Title

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Journal

Military Medicine, 182(9)

ISSN

0026-4075

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Publication Date

2017-09-01

DOI

10.7205/milmed-d-16-00332

Peer reviewed

Published in final edited form as:

Mil Med. 2017 September ; 182(9): e1993–e2000. doi:10.7205/MILMED-D-16-00332.

Diagnosing Chronic Obstructive Pulmonary Disease Among Afghanistan and Iraq Veterans: Veterans Affair's Concordance With Clinical Guidelines for Spirometry Administration

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Abstract

Background—Early diagnosis and treatment of chronic obstructive pulmonary disease (COPD) can slow disease progression. The Department of Veterans Affairs (VA)/Department of Defense Clinical Practice Guidelines (CPG), established to improve patient outcomes, recommend the use of spirometry in the COPD diagnostic process. The aims of this study were to assess VA health care providers' performance related to CPG-recommended spirometry administration in the evaluation of newly diagnosed COPD among veterans, determine the patient characteristics that may influence the adherence rate, and compare VA concordance rates to those of other health plans.

Methods—Administrative health care data related to Operations Enduring Freedom/Iraqi Freedom/New Dawn (OEF/OIF/OND) veterans was used to identify newly diagnosed COPD cases and the proportion of cases receiving spirometry. Cases were defined as veterans who had their first medical encounter with a coded diagnosis of COPD ≥ 6 months after their initial VA health care evaluation. The relationship between prediagnostic and comorbid conditions and the administration of CPG-concordant spirometry was examined using regression analyses.

Findings—Among the 923,646 OEF/OIF/OND veterans receiving VA health care between January 2002 and December 2014, 32,076 (3%) had a coded diagnosis of COPD. Among those, 22,156 (69%) were identified as newly diagnosed COPD cases; only 6,827 (31%) had CPG-concordant spirometry. Concordant spirometry was more likely to occur in veterans aged ≥40. A pre-existing tobacco use disorder marginally changed the concordance rate.

Discussion—VA provider adherence to CPG-concordant spirometry would decrease the prevalence of false-positive COPD cases and lead to more targeted disease treatment. Future

research should focus on such cases by assessing the association between COPD diagnosis and bronchodilator responsiveness.

INTRODUCTION

Research has demonstrated that patient and military service characteristics influence the health differentials found between veterans and the general population. Veterans who served in a combat zone suffer injuries and illnesses at higher rates compared to nondeployed veterans or the general population.[1,2] In recognition of the importance of the relationship between military exposures and health outcomes, the Department of Defense (DoD) launched the Millennium Cohort Study.[3] Mortality among veterans deployed to Iraq and Afghanistan was found to be influenced by lengthy and multiple deployments, activation of reserve/guard forces, and higher injury survival rates due to medical advancements.[4]

Demographic and service characteristics not only affect the overall health of veterans, they also influence the onset of specific conditions such as respiratory disease. One study of veterans found an increase in the prevalence of respiratory disease and in the risk factors associated with disease development, such as smoking, gender, age, and military occupation.[5] Research by Liu et al demonstrated that exposure to burn pits among military personnel increased the risk of respiratory conditions such as COPD.[6] A separate study indicated that the rates of emphysema and chronic bronchitis were highest among Army personnel and, in comparison, significantly lower among Air Force and Marine Corps service members.[7]

Chronic obstructive pulmonary disease (COPD) is a progressive disease in which emptying the lungs of air is difficult, causing shortness of breath or fatigue.[8] Early diagnosis and treatment can improve health-related quality of life and slow disease progression. Spirometry administration is recommended in the COPD diagnostic process and is especially useful in the early stages of disease, specifically among high-risk patients with minimal symptoms.[9]

Clinical practice guidelines (CPG) are evidence-based recommendations developed to assist physicians in diagnostic, treatment, and case management decision-making. Guidelines are developed by multidisciplinary panels that synthesize “scientific literature, [professional knowledge], skills, experience, and patient preferences” to explain health care options and their associated outcomes.[10,11] When appropriately implemented, CPG can increase quality of care by promoting best practices and decreasing treatment variations.[12–15]

