

The Risk of Suicide among U.S. War Veterans: Vietnam War to Operation Iraqi Freedom

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Washington, DC

2010 DOD/VA Suicide Prevention Conference
January 10-14, 2010

Suicide Facts

- >31,000 suicides in U.S. in 2005.
- Suicide was the second leading cause of death for white males, 20-29 years old (n=3,479).
- Firearms are the most commonly used method (51%), followed by suffocation (34%), and poisoning (8%).
- Age, gender, racial/ethnic disparities.
- Risk factors: previous attempt; depression or other mental illness; alcohol/drug abuse; physical illness; feeling alone, etc.

Suicide Rates in General Population*

Males			Females		
Race			Race		
Age	Whites	Others	Age	Whites	Others
20-24	21.9	16.3	20-24	3.5	2.5
80-84	47.2	14.9	80-84	4.3	2.8

* Rate /100,000 /Year, available at : <http://www.cdc.gov/niosh/ltras/>

TABLE 1: Studies of suicide risk among Vietnam veterans compared to non-Vietnam veterans or U.S. general population

Authors	Study Design	Description	Results, Suicide
Breslin, et al. (JOM, 1988)	Proportionate Mortality	Compared mortality of 19,708 deceased Army Vietnam veterans to that of 22,904 Army Vietnam-era veterans (PMR). Compared mortality of 4,527 deceased Marine Vietnam veterans to that of 3,781 Marine Vietnam- era veterans (PMR). Mortality included all deaths through 7/1/1982.	PMR=0.93 (0.88-0.98): Vietnam Army PMR=0.93 (0.86-1.01) :Vietnam Marines
Bullman, et al. (AJE, 1990)	Proportionate Mortality	Compared mortality of 6,668 deceased Army Vietnam veterans who served in I Corps region of Vietnam to that of 27,917 Army Vietnam-era veterans (PMR). Mortality included all deaths through 12/31/1984.	PMR=0.97 (0.90-1.04)
Thomas, et al. (AJE, 1991)	Retrospective Cohort Mortality	Compared the mortality of 4,582 female Vietnam veterans to that of 5,324 female Vietnam-era veterans (RR). The mortality of both groups was also compared separately to that of US general population (SMR). Mortality followed from end of service through 12/31/1987.	RR=0.96 (0.39-2.39) SMR=1.36 (0.62-2.57): women Vietnam veterans SMR=1.42 (0.71-2.54) :women Vietnam-era veterans

TABLE 1 continued: Studies of suicide risk among Vietnam veterans compared to non-Vietnam veterans or U.S. general population

Authors	Study Design	Description	Results, Suicide
Watanabe, et al. (JOM, 1991)	Proportionate Mortality	Compared mortality of 24,145 deceased Army Vietnam veterans to that of 27,917 deceased Army Vietnam-era veterans (PMR). Compared mortality of 5,501 deceased Marine Vietnam veterans to that of 4,505 deceased Vietnam-era veterans. Included deaths through 12/31/1984 (PMR).	PMR=0.96 (ns): Vietnam Army PMR=0.99 (ns): Vietnam Marine
Watanabe/Kang (Ann Epidemiol 1995)	Retrospective Cohort Mortality	Compared mortality of 10,716 Marine Vietnam veterans to that of 9,346 Marine Vietnam-era veterans (RR). The mortality of both groups also compared to that of U.S. general population (SMR). Mortality followed from end of service through 12/31/1991.	RR=1.19 (0.78-1.83) SMR=0.91 (0.67-1.21): Marines Vietnam veterans SMR=0.79 (0.56-1.09): Marines Vietnam-era veterans
Cypel/Kang (Ann Epidemiol 2008)	Retrospective Cohort Mortality	Compared mortality of 4586 female Vietnam veterans to that of 5325 female non-Vietnam veterans (RR) and the US population (SMR). Included deaths through 12/31/2004.	RR=0.90 (0.44-1.85) SMR=1.22 (0.67-2.04)

RR is Relative Risk Estimate; PMR is Proportionate Mortality Ratio; SMR is Standardized Mortality Ratio. All RRs, PMRs, and SMR are adjusted for covariates. All confidence intervals, appear in parentheses, are calculated at the .05 level. Era veterans are those who served during the same time period as Vietnam veterans, but did not serve in Vietnam.

