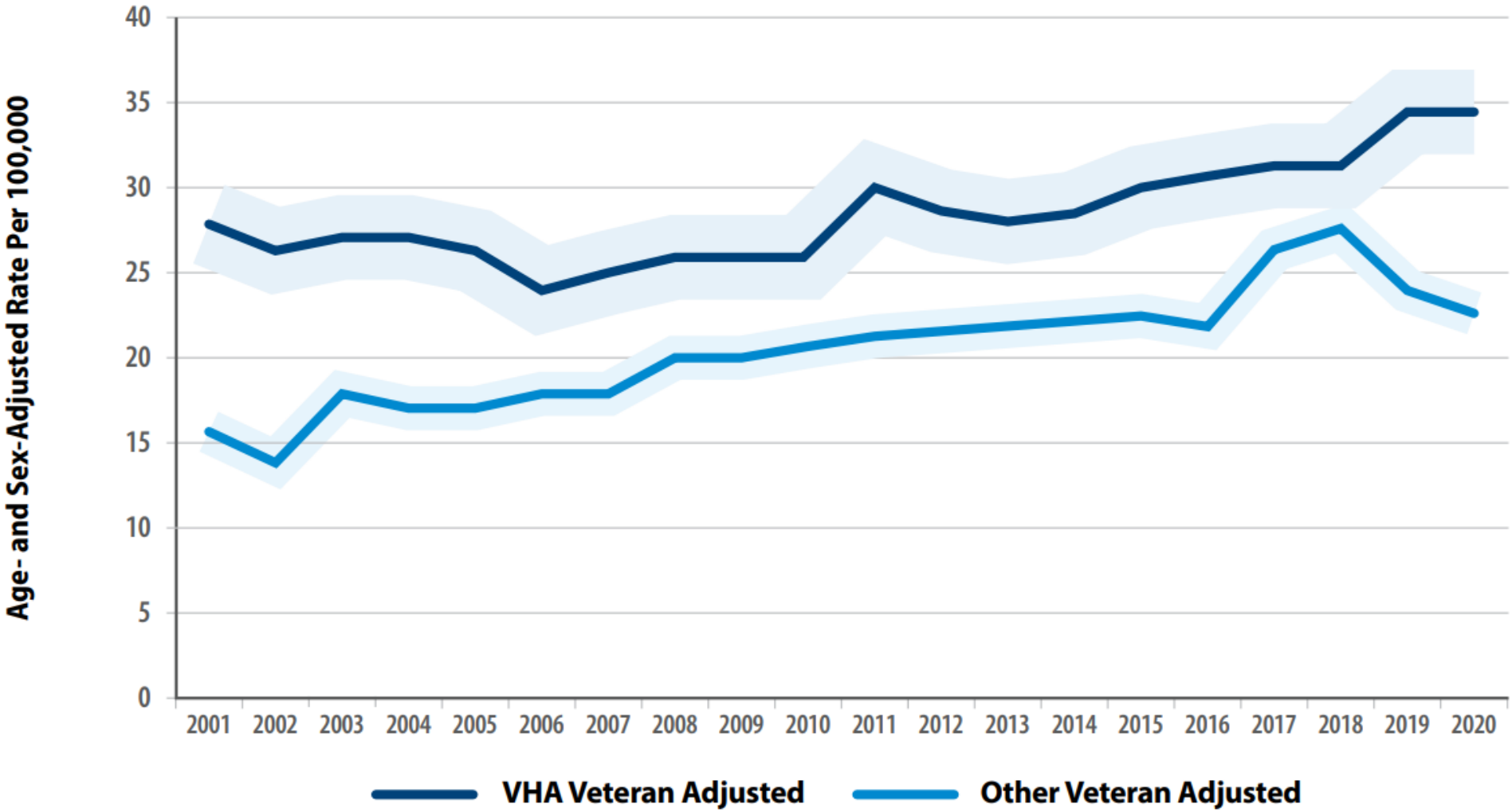
** Recent Veteran VHA Users: Veterans alive at start of year and with VHA inpatient or outpatient care in the year or in the prior year.

