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Women Veterans' Health

Racial Disparities in Uterine Fibroid Treatment Among Veterans Using VA Health Care

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A B S T R A C T

Introduction: Uterine fibroids are common, nonmalignant tumors that disproportionately impact Black patients. We aimed to examine Black and White differences in receipt of any treatment and type of first treatment in the Department of Veterans Affairs, including effect modification by severity as approximated by anemia.
Methods: We used Department of Veterans Affairs administrative data to identify 5,041 Black and 3,206 White veterans with symptomatic uterine fibroids, identified by *International Classification of Diseases*, 9th edition, Clinical Modification, codes, between fiscal year 2010 and fiscal year 2012 and followed in the administrative data through fiscal year 2018 for outcomes. Outcomes included receipt of any treatment, hysterectomy as first treatment, and fertility-sparing treatment as first treatment. We stratified all analyses by age (<45, ≥45 years old), used generalized linear models with a log link and Poisson error distribution, included an interaction term between race and anemia, and used recycled predictions to estimate adjusted percentages for outcomes.
Results: There was evidence of effect modification by anemia for receipt of any treatment but not for any other outcomes. Across age and anemia sub-groups, Black veterans were less likely to receive any treatment than White veterans. Adjusted racial differences were most pronounced among veterans with anemia (<45 years, Black–White difference = −10.3 percentage points; 95% confidence interval, −15.9 to −4.7; ≥45 years, Black–White difference = −20.3 percentage points; 95% confidence interval, −27.8 to −12.7). Across age groups, Black veterans were less likely than White veterans to have hysterectomy and more likely to have a fertility-sparing treatment as their first treatment.
Conclusions: We identified significant Black–White disparities in receipt of treatment for symptomatic uterine fibroids. Additional research that centers the experiences of Black veterans with uterine fibroids is needed to inform strategies to eliminate racial disparities in uterine fibroid care.

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Uterine fibroids are common, nonmalignant uterine tumors occurring in approximately 80% of individuals with a uterus by age 50 (Baird, Dunson, Hill, Cousins, & Schectman, 2003; Eltoukhi, Modi, Weston, Armstrong, & Stewart, 2014; Laughlin-Tommaso, Jacoby, & Myers, 2017). Uterine fibroids can result in debilitating symptoms, including pelvic pressure or pain, problems with conception or pregnancy, heavy menstrual bleeding, and severe anemia (Cardozo et al., 2012). Although hysterectomy remains the only definitive and most common treatment, a number of alternatives to hysterectomy exist, including surgical and nonsurgical treatments. Some alternatives to hysterectomy are also fertility sparing, allowing a patient to safely conceive and carry a pregnancy to term (Figure 1). These new treatments are increasingly popular and growing in use (American College of Obstetricians & Gynecologists, 2008; Marsh et al., 2018). When surgical treatment is chosen, minimally invasive approaches are preferred owing to decreased recovery time and lower risk of complications (Committee on Gynecologic Practice, 2017; Nieboer et al., 2009). Importantly, clinical decision-making related to uterine fibroid treatment depends on clinical factors, including the size and number of fibroids and severity of symptoms, as well as patient preferences, and fewer treatment options may be available for the most severe cases (American College of Obstetricians & Gynecologists, 2008; Laughlin-Tommaso et al., 2017).

There are well-documented racial disparities in uterine fibroids. For example, compared with White women, Black women have higher uterine fibroid incidence and experience greater severity of symptoms (Eltoukhi et al., 2014). Black women also tend to develop uterine fibroids at younger ages relative to their White counterparts. Finally, Black women have higher rates of surgical treatment for uterine fibroids, are less likely to have a minimally invasive surgery versus abdominal surgery, and have poorer surgical outcomes compared to White women regardless of surgical mode (Eltoukhi et al., 2014; Laughlin-Tommaso et al., 2017).