The first DoD and Department of Veterans Affairs (VA) CPG related to the diagnosis and treatment of COPD was developed in 1997 and revised in 1999 and 2007, primarily to provide clearer objectives and stronger recommendations. A revision was published in 2014; the analysis here addresses performance through that same year. One constant in each set of guidelines was the recommendation for the use of spirometry in the COPD diagnostic process. According to the 2007 VA/DoD CPG, diagnosis of COPD requires a comprehensive patient history, a physical examination, and “the requirement that spirometry demonstrates an airflow limitation that is not fully reversible.”[16] Spirometry is recommended by the CPG as an objective and standardized means of measuring airflow limitation.[16]

Adherence to CPG criteria can be used as a proxy measure of quality of care much as the Healthcare Effectiveness Data and Information Set (HEDIS) data is used by U.S. health plans to measure health care performance.[17] The HEDIS data contain a measure for evaluating the use of spirometry in the diagnosis of COPD among patients aged 40 and higher with new or newly active COPD.[17] The specificity within the HEDIS data allows for performance comparisons across health plans.[17] The aims of this study were to assess VA health care providers' performance related to CPG-recommended spirometry administration in the evaluation of newly diagnosed COPD among veterans, determine the patient characteristics that may influence the adherence rate, and compare VA concordance rates to those of other health plans.

METHODS

This was a retrospective analysis of Operations Enduring Freedom/Iraqi Freedom/New Dawn (OEF/OIF/OND) veterans who utilized the VA health care system between January 2002 and December 2014. Veterans eligible for VA health care were identified using a roster file from the DoD Defense Manpower Data Center. The inpatient and outpatient encounter records from the Department of Veteran Affairs National Patient Care Database were queried using International Classification of Disease, Ninth Revision, Clinical Modification (ICD-9-CM) codes to construct a file of records for OEF/OIF/OND veterans diagnosed with COPD. All health care records for these veterans were then assessed to determine whether the COPD cases were associated with a CPG-concordant spirometry test. After this was established, the following information was extracted for analytic purposes: (1) demographic: sex, race, date of birth; (2) service: branch, component, rank; and (3) health: tobacco use disorder and history of tobacco use (ICD-9-CM 305.1 and v15.82).

This analysis represents a quality improvement effort as defined in guidance from the VA Office of Research Oversight; VA has authority to perform such analyses as part of its mission to evaluate and improve health care operations. Pursuant to these guidelines, institutional review board approval is not required. The guidance from the Office of Research Oversight is available in Veterans Health Administration Handbook 1058.05.[18]

Outcome Variable

CPG-concordant spirometry administration in the evaluation of newly diagnosed COPD was the outcome of interest. A dichotomous variable indicating whether or not spirometry was administered during the COPD diagnostic process was used in the analysis. The intent was to evaluate the administration, not results, of a spirometry test; thus, any Current Procedural Terminology (CPT) code indicating spirometry was included in the analysis. No distinction was made between tests using postbronchodilator (BD) spirometry and those that did not because chronic expiratory flow was not the outcome of interest. The medical record was searched for all entries of spirometry CPT codes (CPT = 94010–94016, 94060, 94070, 94150, 94200, and 94664). CPG-concordant spirometry was defined as a test administered prior to, or concurrent with, the initial VA COPD encounter. To assess CPG-concordant clinical activity, the date of spirometry administration was compared to the initial COPD

visit date. Nonconcordance was defined as receiving spirometry after the initial COPD diagnosis or having no spirometry procedural code.

COPD Case Definition

VA inpatient and outpatient health care records with a primary COPD diagnosis were identified via the ICD-9-CM codes: 490–492 and 494–496. Eligibility for inclusion required a new diagnosis of COPD 6 or more months after the initial VA health care visit. Veterans with a primary or secondary diagnosis of COPD within the 6 months after their initial VA health care visit were excluded from the study population (n = 9,920). Coast Guard members were also excluded due to low representation (n = 17). Figure 1 illustrates the study design.

