

Fact Sheet Supplement:

VA Electronic Health Record Frailty Index (VA-FI)

Cooperative Studies Program Epidemiology Analytics Resource (CSPEAR)

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Contributions

This fact sheet is a result of the efforts of the Boston Cooperative Studies Program Epidemiology Center.

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About CSPEAR

CSPEAR translates VA electronic health record data into brief, scientifically-reliable reports on the health status of Veterans. CSPEAR is a collaborative effort of the Cooperative Studies Program's national network of Epidemiology Centers.

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1 Introduction

The Department of Veterans Affairs (VA) is challenged with an accelerated pace of the aging population. Over 4.5 million U.S Veterans are now 75 and older.⁴ An increasing adult population requires the VA's efforts towards interventions that reduces risks of falls, hospitalizations, disability, long-term care, and death.¹ Implementation of such interventions require identifying the Veteran adult population most at risks of these adverse effects. The VA has been a leader in using risk prediction to identify vulnerable Veterans. Since age is not the only determination of clinical risks, the Veterans Affairs Frailty Index (VA-FI) was developed. Frailty indices are calculated to better estimate the vulnerable population, independent of age and other predictors.^{2,4} The VA-FI measures frailty using VA administrative claims and electronic health records. The VA-FI considers up to 31 health deficits⁴ and can be used as a continuous or categorical variable.

In 2018, nearly 1 in 2 US Veterans aged 65 or older were identified as frail.² Frailty is a syndrome of vulnerability that is more common in older adults. Older adults who are frail have a more difficult time recovering from health-related stressors such as surgery. Additionally, those who are frail have an increased risk of falls, fractures, cardiovascular diseases, poor surgical outcomes, elder abuse, suicide and mortality.^{1,3}

The purpose of this fact sheet is to characterize the vulnerable and frail population among Veterans who use Veterans Affairs (VA) health care, focusing on frailty status between the fiscal years of 2012-2018.

2 Methods

2.1 Population and Data Source

The extracted data and population cohort were developed based on the Orkaby et al and Cheng & DuMontier et al studies.

Database access to the Orkaby dataset was provisioned for the purpose of the Factsheet. Data was pulled from the VA Corporate Data Warehouse (CDW) and Medicare data. Medicaid data was used for the years it was available, from 2012-2014. The data extracted were patient demographics, including age, sex, race, ethnicity, geographic location, smoking status, and mortality. The available data included VHA health care users in the United States, Puerto Rico, Virgin Islands, American Samoa, Philippines, and Guam. The data was queried annually, so participants could contribute a single year or multiple years.

The population includes Veterans meeting the following criteria:

1. Age \geq 65
2. Active users of VHA care, who had at least 1 VA clinic visit and one set of routine vitals and labs
3. Used VA services between 2012-2018
5. Alive on September 30th of the given year
6. Had at least 1 outpatient visit during the past year

2.2 Measurements

[The Veterans Affairs Frailty Index](#) recommends 31 health deficits that are defined as symptoms, signs, disabilities, and diseases related to health and aging.⁵ All variables included in the FI met the following four standard criteria⁴:

- a) related to health status.
- b) increased in prevalence with age.
- c) did not reach a prevalence of 100% before age 65.
- d) covered a range of systems such as cognition, function, and morbidity.

These health statuses were mapped out using 9th and 10th revisions of International Classification of Disease (ICD-9 and ICD-10) procedure and diagnostic codes. A patient was verified with one of the health deficits through their codes listed in CDW. Each cohort of each year included patients who had received a diagnosis or procedure code (inpatient or outpatient) for any of the 31 health deficits. The diagnostic or procedure code had to be within 3 years on or prior to October 1st of the given year.

Total frailty score was calculated as the sum of the 31 health deficits divided by the total number of possible 31 deficits to give a score between 0 and 1. Given the size of the database, the frailty index was categorized into 5 groups:

- a) non-frail (0.0-0.10)
- b) pre-frail (0.11-0.20)
- c) mildly frail (0.21-0.30)
- d) moderately frail (0.31-0.40)
- e) severely frail (>0.4)

Project Approval

This work was conducted under IRB approval for research project 3183-X.

Notes

This material is the result of work supported with resources and the use of facilities at the VA Cooperative Studies Program Epidemiology Center in Boston. The contents do not represent the views of VA or the US Government.