*** Other Veterans: Veterans alive at start of the year and who were not identified as Recent Veteran VHA Users

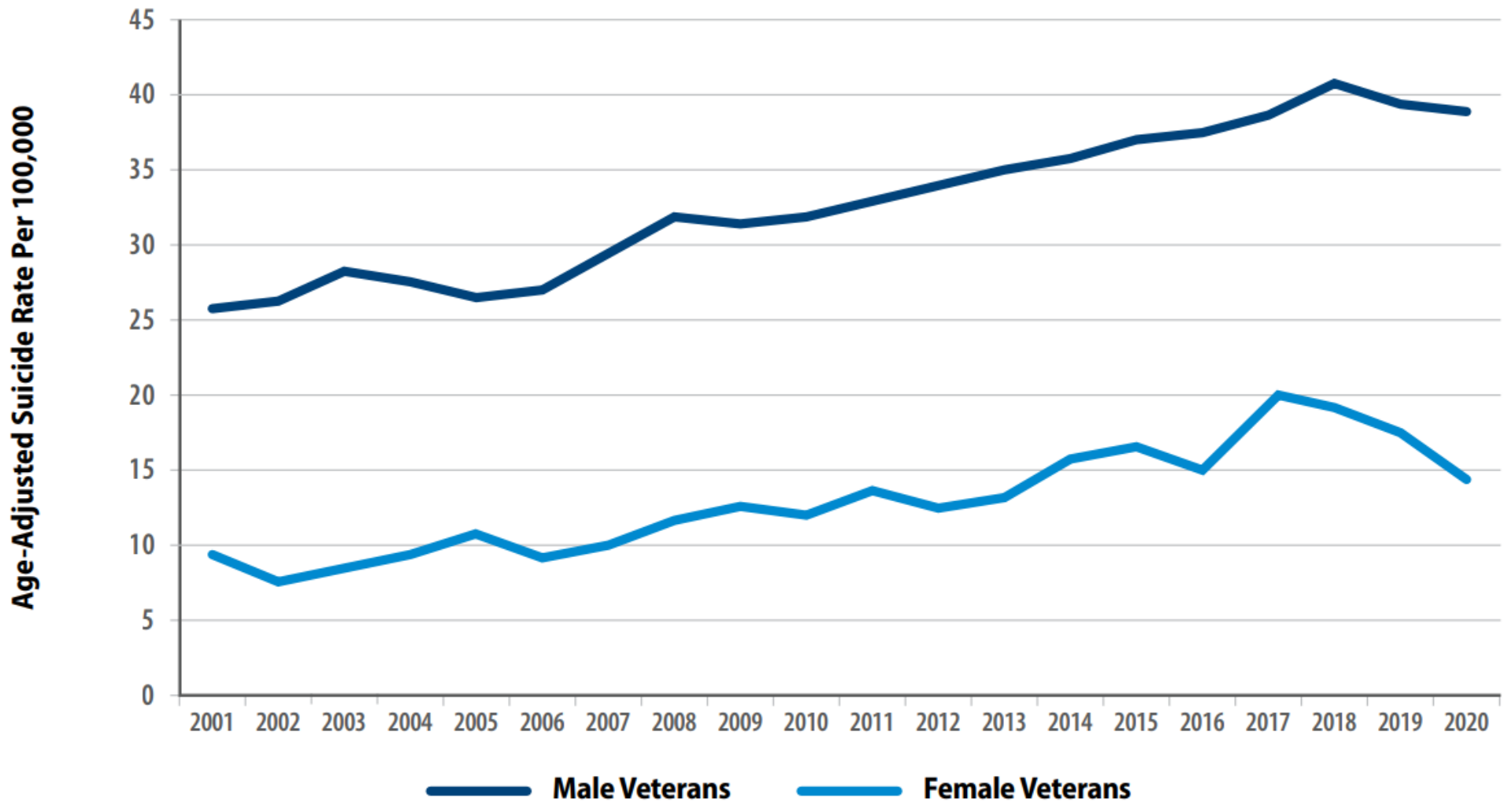
Age- and Sex-Adjusted Suicide Rates, Veterans, Overall and by Recent VHA Care, and Non-Veteran U.S. Adults, 2001–2020