As with other health conditions and outcomes, the root cause of these disparities can be traced to racism, although the mechanisms through which racism acts are complex (Prather, Fuller, Marshall, & Jeffries, 2016). For example, despite their higher rates of hysterectomy for uterine fibroids, there is evidence that Black women prefer nonsurgical treatments and, in particular, may desire to avoid hysterectomy (Sengoba, Ghant, Okeigwe, Mendoza, & Marsh, 2017; Stewart, Nicholson, Bradley, & Borah, 2013; Wegienka et al., 2021). This preference may reflect a complex combination of broader social and historical conditions, including past and present-day racism and discrimination within medical care, such as the U.S. history of forced sterilization; lack of resources to support needed recovery time from surgery, such as paid leave and childcare; and cultural values regarding womanhood (Garver & Garver, 1991; Roberts, 1997; Stewart et al., 2018; VanNoy, Bowleg, Marfori, Moawad, & Zota, 2021; Wegienka et al., 2021). Additionally, given that Black women on average develop fibroids at younger ages than White women, this preference may reflect a desire to maintain the possibility of childbearing (Sengoba et al., 2017; VanNoy et al., 2021). Finally, there is a well-documented pattern of dismissal by clinicians of symptoms reported by Black women, potentially leading to delayed diagnosis, resulting in greater severity of disease at the time of diagnosis and fewer feasible treatment options (Treder, White, Woodhams, Pancholi, & Yinusa-Nyahkoon, 2022; VanNoy et al., 2021). Therefore, to understand and address the root causes of racial disparities in uterine fibroid treatment and outcomes it is important to examine treatment patterns, how they differ between Black and White women, to what extent these racial differences represent disparities in care, and how they may be modified by disease severity (Stewart, 2008). In doing so, we can begin to illuminate the structures and processes within health care systems that underlie racial disparities in uterine fibroid treatments and outcomes.

The Department of Veterans Affairs (VA) offers a unique opportunity to understand treatment patterns for uterine fibroids and if and how these differ between Black and White veterans in an enhanced access system, where many patients qualify for care without copayments. Women veterans are the fastest growing group of new VA users and nearly one-third of women veterans using VA health care identify as Black (Frayne et al., 2014, Frayne et al., 2018). Earlier research indicates that Black women veterans experience similar racial disparities in uterine fibroid

Uterine Fibroid Treatments	
Hysterectomy	Open/abdominal, laparoscopic or robotic assisted hysterectomy
Fertility-sparing	Myomectomy (open/abdominal, laparoscopic or robotic assisted) Hysteroscopic myomectomy Implant or levonorgestrel intrauterine device (IUD) Gonadotropin releasing hormone (GnRH) agonist[1] Antifibrinolytic[1] Other (Selective estrogen receptor modulators (SERM), Danazol)[1] Pill, patch, ring, injection[1]
All other	Endometrial ablation Uterine artery embolization Focused ultrasound ablation[2]

[1] Medication; [2] Insufficient data to be considered fertility-sparing

Figure 1. Treatments for uterine fibroids.

outcomes to their civilian counterparts, including a 40% lower odds of minimally invasive hysterectomy for uterine fibroids compared with White women veterans (Callegari et al., 2019; Katon et al., 2018). These findings highlight the fact that access is necessary but not sufficient for achieving health equity and the importance of understanding uterine fibroid treatment patterns in order to eliminate racial disparities in these treatments and outcomes. The objective of this analysis was to examine racial differences in first treatment received after a uterine fibroid diagnosis, specifically differences in receipt of any treatment, and the type of first treatment among those who received treatment. In addition, we examined the role of severity, as approximated by anemia at the time of diagnosis, in modifying any observed racial differences. We hypothesized that, compared with White veterans, Black veterans would be less likely to receive any uterine fibroid treatment, more likely to have a hysterectomy as a first treatment, and less likely to have a fertility-sparing first treatment. We further hypothesized that these associations would be modified by severity. such that among those with more severe disease, we would observe no racial disparities in treatment patterns or smaller disparities than observed among those with mild disease.

Methods

Study Design and Population

We conducted a retrospective cohort study using VA administrative and clinical data accessed through the Corporate Data Warehouse (CDW) to identify Black and White 18- to 54-year-old veterans with newly diagnosed symptomatic uterine fibroids between fiscal year (FY) 2010 (October 1, 2009–September 30, 2010) and FY12. Ethnicity was treated separately from race; therefore, Hispanic veterans were included in the cohort if they were identified in CDW as either White or Black race. Symptomatic uterine fibroids were defined based on the presence of two or more *International Classification of Diseases*, 9th edition, Clinical Modification (ICD-9-CM), codes for uterine fibroids (215.6, 218.0, 218.1, 218.2, 218.9, 219.0, 219.1, 219.8, 219.9, 654.10, 654.11, 654.12, 654.13, 654.14) or 1 ICD-9-CM code for uterine fibroids plus at least one ICD-9-CM code for bulk symptoms or heavy menstrual bleeding within 12 months of the diagnosis code (see Appendix A; Supplemental Table 1 for full list of codes). The index date was defined as the date of the ICD-9-CM code for uterine fibroids. Notably, although sex at birth is intended to designate biologic sex, on occasion it was changed at the veteran's request to reflect their gender. Thus, this variable conflates information on sex and gender. Because not all individuals with a uterus identify as women and not all individuals who identify as women have a uterus, we chose to not incorporate the CDW sex at birth variable into our cohort creation. We anticipated that requiring more than one ICD-9-CM to define symptomatic uterine fibroids would reduce miscodes where an individual who did not have a uterus may have accidentally been given a diagnosis code for uterine fibroids. Veterans over age 55 receiving a new diagnosis of uterine fibroids were excluded as they were likely postmenopausal, and thus less likely to have symptoms or require treatment (Stewart et al., 2018). Additionally, those with concurrent diagnoses for gynecological malignancies within the same year as their diagnosis of uterine fibroids were excluded, because they were likely to have very different treatment patterns. We scanned CDW for fibroid diagnoses going back to 1999 and those with initial uterine fibroid

