



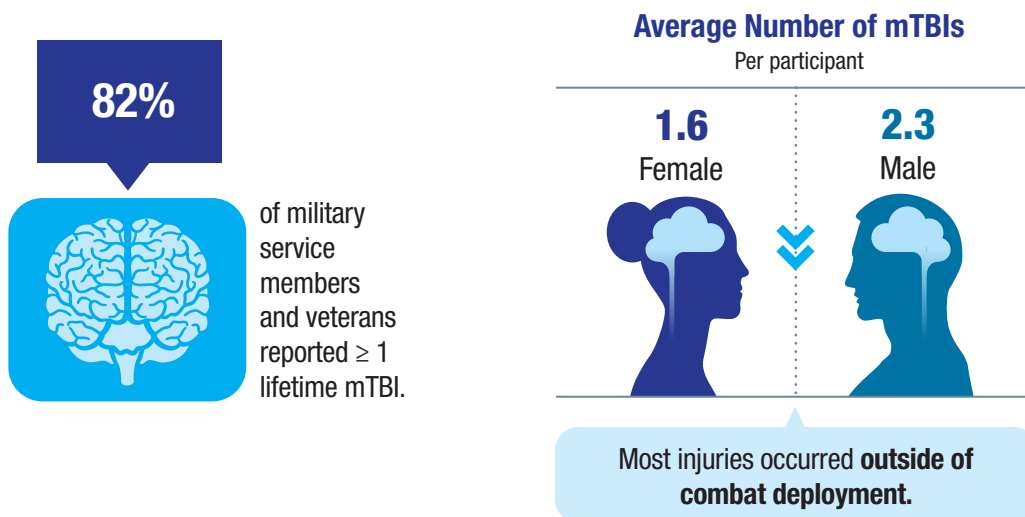
Neurology

Traumatic brain injury (TBI) is a critical area of concern and driver of morbidity for veterans, who face a mortality rate more than three times higher than healthy civilians.^{1,2} This elevated risk is compounded by secondary neurological conditions.³⁻⁵ After a TBI, individuals have an increased risk of epilepsy — which carries its own increased mortality burden — and a 113% increased risk for dementia later in life.³⁻⁵ High baseline fitness provides lasting cognitive protection, while regional incidence of dementia varies across the US.^{6,7} The VHA highlights a multifaceted approach to other neurological conditions, such as dementia, from prevention to clinical care.⁶

Sex Differences in mTBI in Service Members and Veterans¹

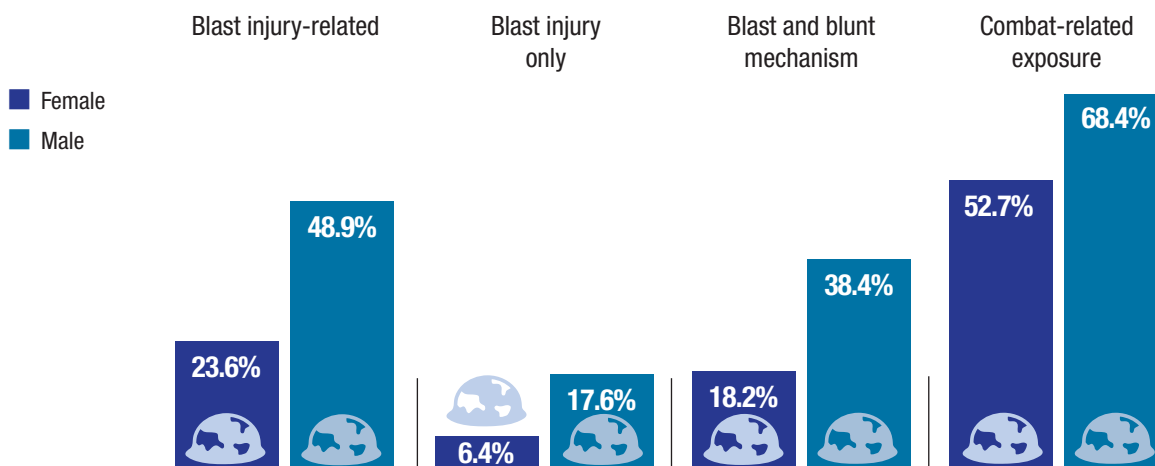


A study of more than 2300 military service members and veterans evaluated sex-related differences in lifetime mild TBI (mTBI) exposure from 2015 to 2022. Participants had at least one prior deployment to a combat zone, and no history of moderate-to-severe TBIs or significant neurologic or psychiatric comorbidities.