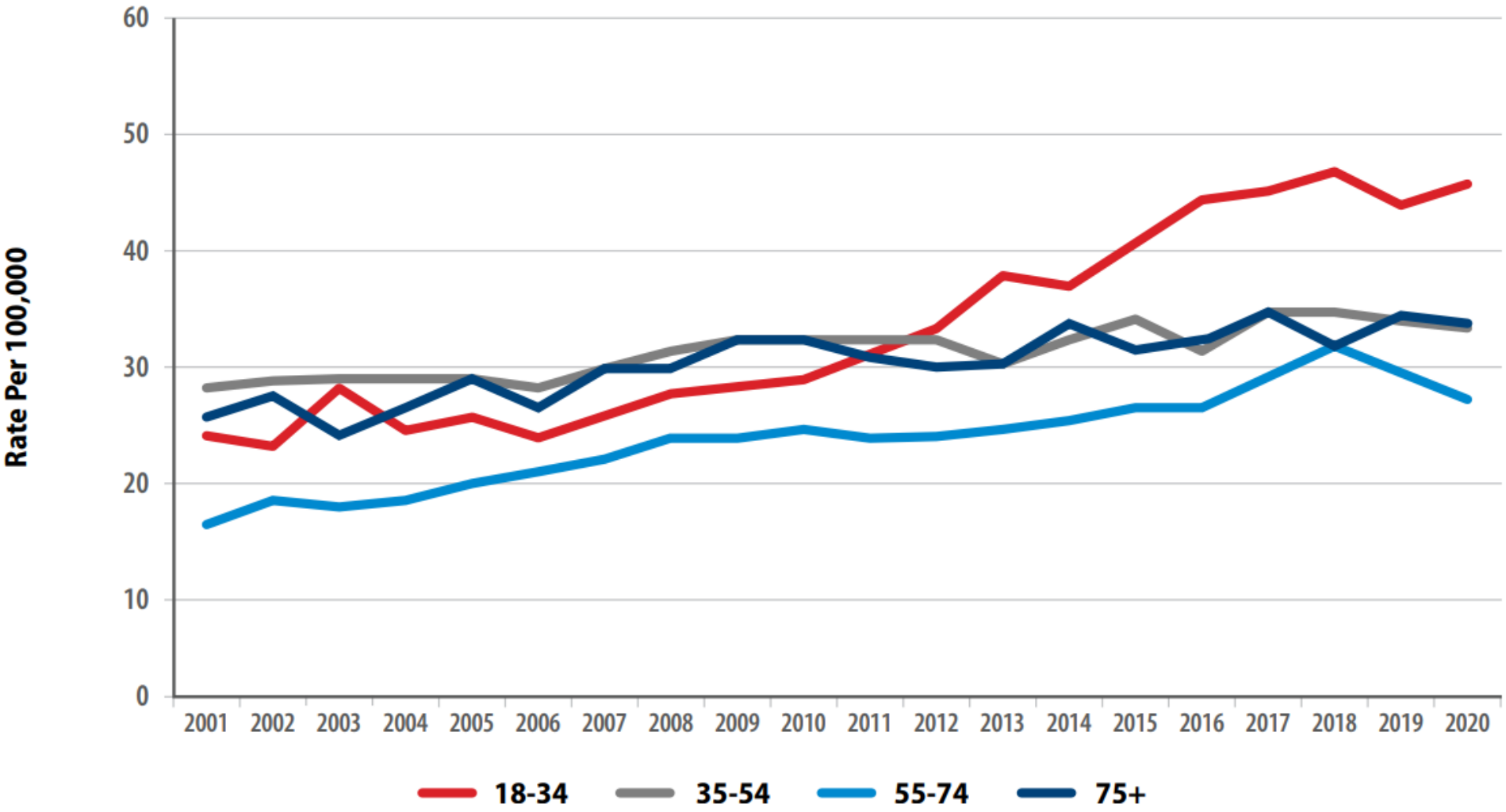
Age- and Sex-Adjusted Suicide Rates Per 100,000, with 95% Confidence Intervals, Veterans, by Recent VHA Care, 2001–2020