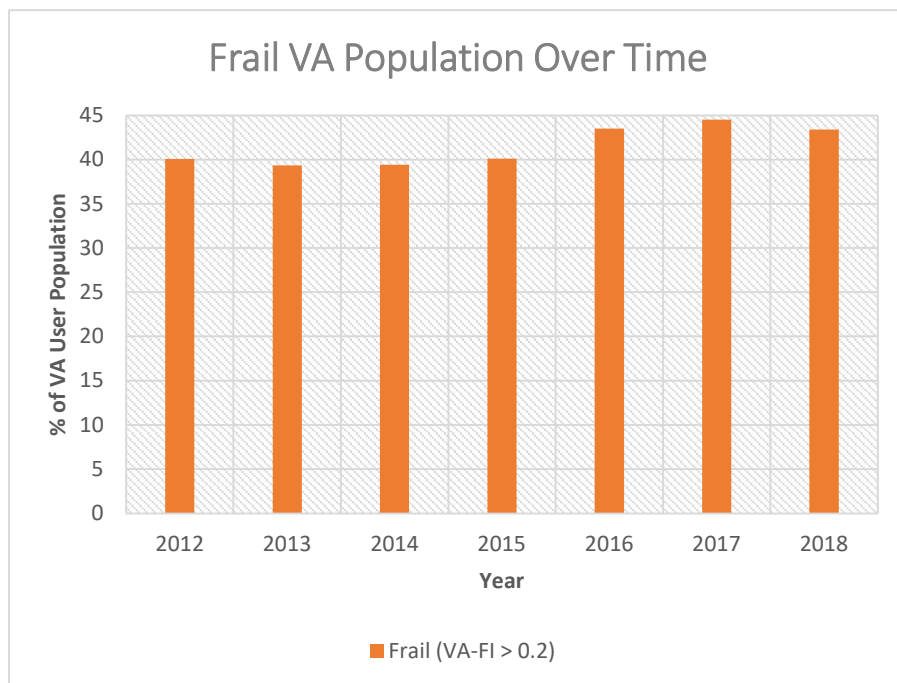
3 Outcomes

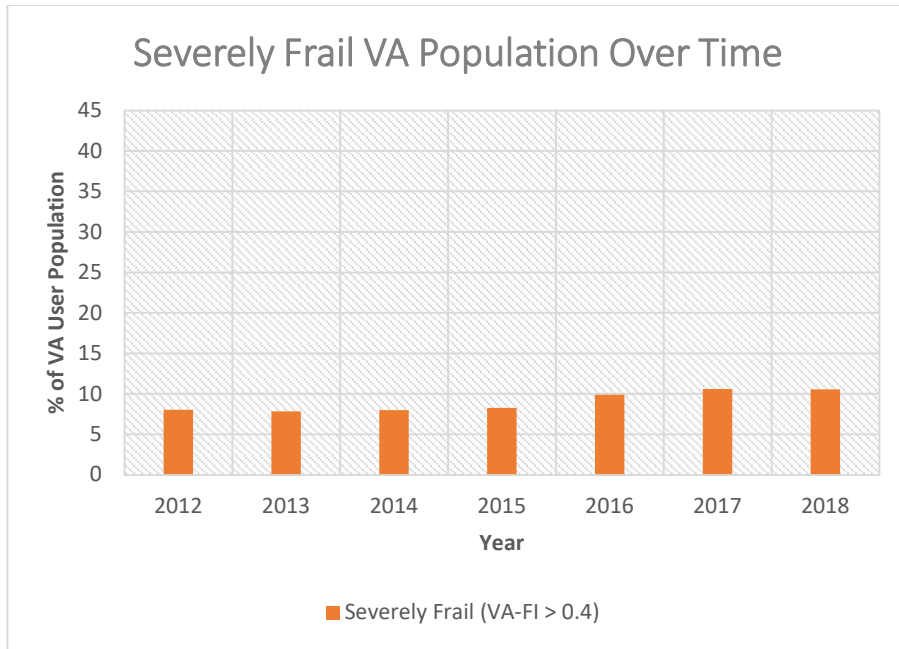
3.1 Cohort Distribution

Table 1. Veteran population (%) by Level of Frailty for each year 2012-2018

Frailty	2012	2013	2014	2015	2016	2017	2018
Non-frail	594,805 (26%)	622,111 (27%)	637,723 (27%)	625,210 (26%)	570,733 (24%)	552,928 (23%)	574,951 (25%)
Pre-frail	752,950 (33%)	787,214 (34%)	811,745 (34%)	819,735 (34%)	790,666 (33%)	767,867 (32%)	752,132 (32%)
Mild	472,670 (21%)	482,590 (21%)	496,847 (21%)	505,973 (21%)	523,253 (22%)	518,733 (22%)	494,318 (21%)
Mod	248,085 (11%)	249,059 (11%)	255,001 (11%)	261,992 (11%)	286,492 (12%)	288,542 (12%)	276,023 (12%)
Severe	180,621 (8%)	182,427 (8%)	191,148 (8%)	199,235 (8%)	238,628 (10%)	252,667 (11%)	247,176 (11%)