Statistical Analysis

COPD cases were first identified among veterans utilizing the VA health care system. These cases were then categorized by CPG-concordant status; bivariate analyses (i.e., frequencies and proportions) were used to describe each group of cases. The descriptive age categories were selected after comparing the results of other age category schema; they were a compromise between the competing factors of a young OEF/OIF/OND population and an age-progressive disease. A logistic regression model was used to test the relationship between selected demographic, service, and health characteristics; resulting odds ratios (ORs) represented the chance of receiving CPG-concordant spirometry. The model controlled for age at the initial COPD encounter; a likelihood ratio test was used to determine if age significantly increased the predictive power of the model. VA CPG-concordance was compared to HEDIS, an evaluation tool used by commercial health maintenance organizations, by performing bivariate analysis using a dichotomous age variable (aged <40 and ≥40).[17] All analyses were performed using SAS 9.4; $p < 0.05$ was considered statistically significant.

All versions of the COPD CPG include the recommendation that spirometry be used in the COPD diagnostic process. Thus, any observable increase in spirometry administration could have been a result of the implementation of the revised document. Before performing the statistical analyses, relative risk and the associated 95% confidence interval (CI) were calculated to assess whether the 2007 “reintroduction” of the COPD CPG influenced spirometry administration. A near significant temporal difference in spirometry administration was found; the proportion of tests administered in and after 2007 was higher relative to the proportion administered before 2007 (relative risk = 1.09; 95% CI = 1.00–1.20).

RESULTS

CPG Concordance

Demographic and Service Characteristics—Of 923,646 OEF/OIF/OND veterans receiving VA care January 2002 to December 2014, 3% (n = 32,076) had a COPD-related VA health care encounter. Of these, 69% (n = 22,156) met the case definition, having their first COPD diagnosis > 6 months after their initial VA health care encounter (results not shown). Thirty-one percent (n = 6,827) of the study population had a CPG-concordant

spirometry; that is, a test that was administered at or before the first COPD encounter. Similar proportions of males, females, and specified race/ethnicity groups received a CPG-concordant spirometry. Among reserve/guard veterans, 36% were administered a CPG-concordant spirometry compared to 26% of active duty veterans, though the difference was not found to be significant (Table I).

A positive association was found between age and receiving a CPG-concordant spirometry; the proportion of veterans receiving CPG-concordant spirometry increased from 19% among those aged 18 to 26 to 45% among those aged 50 and higher. Compared to veterans aged 18 to 26, the odds of receiving CPG-concordant spirometry were 1.3 times greater among those aged 27 to 34 years old (95% CI = 1.20–1.47) and 3.2 times greater among those aged 50 and higher (95% CI = 2.87–3.65). The likelihood of receiving a CPG-concordant spirometry test did not change when adjusting for age (model not shown).

Compared to Army veterans, Marine Corps personnel were 20% less likely to have a concordant spirometry (OR = 0.8; 95% CI = 0.76–0.94) and Navy personnel were 10% less likely to have a concordant test (OR = 0.9; 95% CI = 0.77–0.94). No difference was found between Air Force and Army veterans where 33% of each group received a concordant spirometry (Table I).

Tobacco Use—Of the 8,711 COPD cases with a present or past tobacco use disorder, 33% received a CPG-concordant spirometry. By comparison, 30% of veterans with newly diagnosed COPD and no pre-existing tobacco use disorder received a CPG-concordant spirometry (Table I). Among the entire tobacco using group, 34% (n = 2,579) had continued tobacco-related encounters (in the medical record) 6 months following COPD diagnosis. At 12 months, the proportion with a tobacco use disorder encounter increased to 47% (n = 3,588) (Results not shown).

CPG-Concordance by Diagnostic and Procedural Codes

Table II contains the concordance status of the codes used to identify COPD cases (ICD-9-CM) and spirometry tests (CPT). Within the concordant group, 61% of veterans were diagnosed with chronic airway obstruction, whereas 85% of the discordant group was diagnosed with bronchitis. Within both groups, the most commonly administered spirometry test was “bronchodilation responsiveness pre-post-BD administration,” followed by “spirometry, including graphic record, total, and timed vital capacity.” It should be noted that 87% of veterans in the discordant group were not administered a spirometry test, though they did have a COPD diagnosis.