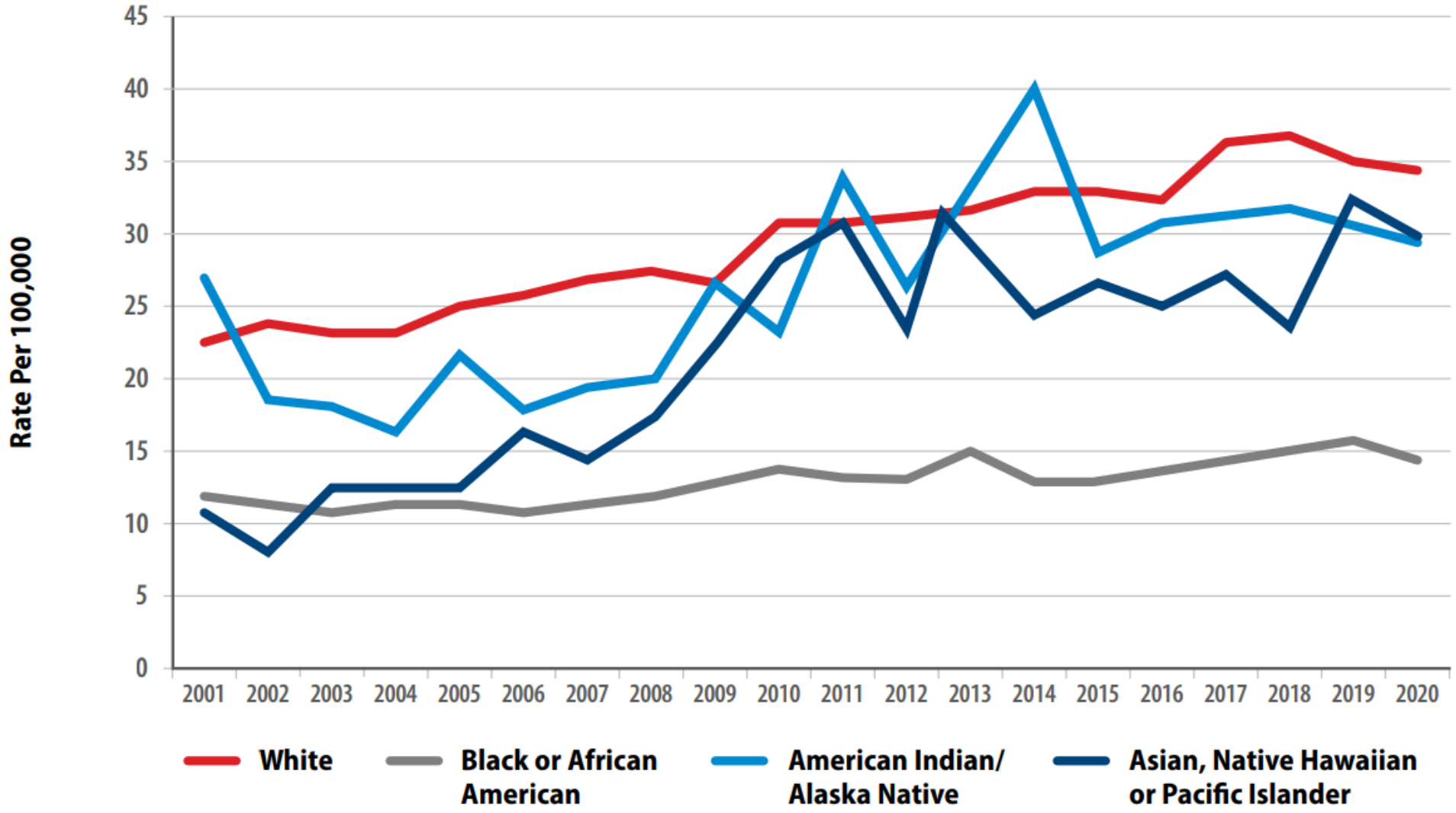
Age-Adjusted Suicide Rate Per 100,000, Male and Female Veterans, 2001–2020



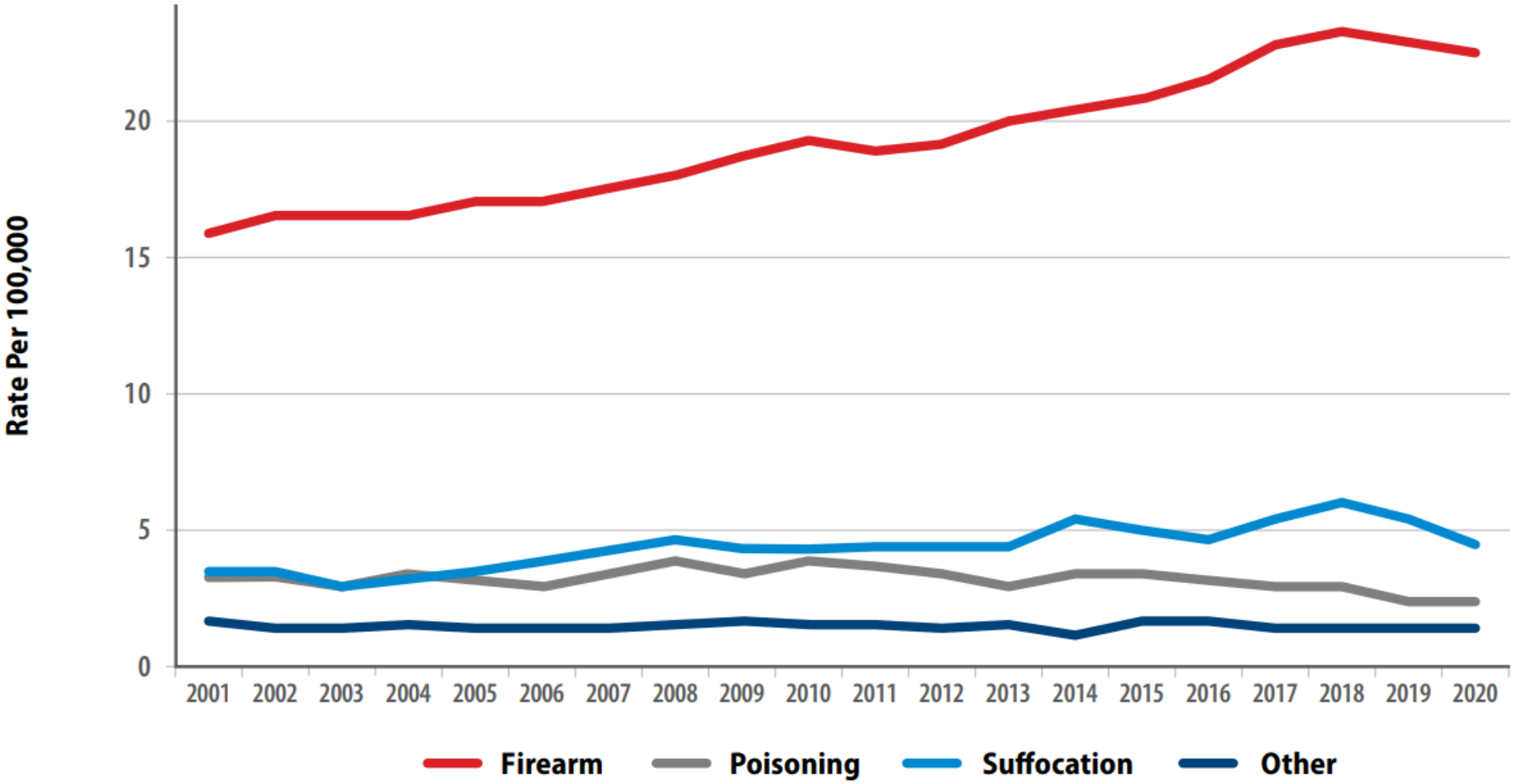
Unadjusted Suicide Rate Per 100,000, Veterans, by Age Group, 2001–2020