TABLE 2. Studies of suicide risk among Vietnam veterans with physical or psychological trauma compared to other Vietnam veterans or U.S. general population

Authors	Study Design	Description	Results, Suicide
Bullman/Kang (J Nerv Ment Dis. 1994)	Retrospective Cohort Mortality	Compared mortality of 4,247 Vietnam veterans diagnosed with PTSD on Agent Orange Registry (AOR) to that of 12,010 Vietnam veterans on the AOR with no clinical diagnosis (RR). The mortality of both groups also compared to that of U.S. general population (SMR). Mortality followed from date of AOR exam through 8/16/1990.	RR=3.97 (2.20-7.03) SMR=6.74 (4.40-9.87) :PTSD Dx
Bullman/Kang (AJPH, 1996)	Retrospective Cohort Mortality	Assessed risk of suicide for 34,534 Army Vietnam veterans who received non-lethal wound in Vietnam relative to severity of wounds and number of times wounded. Severity based on whether or not veteran was hospitalized (HOSP) and number of times wounded, once vs. 2 or more (2+). Mortality of veterans also compared to that of U.S. general population (SMR). Mortality followed from date received 1 st wound through 12/31/1991.	RR=1.50 (1.01-2.24) 2+ SMR=1.22 (1.00-1.46): HOSP SMR=1.58 (1.06-2.26): 2+
Boscarino (Ann Epidemiol 2005)	Retrospective Cohort Mortality	Examined the causes of death among 15,288 Vietnam era male veterans by a history of PTSD. Mortality followed from January 1985 through 12/31/2000.	HR=2.2 (0.9-5.2): era veterans with PTSD HR=2.3 (1.4-3.9): theater veterans with PTSD

RR is Relative Risk Estimate; SMR is Standardized Mortality Ratio; HR is Hazards Ratio. All RRs, HR, and SMRs are adjusted for covariates. All confidence intervals, appear in parentheses, are calculated at the .05 level.

Table 3: Studies of suicide risk among Army or Air Force Vietnam veterans compared to non-Vietnam veterans

Authors	Study Design	Description	Results, Suicide
Boehmer, et al. (Arch Inter Med, 2004)	Retrospective Cohort Mortality	Compared the mortality of 9,324 Army Vietnam veterans to that of 8,989 Army Vietnam-era veterans, stratified by years since discharge. Mortality followed from date of discharge through 12/31/2000.	RR=1.72 (0.76-3.88) 0-5 yrs since discharge RR=0.93 (0.64-1.34) >5 years since discharge
Michalek, et al. (Mil Med, 2005)	Retrospective Cohort Mortality	Compared mortality of 1,262, Vietnam veterans who participated in Operation Ranch Hand to that of 19,078 U.S. Air Force veterans who also served in Vietnam, but did not participate in Operation Ranch Hand. Mortality followed from the date they began their service in Vietnam to 12/31/1999.	RR=0.7 (0.3-1.7)

RR is Relative Risk Estimate; PMR is Proportionate Mortality Ratio; SMR is Standardized Mortality Ratio. All RRs are adjusted for covariates. All confidence intervals, appear in parentheses, are calculated at the .05 level. Vietnam veterans are those who served in-theater during the conflict. Era veterans are those who served during the same time period as Vietnam veterans, but did not serve in Vietnam.