Type of TBI Exposure by Sex

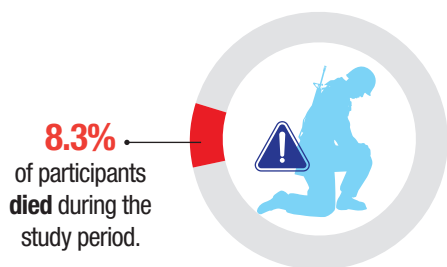
In those with ≥ 1 lifetime mTBI



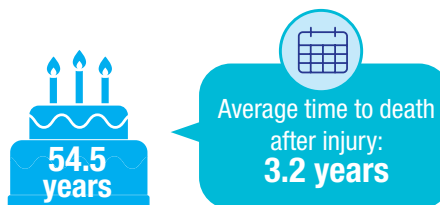
Mortality Following TBI in Service Members and Veterans²



A longitudinal analysis of more than 900 veterans and service members with TBIs assessed mortality rates and related mortality factors up to 10 years post-TBI (2009-2020). Mortality and life expectancy estimations for veterans and service members were compared with those of the general population (2015-2016).



Mean Age of Death



Life Expectancy Reduction



Service members
and veterans had a
7-year reduction

Standard Mortality Ratio

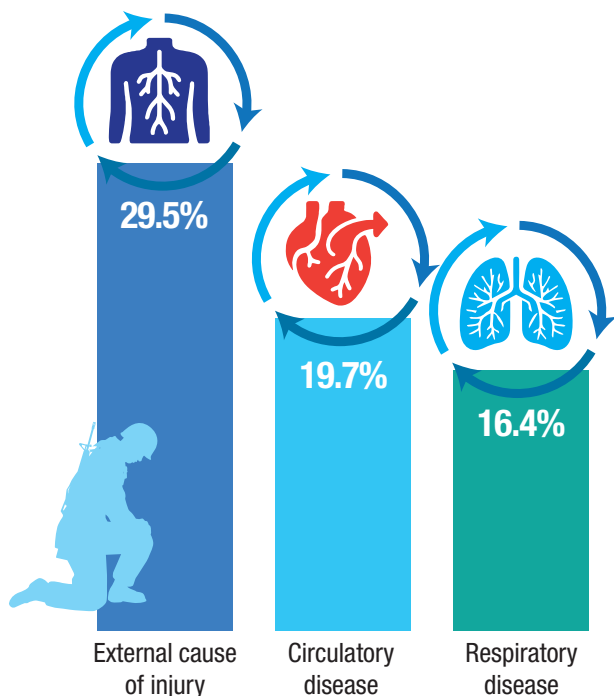


Service members
and veterans had a **3.62x**
increase in mortality

...compared with the general US population

Most Common Cause of Death

In those with a known cause, displayed as % of
participants with known cause



Risk Factors for Mortality

Those who died were...

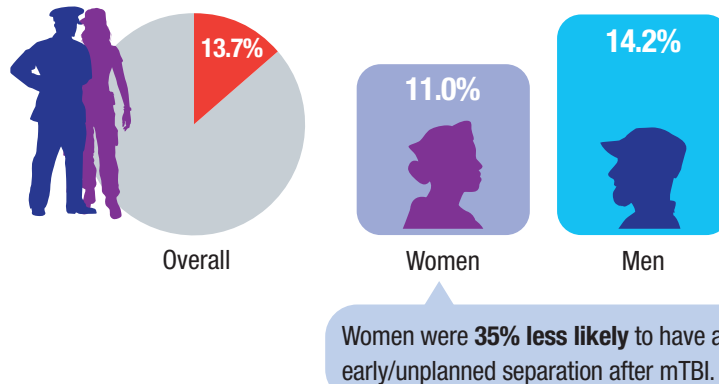
- +** Older at time of injury:
51 vs 35 years (mean age)
- +** More likely to be unemployed:
6.2x
- +** More likely to have a history of
mental health issues: **2.0x**