Unadjusted Suicide Rates, Veterans, by Race, 2001–2020



Unadjusted Method-Specific Suicide Rates, Veterans, 2001–2020



Suicide Deaths, Methods Involved, 2020 and Difference From 2001*

	SUICIDE DECEDENTS, METHODS INVOLVED											
	Non-Veteran U.S. Adults		Veterans		Non-Veteran Men		Veteran Men		Non-Veteran Women		Veteran Women	
	2020	Change*	2020	Change*	2020	Change*	2020	Change*	2020	Change*	2020	Change*
Firearms	50.3%	-2.3%	71.0%	+4.5%	55.3%	-2.7%	72.1%	+4.8%	33.3%	-2.1%	48.2%	+11.2%
Poisoning	12.8%	-5.6%	8.4%	-4.8%	8.0%	-4.3%	7.5%	-4.9%	29.3%	-8.7%	26.8%	-16.0%
Suffocation	28.4%	+7.6%	14.9%	+0.9%	28.6%	+6.2%	14.7%	+0.6%	27.7%	+12.0%	19.2%	+8.8%
Other	8.4%	+0.3%	5.8%	-0.6%	8.1%	+0.8%	5.8%	-0.5%	9.6%	-1.1%	5.8%	-3.9%

**Difference compared to suicide deaths in 2001*

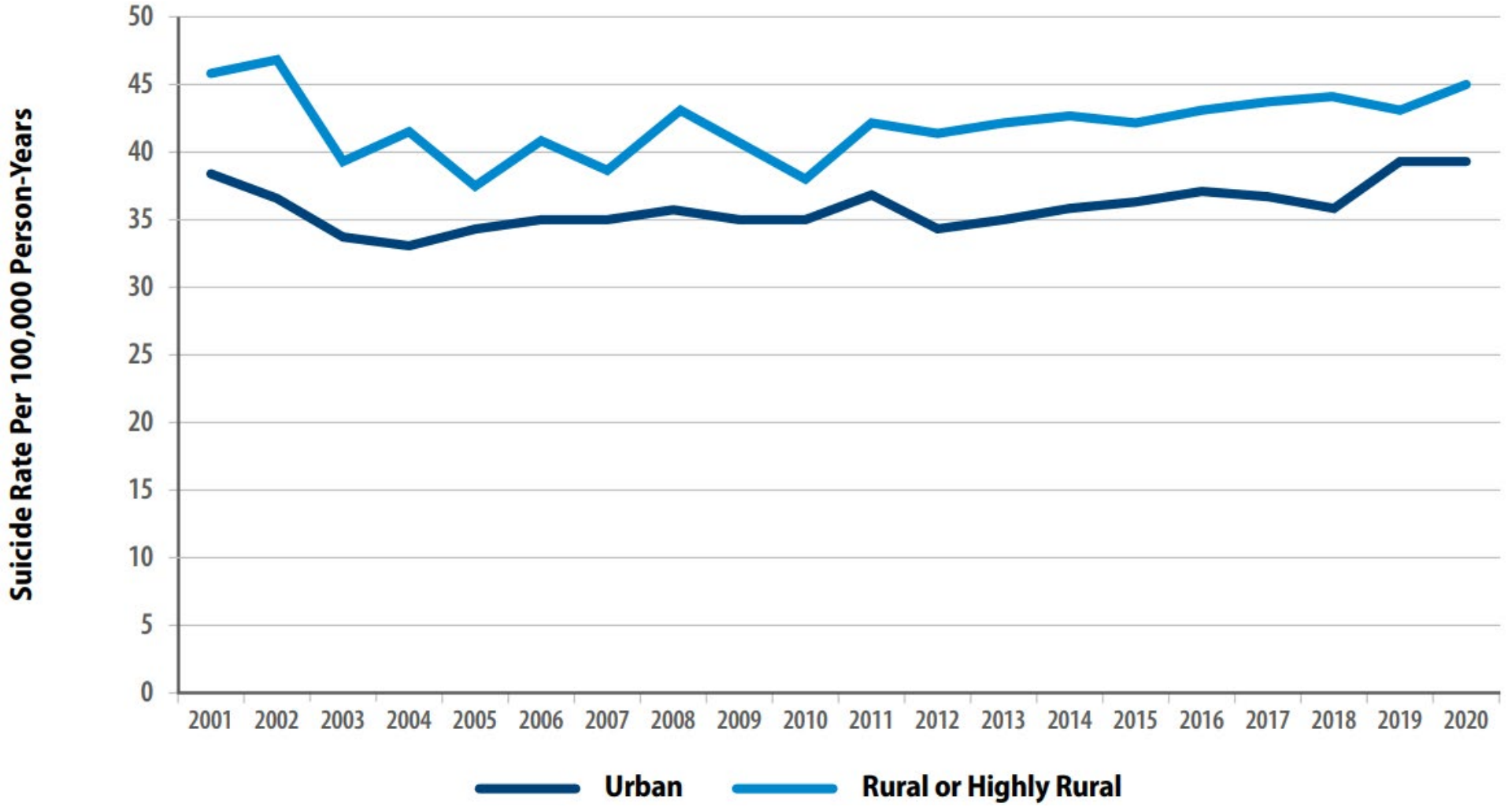
Age-Adjusted Suicide Rates Per 100,000, Veteran VHA Users and Other Veterans, by Sex

	2001	2020	Change
Recent Veteran VHA Users			
Men	43.4	52.2	+20.4%
Women	13.6	16.8	+23.2%
Other Veterans			
Men	23.3	34.1	+46.4%
Women	8.3	13.9	+68.2%

Suicide Deaths and Rates Among Recent Veteran VHA Users, by Mental Health and SUD Diagnoses, 2019 and 2020

	SUICIDE DEATHS		SUICIDE RATES PER 100,000[39]		
Diagnoses[40]	**2019**	**2020**	**2019**	**2020**	**Change[41]**
Without MH Condition/SUD	**1,005**	**1,025**	**28.2**	**29.8**	**+1.7**
With Any MH Condition/SUD	**1,472**	**1,415**	**57.1**	**55.5**	**-1.7**
Anxiety	650	625	68.8	64.8	-4.0
Bipolar disorder	185	184	109.5	111.4	+1.9
Depression	946	859	66.6	60.9	-5.7
Personality disorder	122	112	154.0	147.9	-6.1