TABLE 4: Studies of suicide risk among Gulf War veterans compared to non-Gulf veterans or U.S. general population

Authors	Study Design	Description	Results, Suicide
Kang/Bullman (N Eng J Med, 1996)	Retrospective Cohort Mortality	Compared the mortality of 695,516 Gulf War veterans (PG) to that of 746,291 Gulf War -era veterans (PE), both collectively and separately for males and females The mortality of both PG and PE veterans was also compared to that of the U.S. general population. Mortality followed from end of service through 9/30/1993.	RR=0.94 (0.79-1.12) All RR=0.88 (0.72-1.08) Males RR=1.47 (0.63-3.43) Females SMR=0.69 (0.61-0.77) PG SMR=0.73 (0.65-0.82) PE
Kang/Bullman (AJE, 2001)	Retrospective Cohort Mortality	Compared the mortality of 621,902 Gulf War veterans (PG) to that of 746,248 Gulf War-era veterans (PE), separately for males and females. Mortality followed from end of service through 12/31/1997.	RR=0.92 (0.83-1.02) Males RR=1.29 (0.78-2.31) Females
Bullman/Kang (AJPH, 2005)	Retrospective Cohort Mortality	Compared the mortality of 100,487 Army Gulf War veterans potentially exposed to chemical warfare agents at Khamisiyah in 3/1991 to that of 224,980 Army Gulf War veterans not likely to have been exposed. Exposure based on 2000 plume model. Mortality followed from end of service through 12/31/2000.	RR=1.05 (0.88-1.25)
Kang et al. (Occup Environ Med, 2002)	Review Article	Reviewed findings from various Gulf War veterans mortality studies, including those listed above.	No increased risk of suicide found, whether the expected based on Gulf War-era veterans or US population

RR is Relative Risk Estimate; SMR is Standardized Mortality Ratio. All RRs and SMR are adjusted for covariates. All confidence intervals, appear in parentheses, are calculated at the .05 level. Gulf War veterans are those who served during the 1990-1991 conflict. Era veterans are those who served during the same time period as Gulf War veterans, but did not serve in the theater.

TABLE 5: Risk of suicide among activated military personnel compared to U.S. general population

Authors	Study Design	Description	Results, Suicide
Rothberg, et al. (JAMA, 1990)	Retrospective Cohort Mortality Study	Compared the mortality rates for all US Army in 1986 to US general population.	SMR=.69 (0.56-0.82)
Helmkamp (Mil Med, 1995)	Retrospective Cohort Mortality Study	Compared suicide rates for the period of 1980-1992 of active duty military by subgroup to rates for US general population	Rate All Military=11.84 Rate US General Pop.=15.10 Unadjusted Rate Ratio=.8
Writer, et al (JAMA, 1996)	Retrospective Cohort Mortality Study	Compared in-theater mortality rates of 688,702 Gulf War military personnel on active duty from 8/1/1990 through 7/31/1991 to that of the US general population	SMR=0.34 (0.16-0.63)
Allen, et al (Mil Med, 2005)	Retrospective Cohort Mortality Study	Presented suicide rates all activated military personnel 1993-2003, by branch of service.	Rates generally decreased overtime, until 2003 when the rate increased
U.S Army Surgeon General, 2008	Retrospective Cohort Mortality Study	Presented suicide rate between 2003 and November 2007 for Army personnel while serving in the Iraqi theater.	Suicide rates have generally increased from 2004 to November 2007.

SMR is Standardized Mortality Ratio. All RRs and SMR are adjusted for covariates. Rate is number of suicides per 100,000 persons.

All confidence intervals, appear in parentheses, are calculated at the .05 level. Only those that do not include 1.0 are considered statistically significant.