VHA and HEDIS Comparison

Table III assesses CPG-concordant cases within 2 age groups, veterans aged <40 and those aged ≥40. The age differences in CPG-concordance increased when age was condensed to two groups. Overall, 24% of veterans in the younger group and 42% of those in the older group received a CPG-concordant spirometry. The <40 age group contained a larger proportion of Marine Corps (14.3%) and Navy (12.4%) veterans compared to the ≥40 age group where there were larger proportions of Air Force (14.0%) and Army (73.3%) veterans.

Sixty-six percent of the <40 age group was active duty personnel, whereas 73% of the ≥40 age group was reserve/guard veterans. The two age groups contained similar proportions of veterans with a tobacco use disorder, or history thereof.

DISCUSSION

This study focused on CPG-concordant spirometry by VA health care providers during the diagnostic evaluation of COPD in OEF/OIF/OND veterans. Although we found a relative increase of 9% in the use of spirometry for diagnosis of new COPD after the 2007 revision of VA/DoD CPG, the overall adherence to this guideline on use of spirometry remained low. Additionally, having a pre-existing tobacco use disorder only marginally changed the rate of concordant spirometry. Matthews et al noted these same phenomena in their research; patients diagnosed with COPD or emphysema did not meet the criteria set forth in the guidelines, including "symptoms, cigarette smoking, and spirometric determination of airways obstruction."[19] They also found that study participants received a COPD or emphysema diagnosis without having a complete workup.[19]

Observed rates of spirometry administration within the VA among those aged ≥40 in our study (42%) are comparable to the 2013 HEDIS figure (42.5%).[20] However, the majority of new COPD cases (63%) in our study are aged <40, and only 24% of this group received CPG-concordant spirometry. This difference is notable because the majority of OEF/OIF/OND veterans seen at VA are aged <40. This finding suggests there are opportunities to engage these younger COPD patients while their disease is not yet severe. Adherence to the CPG spirometry recommendations can result in early diagnosis of COPD and timely initiation of services to slow disease progression, such as smoking cessation, or to prevent complications through administration of prophylactic measures such as pneumococcal and influenza vaccines.

Rates of spirometry administration were not only influenced by age, branch of service was also a significant factor. Our results indicate that Army personnel were more likely to have a concordant spirometry compared to Marine Corps and Navy personnel. These same service-related differences were observed by other researchers when focused on the diagnosis of COPD.[21,22] Smith et al also found deployment length and location to be a significant factor in the onset of respiratory conditions.[22] Results such as these, coupled with those related to spirometry administration, may be indicative of a reliance on patient history, as opposed to clinical testing, to diagnose COPD.

The 2007 COPD CPG states that patients with any smoking history have an increased risk of COPD, a risk that is most effectively mitigated through smoking cessation. Spirometry, in conjunction with medical history, is the most standardized and objective means of determining the presence of COPD.[16] Current smoking among OEF/OIF veterans (16–40% depending on age) is considerably higher than nonveterans in the United States.[23,24] Smoking cessation services should be routinely available to support behavior change and prevent relapse. History of former smoking is found in about another third of veterans in the VA.[25] This study found continued tobacco use disorder for a substantial proportion of

smokers following diagnosis of COPD. Tobacco use assessment should be performed at each visit and tobacco cessation and behavioral change support should be offered regularly.

Comparable rates of spirometry are found in other studies.[26] Ferguson reports spirometry is rarely used by primary care physicians for asthma or COPD evaluation of respiratory symptoms.[27] Miravitlles et al found that 46% of COPD patients who consulted a physician were administered spirometry.[28] The similarly low proportion of veterans receiving a CPG-concordant spirometry may stem from the logistics of spirometry administration or physician ambivalence surrounding both spirometry and the diagnosis of COPD.[29–31] Collins et al recently noted the possibility of physician ambivalence regarding COPD, but argued that COPD requires confirmation by spirometry. Their research indicated the inaccuracy associated with empirically based COPD diagnoses can lead to inappropriate pharmacologic treatment for dyspneic patients without airflow obstruction.[32]