diagnosis codes occurring >12 months before FY10 were excluded as they were considered nonincident cases. We used VA administrative data to identify treatments (see Appendix A; Supplemental Table 2 for full list of codes) through FY18. The length of follow-up was chosen to enable us to track full treatment pathways of the cohort, as many patients may receive multiple treatments for uterine fibroids (Borah, Nicholson, Bradley, & Stewart, 2013; Marsh et al., 2018). All study procedures were reviewed and approved by the VA Puget Sound Institutional Review Board.

Independent Variable

The independent variable for this analysis was race as identified in CDW. This represents a combination of patient self-report and clinician or clerk entry. Patients may have more than one race recorded in CDW and we prioritized any non-White race over White or unknown race for those with more than one value indicated. Prior work indicates that CDW adequately classifies White and Black women veterans and that the majority (90%) of women veterans using VA health care are White or Black; therefore, this study was limited to Black/White comparisons (Doll, Dusetzina, & Robinson, 2016; Hernandez et al., 2015; Prather et al., 2018). Because race is a social construct and racial disparities in health outcomes are considered downstream impacts of racism, we considered the variable of race to be a proxy for experiences of and exposure to the impacts of current and historical racism (Boyd, Lindo, Weeks, & McLemore, 2020; Hardeman, Medina, & Kozhimannil, 2016; Lett, Asabor, Beltran, Cannon, & Arah, 2022).

Dependent Variables

Three separate dependent variables were examined in analyses: 1) receipt of treatment (any vs. none), 2) hysterectomy as first treatment (yes/no), and 3) fertility-sparing treatment as first treatment (yes/no). Those with no codes for treatment during the follow-up period were classified as receiving no treatment for the first outcome and excluded from analyses of hysterectomy as first treatment and fertility-sparing treatment as first treatment. Treatment types, including which are fertility preserving, are shown in Figure 1. First treatment was defined as the first evidence of treatment for uterine fibroids after the index date, as identified in the VA administrative data via ICD-9-CM or ICD-10-CM codes and CPT codes (see Appendix A; Supplemental Table 2). Treatments included both those provided at VA and those paid for by the VA and provided by community clinicians. Treatments not provided or paid for by the VA are not captured in the VA administrative data. Subsequent to identifying the first treatment, we also looked across the entire follow-up period to identify those who ever had a hysterectomy, regardless of whether it was their first treatment.

Additional Variables

Additional variables included demographics and general health to enable descriptive analyses of the cohort. Demographics included age (<45, ≥45 years old) and ethnicity (Hispanic/Latina; yes/no). The cut point of 45 years was used as a proxy for decline in likelihood of spontaneous pregnancy without artificial reproductive technology, which can impact treatment decision making. For purposes of description age was also examined as a continuous variable. General health variables

Table 1
Characteristics of Black and White Veterans with Newly Diagnosed Uterine Fibroids Between Fiscal Years 2010 and 2012, by Age and Race ($N = 8,247$)

Characteristics	<45 Years Old				≥45 Years Old			
	Black ($N = 3,115$)		White ($N = 1,649$)		Black ($N = 1,926$)		White ($N = 1,557$)	
Age at diagnosis, median (interquartile range)	39 (34–42)		39 (35–42)		48 (46–50)		49 (47–51)	
Ethnicity (missing $n = 6$), n (%)								
Non-Hispanic	3,061	98	1,428	87	1,905	99	1,440	93
Hispanic	51	2	219	13	21	1	116	7
Mental health diagnosis last year, n %								
Yes	860	28	585	35	510	26	514	33
Charlson Comorbidity Index (ever), (n) %								
0	2,312	74	1,145	69	1,311	68	967	62
1	641	21	391	24	421	22	403	26
≥2	162	5	113	7	194	10	187	12
Anemia (missing $n = 140$), n %	1,281	42	282	17	735	39	260	17