Early/Unplanned Service Separations After mTBI⁸

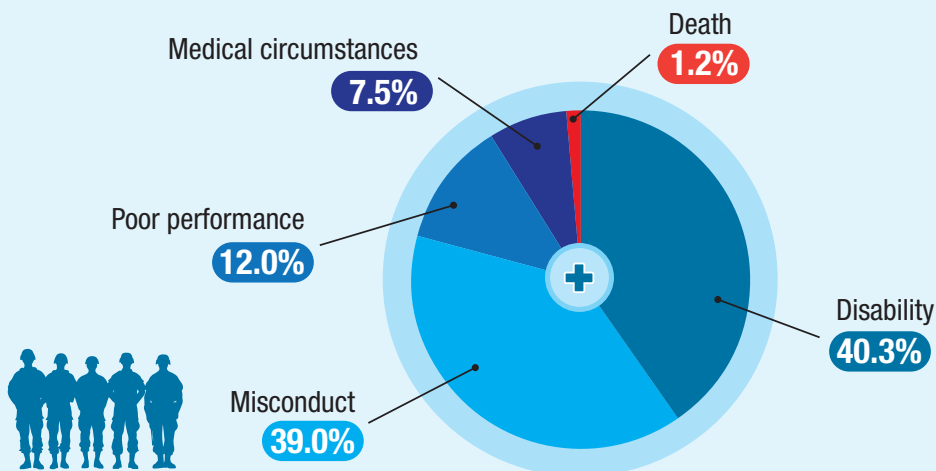


A **retrospective cohort study** assessed more than 75,000 active-duty service members for early/unplanned separations (2011-2018) — defined as disability, misconduct, poor performance, death, or medical circumstances — within 2 years of sustaining an mTBI.

Incidence of Early/Unplanned Separations



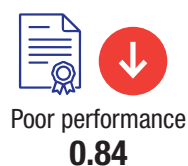
Causes of Separation



Causes of Separation by Sex

Displayed as hazard ratios

Female service members were less likely to separate due to...



But, more likely to separate due to...



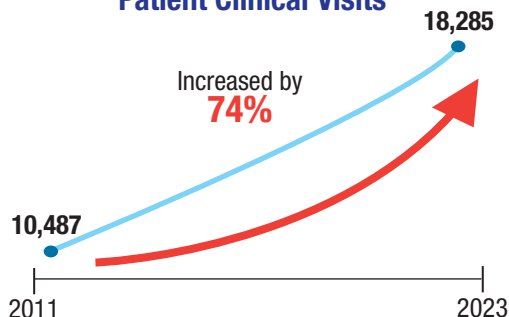
...compared with male service members

VHA Epilepsy Center of Excellence⁹

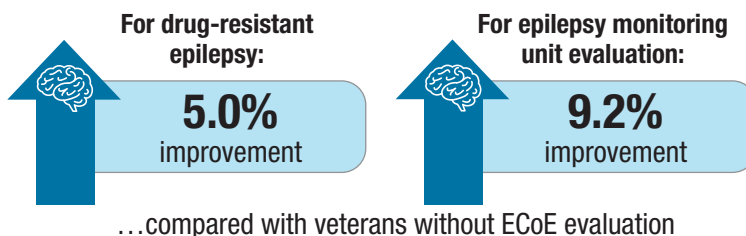


Researchers evaluated the performance of the VHA Epilepsy Center of Excellence (ECoE), which was founded in 2008. Clinical care, research, education, and outreach were measured by analyzing the ECoE website information and annual reports along with relevant data from 2011 to 2023.