Overall, the prevalence of COPD in the general population is estimated to be about 1% across all ages, rising steeply to 8% to 10% or higher in individuals aged 40 years or older.[33] Given this increase in COPD prevalence after age 40, our finding of a higher rate of CPG-concordant spirometry may be expected. However, population studies have shown consistently gross under-diagnosis of COPD (72–93%) independent of its prevalence.[34] In addition, the prevalence of both smoking and COPD are increased in service members with an estimated smoking prevalence of 45% among Iraq and Afghanistan veterans and an estimated COPD prevalence of 33% to 43% among U.S. veterans.[5,35] Thus, despite the lower prevalence of COPD in those aged <40, administering spirometry to detect COPD, as recommended by VA/DoD CPG, remains an important strategy for early diagnosis and intervention.

This analysis was limited in several respects. First, case identification was based on ICD-9-CM codes, increasing the potential for misclassification if an ICD-9-CM code did not represent a confirmed COPD diagnosis.[36] There are varying definitions of COPD using ICD-9-CM codes. The definition used in this research is used by the CDC to identify this condition, but may not match those used in other studies.[18,31,37] Second, cases were defined as one visit with a COPD diagnosis. This case definition was based on VA coding guidelines, which indicate that a diagnosis code should only be used for a final diagnosis, not evaluation. Specifically, the guidelines state “do not code diagnoses documented as ‘probable,’ ‘suspected,’ ‘questionable,’ ‘rule out,’ or a ‘working diagnosis’”; the coder is directed to code the condition “to the highest degree of certainty” using signs and symptoms that are documented.[38] Finally, this analysis relied on administrative data from VA medical records; records for health care received outside of the VA were not obtained and clinician and visit notes were not reviewed.

The results regarding tobacco use disorder and history of tobacco use should be interpreted with caution. The full health care record may have additional information about current or historical use of tobacco and smoking cessation services. Consideration of these factors in this analysis relied on ICD-9-CM codes. Some patient records may have included this information elsewhere and not assigned an ICD-9-CM code.

This project adds to the literature on adherence to clinical practice guidelines for COPD diagnosis in veterans, military personnel, and other populations. Adherence to clinical practice guidelines is an indicator of the quality of care veterans are receiving for respiratory disease, specifically COPD. Our findings indicate that VA performance for spirometry administration to diagnose COPD, while similar to the HEDIS benchmark, can be improved. Increased spirometry administration can result in early, accurate diagnosis and management of COPD. The literature would further benefit from research focusing on false-positive diagnosis; specifically, the association between COPD diagnosis and the responsiveness to pre- post-BDs.

CONCLUSION

These findings suggest that spirometry administration is biased based on age with higher application in those over age 40. Younger veterans may be disproportionately affected by CPG discordance. VA provider adherence to COPD CPG would provide more accurate diagnosis of obstructive respiratory conditions and likely result in more targeted treatment.

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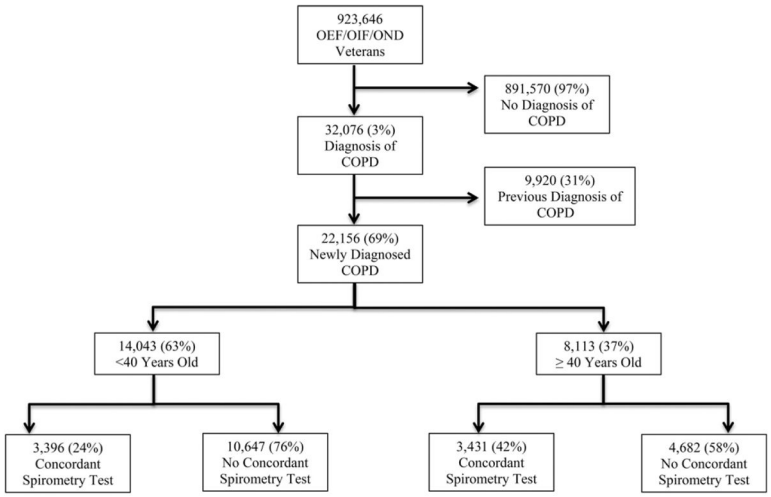

FIGURE 1.
Diagram of study design, 2002–2014.