included any mental health diagnosis in the year before the index date (yes/no, see Appendix A; Supplemental Table 3); physical comorbidities were captured using the Charlson comorbidity index categorized into a three-level variable (0, 1, ≥2), with higher scores reflecting a higher comorbidity burden (Callegari et al., 2019; Charlson, Szatrowski, Peterson, & Gold, 1994). Severity of uterine fibroids was defined as presence of anemia (yes/no) based on the laboratory measured hemoglobin concentration at or closest to the index date. We used the World Health Organization's definition of anemia with hemoglobin concentration of <12 g/dL categorized as clinically relevant anemia (Cappellini & Motta, 2015). VA site of care was defined as the VA health care system where the first diagnosis of uterine fibroids was recorded. Region was defined as West, Midwest, Northeast, South, and Outlying Islands.

Statistical Analyses

All analyses were stratified by age (<45, ≥45 years old) and all models clustered on VA site of care to adjust for correlation of outcomes within sites. We examined the association of race with receipt of any treatment, receipt of hysterectomy as first treatment, and receipt of fertility-sparing treatment as first treatment using general linear models with a log link and Poisson error distribution (Lumley, Kronmal, & Ma, 2006). Models for hysterectomy as first treatment or fertility-sparing treatment as first treatment also adjusted for year of treatment. All other variables (e.g., age, mental and physical comorbidities) were considered downstream of race/racism and therefore on the causal pathway between race and treatment outcomes (Carey et al., 2022; Lett et al., 2022). Therefore, we did not include any additional adjustment variables in the primary models, as doing so would lead to biased estimates (Greenland, Pearl, & Robins, 1999; VanderWeele & Robinson, 2014). In all models, we tested for effect modification of the association of race and treatment outcomes by severity, as approximated by presence of anemia, by including an interaction term between race and anemia. Although other clinical symptoms such as pain and bulk symptoms also contribute to severity, the relative severity of these symptoms is not reliably captured in administrative data without a detailed chart review (Doll et al., 2022). We used the Wald test to determine the statistical significance of the interaction term. We used recycled predictions to estimate adjusted outcome percentages to enable comparison of absolute rather than relative differences. Adjusted percentages for treatment outcomes and their 95% confidence intervals (CIs) are presented, along with Black–White differences in percentages and corresponding

95% CIs. Results are presented by anemia and race within each age strata when a statistically significant interaction between race and anemia was detected. Absent a statistically significant interaction, results are presented within each age strata by race only.

Sensitivity Analyses

To account for potential unmeasured confounding by age within strata and regional practice variations, we conducted a sensitivity analysis that included adjustment for age as a continuous variable and region within strata (see Appendix B; Supplemental Table 1) for any treatment and hysterectomy as first treatment. To further explore how fertility desires or intentions may shape treatment preferences or choices among those of reproductive age, we conducted a sensitivity analysis focused on those <45 years old stratified as <35 years old and ≥35 years old (see Appendix B; Supplemental Table 2) for any treatment and hysterectomy as first treatment. Additionally, gonadotropin-releasing hormone (GnRH) agonists are typically prescribed to decrease fibroid size and anemia before hysterectomy or myomectomy, other procedural or medical management, or menopause (American College of Obstetricians & Gynecologists Committee on Practice, 2021). Owing to limitations of the administrative data, it was impossible to definitively link GnRH agonist treatment to a specific surgery. Therefore, to explore the potential effect of GnRH agonist use before surgical treatment on associations, we conducted a sensitivity analysis for hysterectomy as first fibroid treatment in which all veterans who received GnRH agonists as a first treatment were reclassified as having a hysterectomy as first treatment.

All analyses used STATA 16 and an alpha of 0.05.

Results

In total, we identified 12,004 veterans with at least one diagnosis for uterine fibroids between FY10 and FY12. We sequentially excluded those who were not of Black or White race ($n = 978$), those who did not meet our definition of symptomatic uterine fibroids ($n = 1,546$), those >55 years old ($n = 925$), those with a concurrent diagnosis of a gynecological malignancy ($n = 80$), and those who died during the study period ($n = 228$). The final analytic sample consisted of 8,247 veterans with newly diagnosed symptomatic uterine fibroids (Black $n = 5,041$, White $n = 3,206$) in FY10–12. Of these, 62% ($n = 3,115$) of Black and 51% ($n = 1,649$) of White veterans were <45 years old. Table 1 shows the characteristics of the cohort by age and race. Regardless of

age group, compared with White veterans, Black veterans were less likely to be Hispanic, less likely to have a mental health diagnosis, more likely to have a lower Charlson score (lower comorbidity burden), and more likely to have anemia.