Posttraumatic stress disorder	599	595	53.8	52.9	-0.9
Schizophrenia	81	109	87.4	123.5	+36.1
Substance Use Disorder	**623**	**626**	**87.1**	**89.9**	**+2.8**
Alcohol use disorder	491	478	89.9	90.1	+0.2
Cannabis use disorder	177	202	93.0	108.8	+10.2
Cocaine use disorder	63	67	64.6	74.8	+15.8
Opioid use disorder	108	119	114.4	133.1	+18.7
Sedative use disorder	38	33	195.1	185.8	-9.3
Stimulant use disorder	85	93	138.9	159.9	+21.0

Unadjusted Suicide Rate Per 100,000 Person-Years, Recent Veteran VHA Users, by Urban, Rural or Highly Rural Status, 2001–2020



VA Suicide Predictive Algorithm, REACH VET Program

Predictive Modeling and Concentration of the Risk of Suicide: Implications for Preventive Interventions in the US Department of Veterans Affairs

John F. McCarthy, PhD, Robert M. Bossarte, PhD, Ira R. Katz, MD, PhD, Caitlin Thompson, PhD, Janet Kemp, PhD, Claire M. Hannemann, MPH, Christopher Nielson, MD, and Michael Schoenbaum, PhD

Over the past 8 years, the Veterans Health Administration (VHA), the health system of the Department of Veterans Affairs, strengthened its mental health services and supplemented them with specific programs for suicide prevention.[1,2] However, suicide rates in VHA have been stable, without decreases that can be attributed to these enhancements.[3] The stable rates stand in contrast to increased rates in other US populations, especially middle-aged men,[4,5] and in veterans who do not use VHA[3,6]; VHA programs may have mitigated population-wide increases. Nevertheless, the finding that suicide rates in VHA remain high represents a strong call for action.