TABLE I

Spirometry Concordance Status of OEF/OIF/OND Veterans Diagnosed With COPD, 2002–2014

Characteristics	All Cases[a] 22,156, *n* (%)	Cases With Concordant[b] Spirometry 6,827, *n* (%)	Cases With Discordant[c] Spirometry 15,329, *n* (%)	OR (95% CI)
		Row Percentages		
Sex				
Male	18,525 (83.6)	5,746 (31.0)	12,779 (70.0)	REF
Female	3,631 (16.4)	1,081 (29.8)	2,550 (70.2)	1.0 (0.91–1.07)
Race/Ethnicity				
Black	3,073 (13.9)	1,001 (32.6)	2,072 (67.4)	1.0 (0.93–1.11)
White	12,604 (56.9)	3,829 (30.4)	8,775 (69.6)	REF
Hispanic	2,272 (10.3)	642 (28.3)	1,630 (71.7)	0.9 (0.84–1.03)
Other/Unknown	4,207 (19.0)	1,355 (32.2)	2,852 (67.8)	1.1 (0.99–1.17)
Age at Onset (Years)				
18–26	3,353 (15.1)	643 (19.2)	2,710 (80.8)	REF
27–34	8,154 (36.8)	1,972 (24.2)	6,182 (75.8)	1.3 (1.20–1.47)
35–39	2,536 (11.5)	781 (30.8)	1,755 (69.2)	1.8 (1.59–2.04)
40–49	4,712 (21.3)	1,896 (40.2)	2,816 (59.8)	2.7 (2.41–3.00)
50 or More	3,401 (15.4)	1,535 (45.1)	1,866 (54.9)	3.2 (2.87–3.65)
Branch of Service				
Air Force	2,345 (10.6)	767 (32.7)	1,578 (67.3)	0.9 (0.84–1.02)
Army	14,385 (64.9)	4,715 (32.8)	9,670 (67.2)	REF
Marine Corps	2,506 (11.3)	548 (21.9)	1,958 (78.1)	0.8 (0.76–0.94)
Navy	2,920 (13.2)	797 (27.3)	2,123 (72.7)	0.9 (0.77–0.94)
Rank				
Enlisted	20,956 (94.6)	6,361 (30.4)	14,595 (69.7)	REF
Officer[d]	1,200 (5.4)	466 (38.8)	734 (61.2)	1.0 (0.86–1.10)
Component				
Active Duty	12,079 (54.5)	3,188 (26.4)	8,891 (73.6)	REF
Reserve/Guard	10,077 (45.5)	3,639 (36.1)	6,438 (63.9)	1.1 (0.98–1.14)
Tobacco Use Disorder				
Yes	7,680 (34.7)	2,509 (32.7)	5,171 (67.3)	1.1 (0.99–1.13)
No	14,476 (65.3)	4,318 (29.8)	10,158 (70.2)	REF
History of Tobacco Use				
Yes	1,031 (4.7)	412 (40.0)	619 (60.0)	1.3 (1.12–1.47)
No	21,125 (95.4)	6,415 (30.4)	14,710 (69.6)	REF

REF, Reference Group.

[a] Veterans having a COPD encounter more than 6 months after initial VA visit.

[b] Administered a test before/on day of diagnosis.

[c] Administered a test after the original COPD diagnosis or did not have a spirometry CPT code.

[d] Includes Warrant Officers.