Unadjusted Differences in Treatment Outcomes

Unadjusted racial differences in our treatment outcomes stratified by age are shown descriptively in Table 2. In both age groups, Black veterans were less likely than White veterans to receive any treatment for uterine fibroids. Among those in our cohort who were <45 years old, 54.5% of Black veterans and 57.7% of White veterans received any documented treatment for uterine fibroids. Among those ≥45 years old, 38.3% of Black veterans and 46.2% of White veterans had any documented treatment. Among those <45 years old with any documented treatment ($n = 2,650$), 32.0% of Black veterans and 43.2% of White veterans had a hysterectomy as their first treatment and 58.2% of Black and 45.5% of White veterans had a fertility-preserving first treatment. Among those ≥45 years old with any documented treatment ($n = 1,457$), 40.8% of Black veterans and 52.9% of White veterans had a hysterectomy as their first treatment and 46.8% of Black and 53.2% of White veterans had a fertility-sparing first treatment. For further detailed breakdown of the first treatments in our cohort by race and age, see Table 3.

Examination of the total percentage of Black and White veterans in our cohort who ever had a hysterectomy during the study period indicated that a slightly smaller percentage of Black versus White veterans ever had a hysterectomy (Black 26% vs. White 33%).

Adjusted Differences in Treatment Outcomes

Adjusted percentages from our age-stratified general linear models examining Black–White differences in treatment outcomes are shown in Table 4. In both age groups, a statistically significant interaction between race and anemia was detected in the model for receipt of any treatment (<45 years old: *p* value for interaction = .04; ≥45 years old: *p* value for interaction = .01). Although Black veterans were less likely than White veterans to receive any treatment for uterine fibroids across all age and anemia groups, the magnitude of this disparity varied, with the largest disparities occurring among those with anemia in both age groups. After adjustment, among those with anemia who were <45 years old, 60.3% of Black veterans (95% CI, 56.9–63.6) versus 70.5% of White veterans (95% CI, 65.8–75.3) received any treatment for uterine fibroids, a 10.3 percentage point difference (95% CI, –15.9 to –4.7). Among those without anemia who were <45 years old, 51.6% of Black veterans (95% CI, 48.2–55.1) versus 56.0% of White veterans (95% CI, 53.1–59) received any treatment for uterine fibroids, a 4.4 percentage point difference (95% CI, –8.5

to –0.3). Among those with anemia who were ≥45 years old, 46.3% of Black (95% CI, 41.6–51.0) versus 66.5% of White veterans (95% CI, 60.4–72.7) received any treatment for their uterine fibroids, a 20.3 percentage point difference (95% CI, –27.8 to –12.7). Among those without anemia who were ≥45 years old, 34.2% of Black veterans (95% CI, 30.5–37.9) versus 42.5% of White veterans (95% CI, 39.5–45.6) received any treatment for uterine fibroids, an 8.4 percentage point difference (95% CI, –12.6 to –4.1). Adjustment for age within strata and region did not appreciably change results (see Appendix B Table 1). Similarly, when stratifying by age (<35 years old vs. 35–44 years old), results remained largely consistent, although owing to small numbers within groups, estimates were less stable (see Appendix B Table 2).

Among veterans who received any treatment for uterine fibroids ($N = 4107$), there was no evidence of effect modification by anemia on associations between race and hysterectomy as first treatment for either age group (<45 years old: *p* value for interaction = .10; ≥45 years old *p* value for interaction = .22). In both age groups, Black veterans were less likely than White veterans to have hysterectomy as their first treatment. After adjustment, among those <45 years old, 31.8% of Black veterans (95% CI, 27.7–36.9) versus 44.3% (95% CI, 40.0–48.6) of White veterans had a hysterectomy as their first treatment, a 12.5 percentage point difference (95% CI, –16.8 to –8.3). Among those ≥45 years old, 40.3% of Black veterans (95% CI, 34.5–36.1) versus 53.3% (95% CI, 48.1–58.5) of White veterans had a hysterectomy as their first treatment, a 13.0 percentage point difference (95% CI, –19.6 to –6.4). Reassigning all veterans whose first treatment was a GnRH agonist to hysterectomy as first treatment attenuated the difference in hysterectomy as first treatment between Black and White veterans <45 years old (6.4 percentage points, 95% CI, –10.5 to –2.3; *p* = .002) and resulted in no detectable difference among those ≥45 years old (3.2 percentage points; 95% CI, –8.9 to 2.6). Adjusting for age and region and stratifying by <35 and ≥35 years old among those <45 years old did not appreciably change the results (see Appendix B Tables 1 and 2)