Although epidemiological research has identified an array of risk factors for suicide,

Objectives. The Veterans Health Administration (VHA) evaluated the use of predictive modeling to identify patients at risk for suicide and to supplement ongoing care with risk-stratified interventions.

Methods. Suicide data came from the National Death Index. Predictors were measures from VHA clinical records incorporating patient-months from October 1, 2008, to September 30, 2011, for all suicide decedents and 1% of living patients, divided randomly into development and validation samples. We used data on all patients alive on September 30, 2010, to evaluate predictions of suicide risk over 1 year.

Results. Modeling demonstrated that suicide rates were 82 and 60 times greater than the rate in the overall sample in the highest 0.01% stratum for calculated risk for the development and validation samples, respectively; 39 and 30 times greater in the highest 0.10%; 14 and 12 times greater in the highest 1.00%; and 6.3 and 5.7 times greater in the highest 5.00%.

Conclusions. Predictive modeling can identify high-risk patients who were not identified on clinical grounds. VHA is developing modeling to enhance clinical care and to guide the delivery of preventive interventions. (*Am J Public Health.* 2015;105: 1935–1942. doi:10.2105/AJPH.2015.302737)

Developing a practical suicide risk prediction model for targeting high-risk patients in the Veterans health Administration

Ronald C. Kessler[1] | Irving Hwang[1] | Claire A. Hoffmire[2] | John F. McCarthy[3] | Maria V. Petukhova[1] | Anthony J. Rosellini[4] | Nancy A. Sampson[1] | Alexandra L. Schneider[2] | Paul A. Bradley[5] | Ira R. Katz[6] | Caitlin Thompson[7,8] | Robert M. Bossarte[9,10]

JAMA Network | Open

Original Investigation | Psychiatry

Evaluation of the Recovery Engagement and Coordination for Health–Veterans Enhanced Treatment Suicide Risk Modeling Clinical Program in the Veterans Health Administration

John F. McCarthy, PhD; Samantha A. Cooper, MPH; Kallisse R. Dent, MPH; Aaron E. Eagan, MPH; Bridget B. Matarazzo, PsyD; Claire M. Hannemann, MPH; Mark A. Reger, PhD; Sara J. Landes, PhD; Jodie A. Trafton, PhD; Michael Schoenbaum, PhD; Ira R. Katz, MD

Abstract

IMPORTANCE The Veterans Health Administration (VHA) implemented a national clinical program using a suicide risk prediction algorithm, Recovery Engagement and Coordination for Health–Veterans Enhanced Treatment (REACH VET), in which clinicians facilitate care enhancements for individuals identified in local top 0.1% suicide risk tiers. Evaluation studies are needed.

OBJECTIVE To determine associations with treatment engagement, health care utilization, suicide attempts, safety plan documentation, and 6-month mortality.

DESIGN, SETTING, AND PARTICIPANTS This cohort study used triple differences analyses comparing 6-month changes in outcomes after vs before program entry for individuals entering the REACH VET program (March 2017-December 2018) vs a similarly identified top 0.1% suicide risk tier cohort from prior to program initiation (March 2014-December 2015), adjusting for trends across subthreshold cohorts. Subcohort analyses (including individuals from March 2017-June 2018) evaluated difference-in-differences for cause-specific mortality using death certificate data. The subthreshold cohorts included individuals in the top 0.3% to 0.1% suicide risk tier, below the threshold for REACH VET eligibility, from the concurrent REACH VET period and from the pre-REACH VET period. Data were analyzed from December 2019 through September 2021.

EXPOSURES REACH VET–designated clinicians treatment reevaluation and outreach for care enhancements, including safety planning, increased monitoring, and interventions to enhance coping.

MAIN OUTCOMES AND MEASURES Process outcomes included VHA scheduled, completed, and missed appointments; mental health visits; and safety plan documentation and documentation within 6 months for individuals without plans within the prior 2 years. Clinical outcomes included mental health admissions, emergency department visits, nonfatal suicide attempts, and all-cause, suicide, and nonsuicide external-cause mortality.