TABLE 6: Suicide risk among all veterans compared to non-veterans

Authors	Study Design	Description	Results, Suicide
MaCarthy et al (AJE, 2009)	Cohort mortality	Suicide mortality was assessed in FY 2001 for patients alive at the start of that FY among 4,692,034 veterans who used VA healthcare in FY 2000-2001	Male patients: SMR=1.66 (1.58-1.74) Female patients: SMR=1.87(1.35-2.47)
Zivin et al (AJPH, 2007)	Retrospective cohort mortality	Suicide mortality rate among 807,694 veterans who received treatment for depression in the VA healthcare system in 1999-2004 was determined	Male patients: 89.6/100,000 Female: 28.9/100,000 White: 95.1/100,000 Black:27.1/100,000
Kapur et al (PLoS Med, 2009)	Cohort mortality	Suicide mortality was assessed among 233,803 UK veterans who were discharged in 1996-2005 in comparison with UK general population	1 st 2 years after discharge: 24.7/100,000 2-6 years: 18.7/100,000 SMR=0.97(0.84-1.10)
Kaplan et al (J Epidemiol Community Health, 2007)	A prospective Population based study	A total of 320,890 men who participated in the National Health Interview Surveys 1986-94 were matched to the Multiple Cause of Death file (1986-97) through the National Death Index.	HR (hazard ratio)=2.13 (1.14-3.99): veterans

TABLE 7: Study of suicide risk among OEF/OIF veterans compared to U.S. general population- Deaths through 12/31/2005

Authors	Study Design	Description	Results, Suicide
Kang and Bullman (JAMA 2008)	Retrospective Cohort Mortality	Compared mortality of 490,346 OEF/OIF veterans to that of U.S. general population (SMR). Mortality followed from end of active duty service through 12/31/2005	SMR=1.15(0.97-1.35): All veterans SMR=1.33 (1.03-1.69): Active component SMR=1.77(1.01-2.87): VA patients with a mental disorder

SMR is Standardized Mortality Ratio. SMR are adjusted for covariates. All confidence intervals, appear in parentheses are calculated at the .05 level. Only those that do not include 1.0 are considered statistically significant.

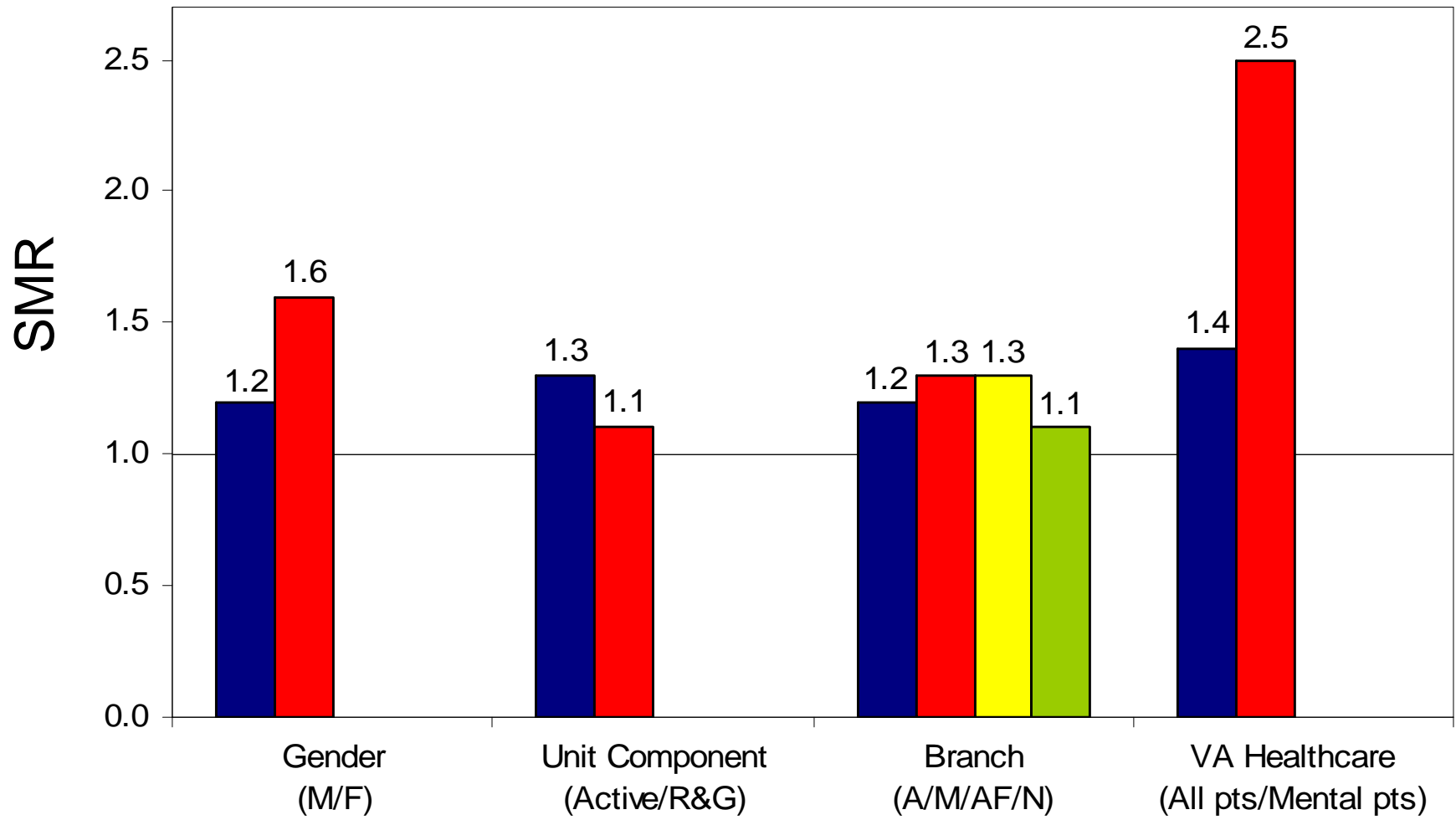
TABLE 8: Suicide risk among OEF/OIF veterans compared to U.S. general population- deaths through 12/31/2007