There was also no evidence of the effect modification by anemia on associations between race and fertility-sparing treatment as first treatment for either age group (<45 years old: *p* value for interaction = .99; ≥45 years old *p* value for interaction = 0.15). In both age groups, Black veterans were more likely to receive a fertility-sparing treatment as their first treatment. Among those <45 years old, 58.8% of Black veterans (95% CI, 54.7–62.8) versus 44.2% of White veterans (95% CI, 39.7–48.6) had a fertility-sparing treatment as their first uterine fibroid treatment, a 14.6 percentage point difference (95% CI, 10.1–19.1). Among those ≥45 years old, 47.3% of Black veterans (95% CI, 41.7–52.9) versus 35.9% of White veterans (95% CI, 31.0–40.9) had a fertility-sparing treatment, an 11.3 percentage point difference (95% CI, 5.1–17.6).

Table 2
Uterine Fibroid Treatments among Black and White Veterans with Newly Diagnosed Uterine Fibroids Between Fiscal Years 2010 and 2012, by Age and Race

Treatments	<45 Years Old		≥45 Years Old	
		N (%)		N (%)
Any treatment	Black ($n_{total} = 3,115$)	1,698 (54.5)	Black ($n_{total} = 1,926$)	738 (38.3)
	White ($n_{total} = 1,649$)	952 (57.7)	White ($n_{total} = 1,557$)	719 (46.2)
First treatment				
Hysterectomy	Black ($n_{total} = 1,698$)	547 (32.2)	Black ($n_{total} = 738$)	301 (40.8)
	White ($n_{total} = 952$)	412 (43.2)	White ($n_{total} = 719$)	380 (52.9)
Fertility sparing	Black ($n_{total} = 1,698$)	988 (58.2)	Black ($n_{total} = 738$)	345 (46.8)
	White ($n_{total} = 952$)	433 (45.5)	White ($n_{total} = 719$)	262 (53.2)

Table 3
Detailed Breakdown of First Uterine Fibroid Treatment among Black and White Veterans with Newly Diagnosed Uterine Fibroids Between Fiscal Years 2010 and 2012 by Age and Race

Type	Treatment	<45 Years Old		≥45 Years Old	
		Black	White	Black	White
		$N_{total} = 3{,}115$	$N_{total} = 1{,}649$	$N_{total} = 1{,}926$	$N_{total} = 1{,}557$
Treatment, n (%)	Any	1,698 (54.5)	952 (57.7)	738 (38.3)	719 (46.2)
	None	1,417 (45.5)	697 (42.3)	1,188 (61.7)	838 (53.8)
		$N_{treated} = 1{,}698$	$N_{treated} = 952$	$N_{treated} = 738$	$N_{treated} = 719$
Hysterectomy, n (%)	Hysterectomy (vaginal, laparoscopic or robotic assisted, or open/abdominal)	547 (32.2)	412 (43.3)	301 (40.8)	380 (59.2)
Fertility sparing, n (%)	Myomectomy (vaginal, laparoscopic or robotic assisted, or open/abdominal)	135 (8.0)	51 (5.4)	28 (3.8)	18 (2.5)
	Hysteroscopic myomectomy	25 (1.5)	9 (1.0)	19 (2.6)	13 (1.8)
	Implant or levonorgestrel IUD	292 (17.2)	155 (16.3)	50 (6.8)	49 (6.8)
	GnRH agonist	172 (10.1)	52 (5.5)	118 (1.6)	50 (7.0)
	Antifibrinolytic	10 (0.6)	4 (0.4)	2 (0.3)	3 (0.4)
	Other (SERM, Danazol)	1 (0)	1 (0.1)	0	2 (0.3)
	Pill, patch, ring, injection	353 (20.8)	161 (16.9)	128 (17.3)	127 (17.7)
All other, n (%)	Endometrial ablation	138 (8.1)	104 (10.9)	77 (10.4)	75 (10.4)
	Uterine artery embolization	24 (1.4)	3 (0.3)	15 (2.0)	2 (0.3)
	Focused ultrasound ablation	1 (0)	0	0	0

Abbreviations: GnRH, gonadotropin-releasing hormone; IUD, intrauterine device; SERM, selective estrogen receptor modulators.