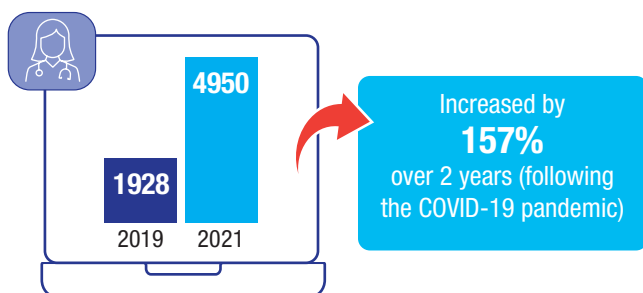
Patient Clinical Visits



Mortality Rate Improvement



Tele-Epilepsy Visits



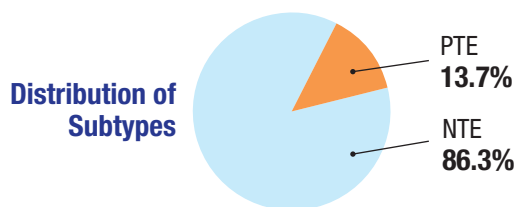
Research Grant Funding



Mortality in Posttraumatic and Nontraumatic Epilepsy³



Data from over 210,000 veterans with epilepsy were assessed to identify differences in mortality for nontraumatic epilepsy (NTE) and posttraumatic epilepsy (PTE), defined as documented TBI within 5 years before an epilepsy diagnosis.



Mortality Rates for PTE

Displayed as hazard ratios (HRs)



Extracerebral TBI



Fracture TBI



Diffuse cerebral TBI



Focal cerebral TBI

Underlying concussion had a lower mortality rate for PTE compared with NTE (HR, 0.91).

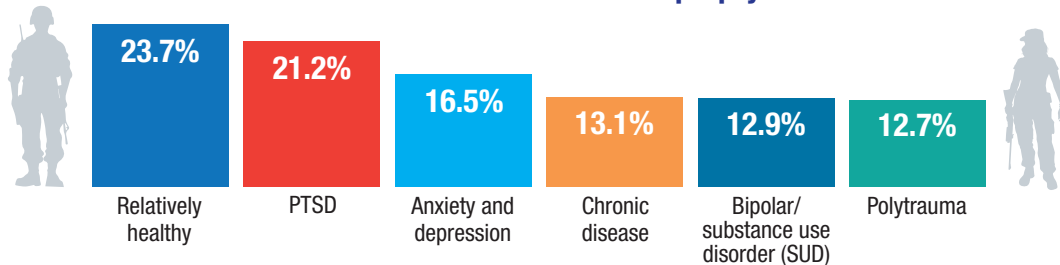
Although the overall mortality rate was similar between extracerebral-related PTE and NTE, this was driven by a high portion of the extracerebral subgroup being older in age. In contrast, significantly higher mortality risks were observed in younger patients with extracerebral-related PTE, such as those with epilepsy onset at ages 18 to 39 years (HR, 2.02) and 40 to 59 years (HR, 1.25).

Epilepsy and Comorbidities in Post-9/11 Veterans¹⁰

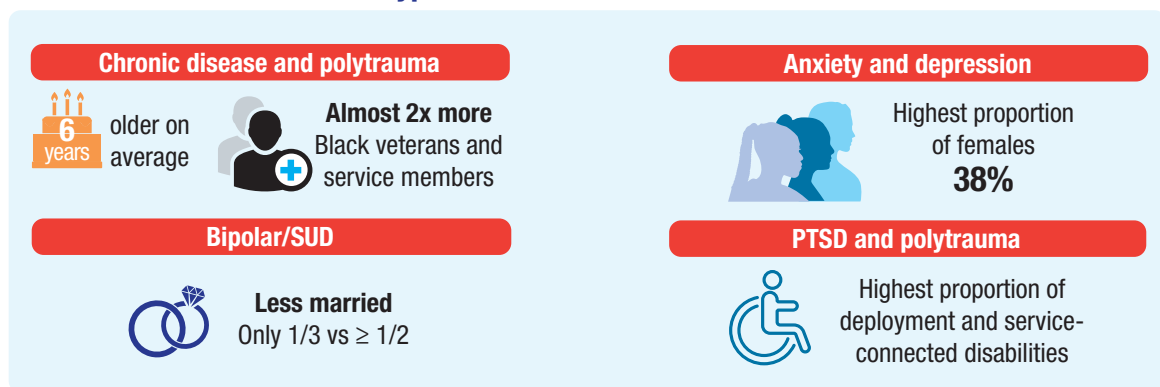


Using EHR data from more than 15,700 post-9/11 veterans and service members (2002-2018), researchers assessed potential comorbidities associated with epilepsy.