Key Points

Question Is the Veterans Health Administration Recovery Engagement and Coordination for Health-Veterans Enhanced Treatment (REACH VET) program, which facilitates care enhancements for individuals in the top 0.1% suicide risk tier using a validated algorithm, associated with health care utilization, treatment engagement, suicide attempts, suicide safety plan documentation, and suicide mortality?

Findings In this cohort study including 173 313 individuals before and after implementation of the REACH VET program using triple differences, inclusion in the REACH VET program was associated with having more outpatient encounters, increased documentation of new suicide prevention safety plans, and fewer inpatient mental health admissions, emergency department visits, and documented suicide attempts.

Meaning These findings suggest that clinical programs using predictive modeling can support care enhancements and risk reduction

Variables Included in the REACH VET Model

Demographics

Age >= 80
Male
Currently married
Region (West)
Race/ethnicity (White)
(Non-white)
Service Connected (SC) Disability Status
SC > 30%
SC > 70%

Prior Suicide Attempts

Any suicide attempt in prior 1 month
in prior 6 months
in prior 18 months

Diagnoses

Arthritis (prior 12 months)
(prior 24 months)
Bipolar I (prior 24 months)
Head and neck cancer (prior 12 months)
(prior 24 months)
Chronic pain (prior 24 months)
Depression (prior 12 months)
(prior 24 months)
Diabetes mellitus (prior 12 months)
Systemic lupus erythematosus (prior 24 months)
Substance Use Disorder (prior 24 months)
Homelessness or services (prior 24 months)

VHA utilization

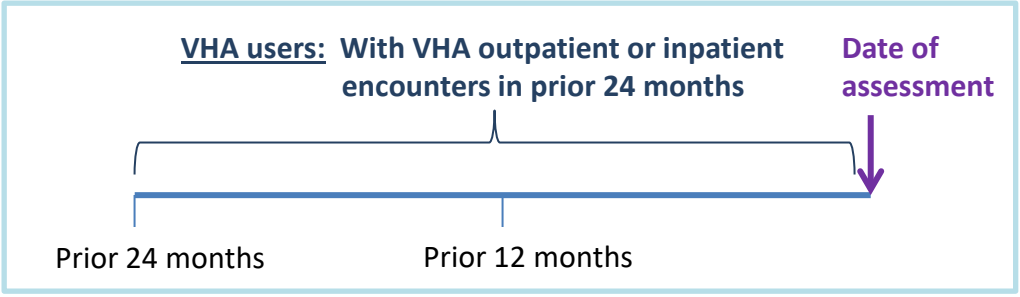
Emergency Dept visit (prior month)
(prior 2 months)
Psychiatric Discharge (prior month)
(prior 6 months)
(prior 12 months)
(prior 24 months)
Any mental health (MH) tx (prior 12 months)
(prior 24 months)
Days of Use (0-30) in the 13th month prior
in the 7th month prior
Emergency Dept visits (prior month)
(prior 24 months)
First Use in Prior 5 Years was in the Prior Year
Days of Inpatient MH (0-30) in 7th month prior
Squared
Days of Outpatient (0-30) in 7th month prior
in 8th month prior
in 15th month prior
in 23rd month prior
Days with outpt MH use in prior month, squared

Medications

Alprazolam (prior 24 months)
Antidepressant (prior 24 months)
Antipsychotic (prior 12 months)
Clonazepam (prior 12 months)
(prior 24 months)
Lorazepam (prior 12 months)
Mirtazapine (prior 12 months)
(prior 24 months)
Mood stabilizers (prior 12 months)
Opioids (prior 12 months)
Sedatives or anxiolytics (prior 12 months)
(prior 24 months)
Statins (prior 12 months)
Zolpidem (prior 24 months)

Interactions

- Between Other anxiety disorder (prior 24 months) and Personality disorder (prior 24 months)
- Interaction between Divorced and Male
- Interaction between Widowed and Male



Summary

- VA operational analyses since 2007 have substantially advanced our understanding of Veteran suicide.
- We have solid findings.
  - Veterans are at greater risk for suicide than non-Veteran US adults.
  - Veteran suicide deaths are more likely to involve firearms than suicide deaths among non-Veterans.
  - Context matters – state variation in suicide rates in the general population is associated with state variation in rates among Veterans in VHA care.
  - Among Veterans, suicide rates have increased substantially among younger Veterans.
  - Electronic health records include many markers of increased suicide risk, including screening, diagnostics, medication and treatment setting measures. It is important to assess how these findings may generalize to other health systems.
- Questions → Answers → Actions

Contact Information

Thank you!

John F. McCarthy, PhD, MPH
VA Office of Mental Health and Suicide Prevention

John.McCarthy2@va.gov
(734) 277-8737