Discussion

In this study, we examined differences in symptomatic uterine fibroid treatment patterns between Black and White veterans and whether these differences were modified by severity as approximated by anemia. Regardless of age, Black veterans with uterine fibroids were less likely than their White counterparts to receive any treatment at the time of initial diagnosis. Contrary to expectations, this disparity was most pronounced among those with more severe disease. Further, we found that, among those receiving treatment, Black veterans across age groups were less likely than White veterans to have a hysterectomy as their first treatment and more likely to have a fertility-sparing first treatment. We found no evidence that Black–White differences in type of first treatment (hysterectomy, fertility sparing) varied by severity.

Our findings regarding receipt of any treatment are consistent with findings from other studies indicating that for many medical conditions, including uterine fibroids, Black people and particularly Black women may be less likely to receive treatment than White people (Hoffman, Trawalter, Axt, & Oliver, 2016; Smedley et al., 2003). A key potential contributor is dismissal and misattribution of symptoms by providers (Hoffman et al., 2016; VanNoy et al., 2021). This can result in delayed or foregone diagnosis and treatment and reinforces the medical mistrust among Black patients that exists owing to contemporary and

Table 4
Adjusted Percentages of Black Versus White Veterans with Newly Diagnosed Uterine Fibroids between Fiscal Years 2010 and 2012 Receiving Any Fibroid Treatment, Hysterectomy as First Treatment, or a Fertility-Sparing First Treatment, by Age

Outcome	<45 Years Old		≥45 Years Old	
	N	Adjusted % (95% CI)	N	Adjusted % (95% CI)
Any treatment*				
Anemia				
Black	1,281	60.3 (56.9 to 63.6)	735	46.3 (41.6 to 51.0)
White	282	70.5 (65.8 to 75.3)	260	66.5 (60.4 to 72.7)
Black–White difference		−10.3 (−15.9 to −4.7)[†]		−20.3 (−27.8 to −12.7)[†]
No anemia				
Black	1,778	51.6 (48.2 to 55.1)	1,159	34.2 (30.5 to 37.9)
White	1,333	56.0 (53.1 to 59.0)	1,279	42.5 (39.5 to 45.6)
Black–White difference		−4.4 (−8.5 to −0.3)[‡]		−8.4 (−12.6 to −4.1)[†]
First treatment[§]				
Hysterectomy				
Black	1,698	31.8 (27.7 to 36.9)	738	40.3 (34.5 to 36.1)
White	952	44.3 (40.0 to 48.6)	719	53.3 (48.1 to 58.5)
Black–White difference		−12.5 (−16.8 to −8.3)[†]		−13.0 (−19.6 to −6.4)[†]
Fertility sparing				
Black	1,698	58.8 (54.7 to 62.8)	738	47.3 (41.7 to 52.9)
White	952	44.2 (39.7 to 48.6)	719	35.9 (31.0 to 40.9)
Black–White difference		14.6 (10.1 to 19.1)[†]		11.3 (5.1 to 17.6)[†]

Abbreviation: CI, confidence interval.
  * Models adjusted for correlation within VA facilities and included an interaction term for race and anemia.
  [†] $p < .001$ for Black versus White comparison.
  [‡] $p < .05$ for Black versus White comparison.
  [§] Models adjusted for correlation within facilities and year of treatment.

historical mistreatment and discrimination (Prather et al., 2016, Prather et al., 2018; VanNoy et al., 2021). Such distrust may be particularly salient with respect to Black women with uterine fibroids considering the United States's history of forced sterilizations among women of color and the connection of the origins of modern gynecology with the enslavement of Black women (Owens, 2017; Roberts, 1997; Washington, 2006). In addition to reflecting negative experiences with the health care system, delays in diagnosis and treatment may also be partially attributable to normalization of symptoms and low knowledge about fibroids among veterans (Hardeman et al., 2016; Sengoba et al., 2017; VanNoy et al., 2021). Alternatively, prior non-VA research indicates that, although Black women prefer nonsurgical management for uterine fibroids, they may be less likely to be offered these treatments by providers (Sengoba et al., 2017; Stewart et al., 2013; Wegienka et al., 2021). Thus, Black veterans with uterine fibroids may be more likely than their White counterparts to delay or forego treatment if they are disproportionally less likely to be offered nonsurgical or fertility-sparing surgical options. This may also mean that, when Black veterans do undergo surgical treatment for uterine fibroids, they have more and larger fibroids than White veterans undergoing surgery, which may explain earlier findings regarding racial disparities in receipt of minimally invasive hysterectomy for uterine fibroids (Callegari et al., 2019; Katon et al., 2018).