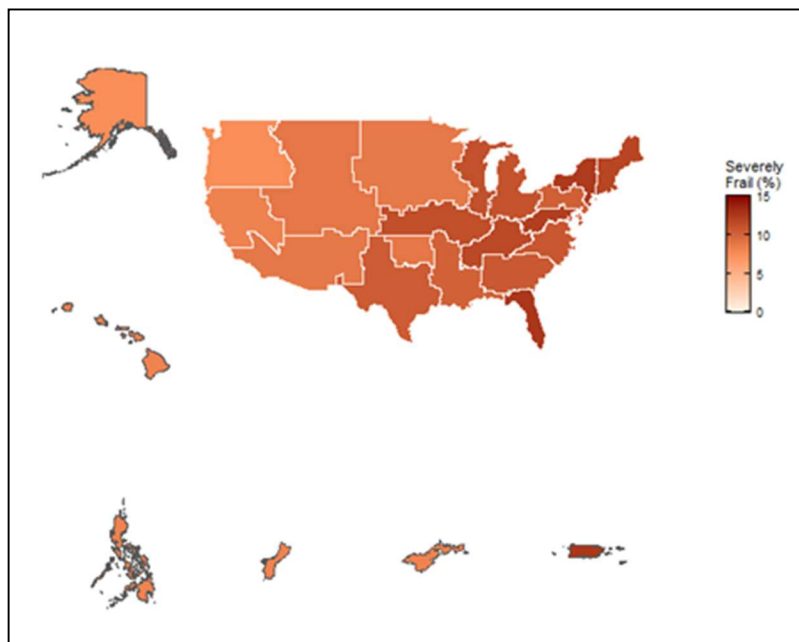
Figure 1. % of Frail and Severely Frail Veteran VHA users, 2012-2018





3.2. Geographic Distribution

Figure 1. Geographic Distribution of Severely Frail Veteran Population by VISN



Note: Figure 1 in the Factsheet only includes the 50 States of the United States. Shown here includes VISN 21: Philippines, Guam, American Samoa; VISN 8: Puerto Rico, Virgin Islands Puerto Rico, Virgin Islands, American Samoa, Philippines, and Guam.

3.3 Demographics

Table 2. Number (%) of Frail and Non-Frail Veteran VHA users, 2012 -2018

Characteristics	2012		
	Frail	Non-Frail	Total
Variable			
N	901,376	1,347,755	2,249,131
Age (mean \pm sd) *	78.3 \pm 8.2	73.9 \pm 7.9	75.2 \pm 8.3
Gender			
Male	882,321 (97.9)	1,325,954 (98.4)	2,208,275 (98.2)
Female	19,055 (2.1)	21,801 (1.6)	40,856 (1.8)
Race			
White	707,216 (78.5)	1,077,775 (80.0)	1,784,991 (79.4)
Black	78,634 (8.7)	111,231 (8.3)	189,865 (8.4)
Asian	3,684 (0.4)	8,265 (0.6)	11,949 (0.5)
American Indian	4,670 (0.5)	7,908 (0.6)	12,578 (0.6)
Pacific Islander	6,465 (0.7)	9,625 (0.7)	16,090 (0.7)
Unknown/Null	100,707 (11.2)	132,951 (9.9)	233,658 (10.4)
Ethnicity			
Not Hispanic/Latino	804,982 (89.3)	1,207,476 (89.6)	2,012,458 (89.5)
Hispanic/Latino	31,904 (3.5)	55,162 (4.1)	87,066 (3.9)
Unknown/Null	64,490 (7.2)	85,117 (6.3)	149,607 (6.7)
Smoking			
Current/Former	723,892 (80.3)	1,045,036 (77.5)	1,768,928 (78.6)
Never	143,737 (15.9)	255,805 (19.0)	399,542 (17.8)
Unknown	33,747 (3.7)	46,914 (3.5)	80,661 (3.6)

Characteristics	2013		
	Frail	Non-Frail	Total
Variable			
N	914,076	1,409,325	2,323,401
Age (mean + sd) *	77.8 \pm 8.6	73.5 \pm 8.0	74.7 \pm 8.5
Gender			
Male	894,804 (97.9)	1,386,449 (98.4)	2,281,253 (98.2)
Female	19,272 (2.1)	22,876 (1.6)	42,148 (1.8)
Race			
White	723,771 (79.2)	1,133,639 (80.4)	1,857,410 (79.9)
Black	85,694 (9.4)	123,076 (8.7)	208,770 (9.0)
Asian	3,880 (0.4)	8,737 (0.6)	12,617 (0.5)