TABLE II

CPG-Concordant Status of Case Definition ICD-9-CM Codes and Spirometry CPT Codes

	CPG-Concordant *n* = 6,827	**CPG-Discordant[a] *n* = 15,329**
ICD-9-CM Codes (Not Mutually Exclusive)		
Bronchitis: 490	2,702 (39.6)	13,008 (84.9)
Chronic Bronchitis: 491	759 (11.1)	929 (6.0)
Emphysema: 492	239 (3.5)	207 (1.4)
Bronchiectasis: 494	71 (1.0)	65 (0.4)
Extrinsic Allergic Alveolitis: 495	23 (0.3)	35 (0.2)
Chronic Airway Obstruction, Not Elsewhere Classified: 496	4,146 (60.7)	2,176 (14.2)
CPT Codes (Not Mutually Exclusive)		
Spirometry, Including Graphic Record Total and Timed Vital Capacity: 94010	3,763 (55.1)	1,024 (50.7)
Measurement of Spirometric Forced Expiratory Flows: 94011	0 (0.0)	0 (0.0)
Measurement of Spirometric Forced Expiratory Flows, Bronchodilator: 94012	0 (0.0)	0 (0.0)
Measurement of Lung Volumes Forced Vital Capacity and Expiratory: 94013	17 (0.3)	*
Patient Initiated Spirometric Recording Per 30-Day Period of Time: 94014	94 (1.4)	22 (1.1)
Recording (Include Hook-Up Reinforced Education Data Transmission: 94015	*	*
Review and Interpretation Only by a Physician or Other Qualified Health Care: 94016	355 (5.2)	58 (2.9)
Bronchodilation Responsiveness, Pre- and Post-BD Administration: 94060	4,723 (69.2)	1,267 (62.8)
Bronchospasm Provocation Evaluation, Multiple Spirometric: 94070	100 (1.5)	35 (1.7)
Vital Capacity Total (Separate Procedure): 94150	1,441 (21.1)	339 (16.8)
Maximum Breathing Capacity, Maximal Voluntary Ventilation: 94200	970 (14.2)	233 (11.5)
Demonstration and/or Evaluation of Patient Utilization of an Aerosol: 94664	1,165 (17.1)	345 (17.1)

[a] 86.8% (*n* = 13,310) of discordant cases had no spirometry test.

* To protect the privacy of Veterans, frequencies of fewer than 10 individuals are not reported.

TABLE III

OEF/OIF/OND Veterans Diagnosed With COPD Stratified by HEDIS Age Groupings, 2002–2014

Characteristics	Age at Onset < 40		Age at Onset ≥ 40	
	Cases *n* = 14,043	Cases With Concordant[a] Spirometry *n* = 3,396	Cases *n* = 8,113	Cases With Concordant[a] Spirometry *n* = 3,431
Sex				
Male	11,570 (82.4)	2,805 (82.6)	6,955 (85.7)	2,941 (85.7)
Female	2,473 (17.6)	591 (17.4)	1,158 (14.3)	490 (14.3)
Race/Ethnicity				
Black	1,690 (12.0)	440 (13.0)	1,383 (17.0)	561 (16.4)
White	8,076 (57.5)	1,904 (56.1)	4,528 (55.8)	1,925 (56.1)
Hispanic	1,552 (11.1)	350 (10.3)	720 (8.9)	292 (8.5)
Other/Unknown	2,725 (19.4)	702 (20.7)	1,482 (18.3)	653 (19.0)
Branch of Service				
Air Force	1,190 (8.5)	288 (8.5)	1,155 (14.2)	479 (14.0)
Army	8,526 (60.7)	2,199 (64.8)	5,859 (72.2)	2,516 (73.3)
Marine Corps	2,341 (16.7)	487 (14.3)	165 (2.0)	61 (1.8)
Navy	1,986 (14.1)	422 (12.4)	934 (11.5)	375 (10.9)
Rank				
Enlisted	13,765 (98.0)	3,313 (97.6)	7,191 (88.6)	3,048 (88.8)
Officer	278 (2.0)	83 (2.4)	922 (11.4)	383 (11.2)
Component				
Active Duty	9,860 (70.2)	2,244 (66.1)	2,219 (27.4)	944 (27.5)
Reserve/Guard	4,183 (29.8)	1,152 (33.9)	5,894 (72.6)	2,487 (72.5)
Tobacco Use Disorder				
Yes	4,883 (34.8)	1,214 (35.8)	2,797 (34.5)	1,295 (37.7)
No	9,160 (65.2)	2,182 (64.3)	5,316 (65.5)	2,136 (62.3)
History of Tobacco Use				
Yes	569 (4.1)	177 (5.2)	462 (5.7)	235 (6.9)
No	13,474 (95.9)	3,219 (94.8)	7,651 (94.3)	3,196 (93.2)

[a]Concordant: a spirometry test that was administered before or on the day of a COPD diagnosis.