These hypotheses explaining the observed racial disparity in receipt of any treatment are supported by our finding that Black veterans were more likely than White veterans to have anemia at the time of diagnosis, suggesting that they may have experienced delays in care. Additionally, although overall those with anemia were more likely to receive treatment than those without anemia, the largest racial disparities in receipt of any treatment were evident among those with anemia. Delayed treatment for fibroids in patients with anemia is of particular concern, because it may result in adverse clinical outcomes, including hospitalizations for anemia and blood transfusion or urgent surgical intervention (Ghant, Sengoba, Vogelzang, Lawson, & Marsh, 2016).

Our results regarding hysterectomy and fertility-sparing treatment, though unexpected, may be generally consistent with prior data. Although prior VA and non-VA studies indicate that Black women ultimately have higher rates of hysterectomy for fibroids than White women (Gardella, Johnson, Dobie, & Bradley, 2005; Wechter, Stewart, Myers, Kho, & Wu, 2011; Wilcox et al., 1994), our study focused on first treatment for fibroids and was consistent with data from outside VA indicating that, compared with White women, Black women prefer nonsurgical or uterine- and fertility-sparing treatments for fibroids. Our findings can also provide further context for the consistently lower rates of minimally invasive hysterectomy for uterine fibroids among Black versus White individuals with fibroids reported within VA and in the general population (Callegari et al., 2019; Eltoukhi et al., 2014; Katon et al., 2018). Specifically, our results suggest that Black veterans may receive hysterectomy for uterine fibroids after receiving other fertility-sparing treatments, meaning at a later time in the course of their disease when fibroids may be larger and they are poorer candidates for a minimally invasive approach.

This study has several important strengths, including the use of data from a national health care system with enhanced access; a large population of Black individuals with fibroids; examination of first treatment, which has important implications for subsequent treatments; and up to 8 years of follow-up, allowing for the identification of treatments that occurred long after initial diagnosis. One key limitation is that this study relied solely on administrative data and was lacking in patient perspectives. Thus, although we offer several putative explanations for our results based on previously published findings, these remain speculative. Reliance on administrative data alone also means that we were unable to directly explore the role of characteristics such as parity or fibroid size and number. Additionally, we were only able to include a single, unidimensional measure of disease severity. One recent study highlights the importance of considering multidimensional measures of gynecological disease severity, including bleeding, bulk symptoms, and pain when examining racial disparities in hysterectomy (Doll et al., 2022). However, use of this type of measure requires additional chart-abstracted data, which was not feasible for this cohort. Future work will entail the consideration of chart abstracted data, including imaging data, to better define severity. We were also unable to capture any data on treatments that were not provided or paid for by the VA, potentially leading to misclassification of first treatments. However, at least some earlier data suggest that women veterans using VA reproductive health services may be more dependent on or engaged with VA health care and therefore less likely to seek treatment or services outside VA (Katon et al., 2015). Finally, although we adjusted for the lack of independence of outcomes within sites, assessing the role of variation across sites or practice patterns by region was beyond the scope of this analysis. Future work is needed to investigate the contributions of VA site and practice patterns to racial disparities in fibroid treatment.

Implications for Policy and/or Practice

Our results raise important questions about the complex way in which racism leads to biased and inequitable care experienced by Black veterans along the pathway from diagnosis to treatment (Prather et al., 2016, Prather et al., 2018). Addressing these disparities in uterine fibroid care in the VA will require investing in culturally and structurally competent gynecology care to build trust with patients (Moorman, Leppert, Myers, & Wang, 2013). Developing systems of accountability, including mechanisms for reporting biased or discriminatory treatment, can also help to both ensure equitable, high-quality care and overcome mistrust. Patient input is critical for the success of such initiatives, including veterans' experiences and preferences regarding VA gynecology care, particularly care for uterine fibroids. Finally, assessing regional- and site-level capacity in VA to provide fertility-sparing treatments, such as minimally invasive myomectomy, particularly in areas that are home to large populations of Black veterans, is an important structural component to ensure equity in uterine fibroid care for patients (Aninye & Laitner, 2021; Moorman et al., 2013).

Conclusions

Taken together, our findings highlight significant disparities in treatment for symptomatic uterine fibroids between Black and White veterans, specifically that Black veterans are less likely than White veterans to receive any treatment regardless of fibroid severity. Understanding the persistent racial disparity in treatment even among those with more severe disease is of particular concern given the potential health consequences. Additional research that explores and centers the experiences of Black veterans with uterine fibroids will be essential to fully

contextualize our findings and to inform future strategies to eliminate disparities in uterine fibroid care.

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Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.whi.2023.03.005.

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