Distribution of Patients With Epilepsy



Phenotype Characteristics and Associations



...compared to the rest of the comorbidity groups

Overall Mortality



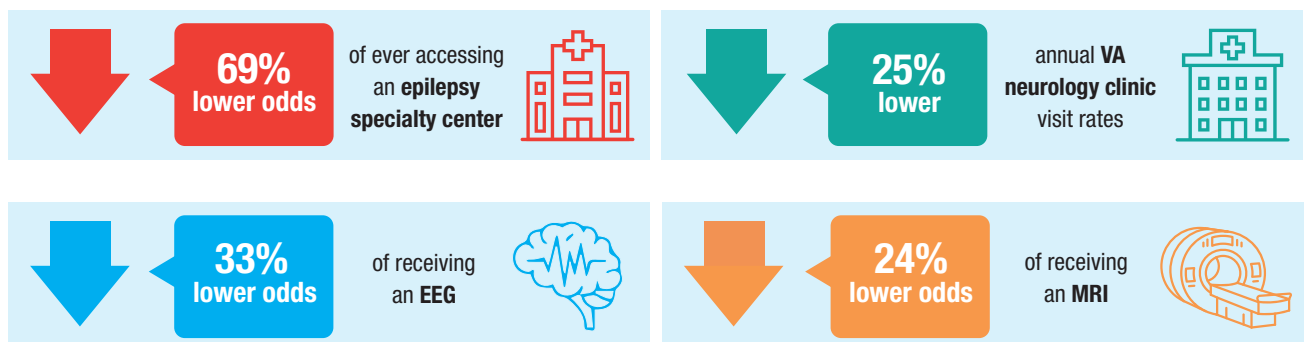
The highest mortality by group was seen in the **chronic disease and bipolar/SUD groups, both at > 16%**. The most common causes of death included accidents, suicide/mental health-related, and cancer.

Social Factors and Healthcare Use in Veterans With Epilepsy¹¹



A study of more than 6000 veterans with PTE assessed the effect of social determinants of health on healthcare use from 1997 to 2022. Area deprivation index (ADI) was measured to determine the level of disadvantage in a US region. The ADI includes factors such as income, education, employment, and housing quality.

Compared with veterans in the least disadvantaged areas (first ADI quartile), those in the most disadvantaged areas (fourth ADI quartile) have...



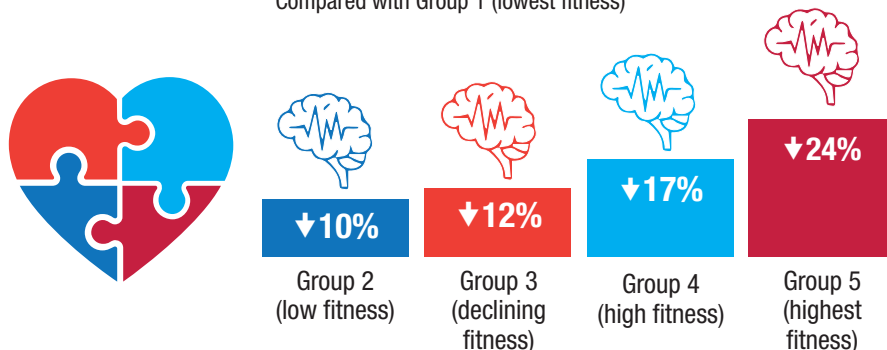
Alzheimer and Dementia: Cardiovascular Fitness Levels⁷



A study of over 75,000 veterans who had three or more exercise treadmill tests completed assessed the effect of cardiovascular fitness on later incident Alzheimer disease and related dementias (ADRD). Cardiovascular fitness was measured in metabolic equivalents (METs), which were based on treadmill speed, grade, and time.