Veterans	N	Deaths N	All Cause SMR(95%CI)	Suicides N	Suicides SMR (95%CI)	Suicide Rate/100,000
All	791,386	2,356	0.55 (0.53-0.57)	416	1.21 (1.09-1.33)	21.8
Active Component	426,496	1,182	0.68 (0.64-0.72)	223	1.31 (1.14-1.49)	22.9
Reserve Component	364890	1,174	0.46 (0.44-0.49)	193	1.11 (0.96-1.27)	20.7
Male	700,451	2,234	0.55 (0.53-0.58)	401	1.2 (1.08-1.32)	23.8
Female	90,935	122	0.52 (0.43-0.62)	15	1.56 (0.87-2.57)	6.8
VA Healthcare Users	312,840	877	0.6 (0.56-0.64)	150	1.4 (1.19-1.65)	24.7
Pts with Certain Mental Dx*	106,819	384	0.79 (0.72-0.88)	91	2.46 (1.98-3.02)	42.8

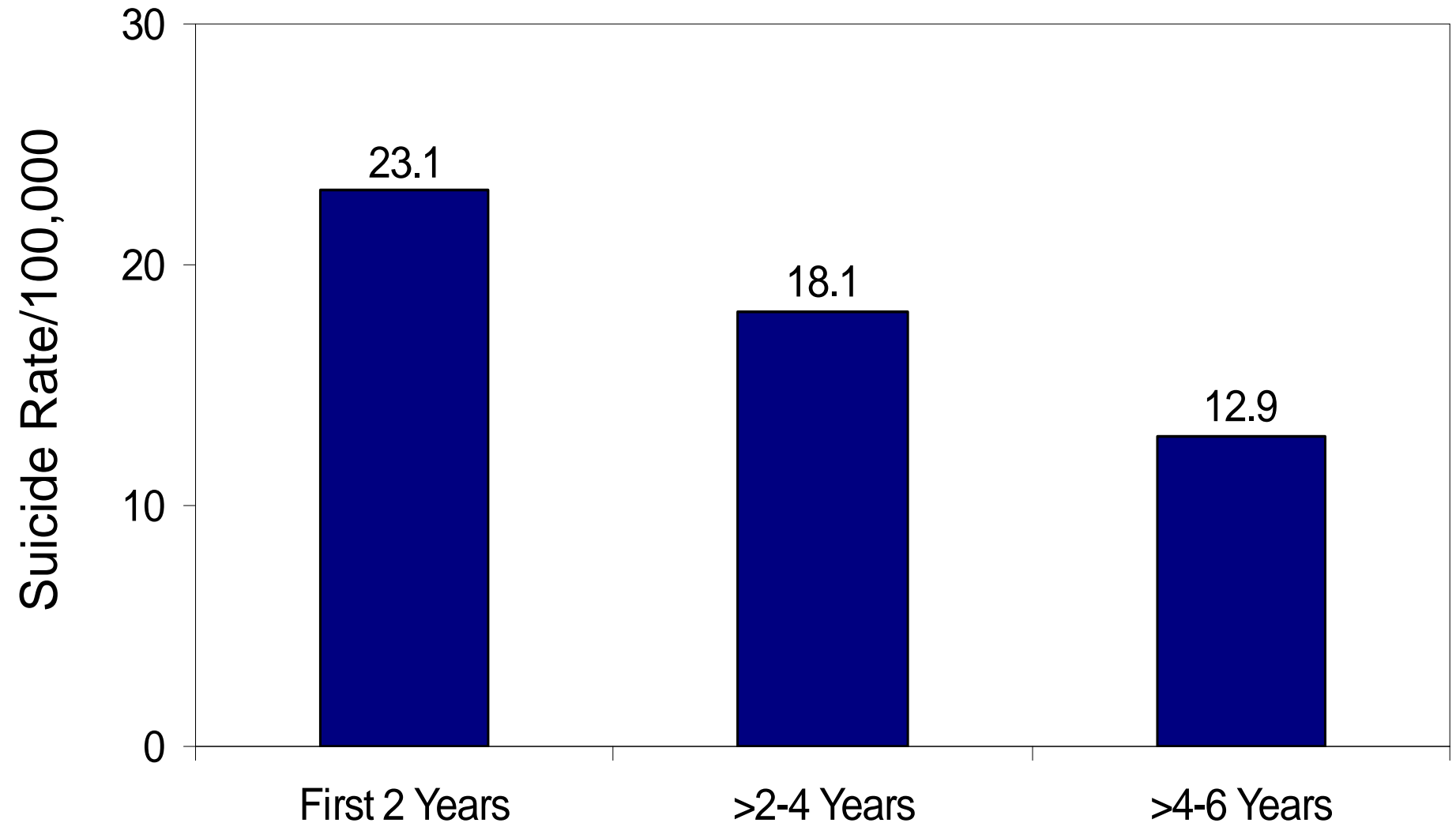
SMR (95% CI): Standardized Mortality Ratio (95% confidence interval).

* Patients with affective psychoses, neurotic disorder, alcohol/drug dependence, adjustment disorder including PTSD, and depressive disorder.

Suicide Risk among OEF/OIF Veterans by Demographic and Military Characteristics



Suicide Rates among OEF/OIF Veterans by Years since Separation from Active Duty



Summary

- The risk of suicide among Vietnam War veterans and Gulf War veterans, as a whole, is not significantly higher than non-deployed veterans or than the comparable U.S. general population.
- Level of combat trauma as indirectly measured by having PTSD and being wounded in action was associated with the risk of suicide among Vietnam veterans.
- Veterans who sought healthcare from VA, especially for depression, experienced a significantly higher suicide risk compared to the U.S. general population.
- The risk of suicide among OEF/OIF veterans is significantly higher than the comparable U.S. general population based on follow-up through December 2007.
- The risk appears to be inversely related to the time elapsed since separation from active military duty (or return from Iraq or Afghanistan theaters).
- In view of the high percentage of returning OEF/OIF veterans screening positive for one or more mental disorders, this group of OEF/OIF veterans should be monitored closely.

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