American Indian	5,280 (0.6)	8,775 (0.6)	14,055 (0.6)
Pacific Islander	6,722 (0.7)	10,170 (0.7)	16,892 (0.7)
Unknown/Null	88,729 (9.7)	124,928 (8.9)	213,657 (9.2)
Ethnicity			
Not Hispanic/Latino	824,106 (90.2)	1,271,751 (90.2)	2,095,857 (90.2)
Hispanic/Latino	34,328 (3.8)	59,206 (4.2)	93,534 (4.0)
Unknown/Null	5,5642 (6.1)	78,368 (5.6)	134,010 (5.8)
Smoking			
Current/Former	740,166 (81.0)	1,093,403 (77.6)	1,833,569 (78.9)
Never	143,032 (15.6)	269,988 (19.2)	413,020 (17.8)
Unknown	30,878 (3.4)	45,934 (3.3)	76,812 (3.3)

Characteristics	2014		
	Frail	Non-Frail	Total
Variable			
N	942,996	1,449,468	2,392,464
Age (mean + sd) *	77.5±8.8	73.2±7.9	74.4±8.6
Gender			
Male	923,054 (97.9)	1,424,781 (98.3)	2,347,835 (98.1)
Female	19,942 (2.1)	24,687 (1.7)	44,629 (1.9)
Race			
White	751,711 (79.7)	1,169,887 (80.7)	1,921,598 (80.3)
Black	94,253 (10.0)	133,186 (9.2)	227,439 (9.5)
Asian	4,083 (0.4)	9,114 (0.6)	13,197 (0.6)
American Indian	5,935 (0.6)	9,618 (0.7)	15,553 (0.7)
Pacific Islander	7,025 (0.7)	10,587 (0.7)	17,612 (0.7)
Unknown/Null	79,989 (8.5)	117,076 (8.1)	197,065 (8.2)
Ethnicity			
Not Hispanic/Latino	856,666 (90.8)	1,314,030 (90.7)	2,170,696 (90.7)
Hispanic/Latino	36,731 (3.9)	62,892 (4.3)	99,623 (4.2)
Unknown/Null	49,599 (5.3)	72,546 (5.0)	122,145 (5.1)
Smoking			
Current/Former	768,167 (81.5)	1,124,254 (77.6)	1,892,421 (79.1)
Never	146,019 (15.5)	280,524 (19.4)	426,543 (17.8)
Unknown	28,810 (3.1)	44,690 (3.1)	73,500 (3.1)

Characteristics	2015		
	Frail	Non-Frail	Total
Variable			

N	967,200	1,444,945	2,412,145
Age (mean + sd) *	77.2±8.9	73.2±7.9	74.3±8.5
Gender			
Male	946,022 (97.8)	1,418,372 (98.2)	2,364,394 (98.0)
Female	21,178 (2.2)	26,573 (1.8)	47,751 (2.0)
Race			
White	773,903 (80.0)	1,166,186 (80.7)	1,940,089 (80.4)
Black	101,954 (10.5)	139,045 (9.6)	240,999 (10.0)
Asian	4,393 (0.5)	9,423 (0.7)	13,816 (0.6)
American Indian	6,567 (0.7)	9,967 (0.7)	16,534 (0.7)
Pacific Islander	7,249 (0.7)	10,659 (0.7)	17,908 (0.7)
Unknown/Null	73,134 (7.6)	109,665 (7.6)	182,799 (7.6)
Ethnicity			
Not Hispanic/Latino	882,562 (91.2)	1,313,753 (90.9)	2,196,315 (91.1)
Hispanic/Latino	39,494 (4.1)	64,068 (4.4)	103,562 (4.3)
Unknown/Null	45,144 (4.7)	67,124 (4.6)	112,268 (4.7)
Smoking			
Current/Former	791,955 (81.9)	1,117,921 (77.4)	1,909,876 (79.2)
Never	148,546 (15.4)	283,665 (19.6)	432,211 (17.9)
Unknown	26,699 (2.8)	43,359 (3.0)	70,058 (2.9)