Reduction in Risk of Developing ADRD

Compared with Group 1 (lowest fitness)



Higher initial cardiovascular fitness correlated with a significant reduction in incident ADRD. Notably, veterans who started with high fitness levels but experienced a decline (Group 3) still maintained a lower risk of dementia compared with those with consistently low fitness levels.

Mechanical Ventilation and Mortality in Veterans With Dementia¹²

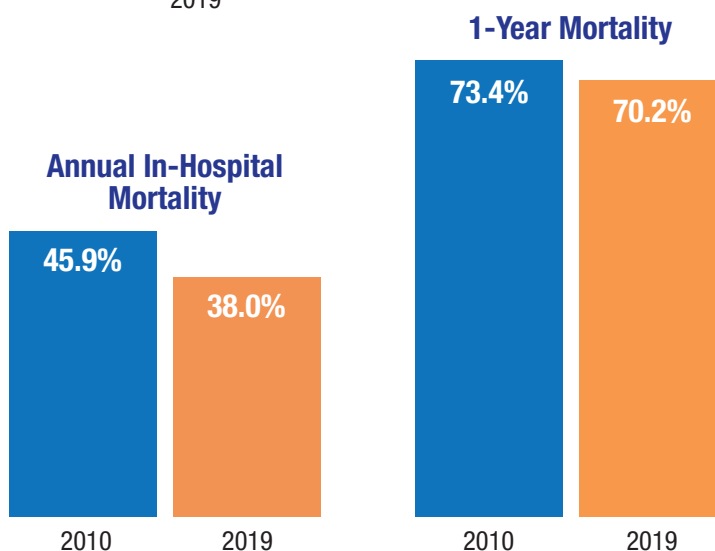


Researchers assessed the use of mechanical ventilation, a critical intervention for respiratory failure in late stage dementia, and its relation to mortality in veterans with dementia (aged 65 years or older) who were hospitalized from 2010 to 2019 (n = > 250,000).

Mechanical Ventilation Use



Veterans who received mechanical ventilation had improved outcomes over time:



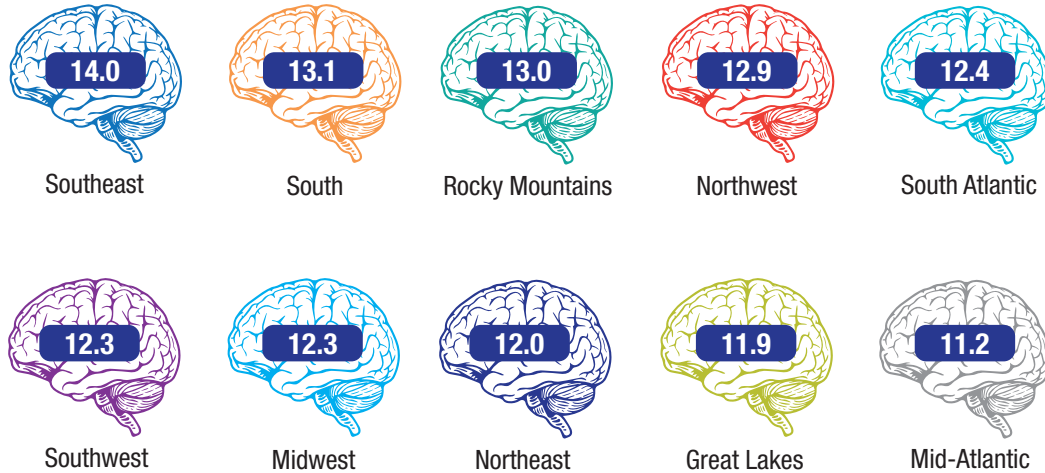
Geographic Differences in Incidence of Dementia⁶



A study of over 1.2 million veterans analyzed US regional differences in dementia incidence among patients (aged 65 years or older) at the VHA from 1999 to 2021.

Dementia Incidence Rate

Per 1000 person-years



Incidence Rate Compared To Mid-Atlantic Region