Characteristics	2016		
	Frail	Non-Frail	Total
Variable			
N	1,048,373	1,361,399	2,409,772
Age (mean + sd) *	77.0±8.8	73.2±7.8	74.4±8.5
Gender			
Male	1,024,480 (97.7)	1,333,450 (97.9)	2,357,930 (97.8)
Female	23,893 (2.3)	27,949 (2.1)	51,842 (2.2)
Race			
White	840,805 (80.2)	1,093,493 (80.3)	1,934,298 (80.3)
Black	114,045 (10.9)	138,987 (10.2)	253,032 (10.5)
Asian	4,883 (0.5)	9,473 (0.7)	14,356 (0.6)
American Indian	7,459 (0.7)	9,719 (0.7)	17,178 (0.7)
Pacific Islander	7,924 (0.8)	10,233 (0.8)	18,157 (0.8)
Unknown/Null	73,257 (7.0)	99,494 (7.3)	172,751 (7.2)
Ethnicity			
Not Hispanic/Latino	959,297 (91.5)	1,238,453 (91.0)	2,197,750 (91.2)
Hispanic/Latino	44,047 (4.2)	62,316 (4.6)	106,363 (4.4)
Unknown/Null	45,029 (4.3)	60,630 (4.5)	105,659 (4.4)
Smoking			

Current/Former	857,915 (81.8)	1,048,273 (77.0)	1,906,188 (79.1)
Never	163,216 (15.6)	272,771 (20.0)	435,987 (18.1)
Unknown	27,242 (2.6)	40,355 (3.0)	67,597 (2.8)

Characteristics	2017		
	Frail	Non-Frail	Total
Variable			
N	1,059,942	1,320,795	2,380,737
Age (mean + sd) *	76.9±8.8	73.3±7.6	74.4±8.4
Gender			
Male	1,034,109 (97.6)	1,290,096 (97.7)	2,324,205 (97.6)
Female	25,833 (2.4)	30,699 (2.3)	56,532 (2.4)
Race			
White	848,036 (80.0)	1,055,285 (79.9)	1,903,321 (79.9)
Black	120,540 (11.4)	142,878 (10.8)	263,418 (11.1)
Asian	5,095 (0.5)	9,708 (0.7)	14,803 (0.6)
American Indian	7,812 (0.7)	9,706 (0.7)	17,518 (0.7)
Pacific Islander	8,158 (0.8)	10,136 (0.8)	18,294 (0.8)
Unknown/Null	70,301 (6.6)	93,082 (7.0)	163,383 (6.9)
Ethnicity			
Not Hispanic/Latino	970,459 (91.6)	1,202,627 (91.1)	2,173,086 (91.3)
Hispanic/Latino	46,301 (4.4)	61,675 (4.7)	107,976 (4.5)
Unknown/Null	43,182 (4.1)	56,493 (4.3)	99,675 (4.2)
Smoking			
Current/Former	866,216 (81.7)	1,012,269 (76.6)	1,878,485 (78.9)
Never	167,423 (15.8)	269,424 (20.4)	436,847 (18.3)
Unknown	26,303 (2.5)	39,102 (3.0)	65,405 (2.7)

Characteristics	2018		
	Frail	Non-Frail	Total
Variable			
N	1,017,517	1,327,083	2,344,600
Age (mean + sd) *	77.1±8.7	73.5±7.5	74.6±8.2
Gender			
Male	990,712 (97.4)	1,291,520 (97.3)	2,282,232 (97.3)
Female	26,805 (2.6)	35,563 (2.7)	62,368 (2.7)
Race			
White	811,003 (79.7)	1,051,754 (79.3)	1,862,757 (79.4)
Black	120,721 (11.9)	153,911 (11.6)	274,632 (11.7)
Asian	5,045 (0.5)	10,154 (0.8)	15,199 (0.6)
American Indian	7,701 (0.8)	10,196 (0.8)	17,897 (0.8)

Pacific Islander	7,914 (0.8)	10,293 (0.8)	18,207 (0.8)
Unknown/Null	65,133 (6.4)	90,775 (6.8)	155,908 (6.6)
Ethnicity			
Not Hispanic/Latino	932,088 (91.6)	1,208,044 (91.0)	2,140,132 (91.3)
Hispanic/Latino	45,029 (4.4)	63,958 (4.8)	108,987 (4.6)
Unknown/Null	40,400 (4.0)	55,081 (4.2)	95,481 (4.1)
Smoking			
Current/Former	826,965 (81.3)	1,014,372 (76.4)	1,841,337 (78.5)
Never	164,555 (16.2)	272,628 (20.5)	437,183 (18.6)
Unknown	25,997 (2.6)	40,083 (3.0)	66,080 (2.8)

* Cohort included Veterans ages 65 years and older.

4 References and Resources

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