

# Satisfaction With Department of Veterans Affairs Prosthetics and Support Services as Reported by Women and Men Veterans

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**Background:** Women veterans represent a growing number of veterans with limb loss who receive Veterans Health Administration treatment. This study surveyed a large sample of veterans about their satisfaction with prosthetic-related care and sought to understand how women veterans with limb loss rate their satisfaction with prostheses and care.

**Methods:** We conducted a cross-sectional, mixed-mode survey of 46,614 veterans with major upper or lower limb amputation or partial foot amputation to assess amputation type, prosthesis use intensity, satisfaction with prostheses and services, and quality of life. We conducted a descriptive analysis and compared responses for individuals who self-identified as men and women.  $\chi^2$  tests determined significant differences in percentage calculations and *t* tests determined significant differences in means across gender.

**Results:** A total of 4981 respondents completed the survey, yielding a 10.7% raw response rate. Most respondents identified as men (83%) and White (77%). The mean age for men was

67 years while the mean age for women was 58 years. Women respondents were less likely to have diabetes or report their most recent amputation resulting from diabetes. Women were more likely to report not using a prosthesis, to use prostheses less intensely, and to have lower overall satisfaction, including lower satisfaction with prosthesis appearance, usefulness, reliability, and comfort. Men were more likely to be satisfied with prosthesis training and problem discussion. There were no differences in quality of life rating between women and men.

**Conclusions:** The findings of this study reflect previous research indicating that women tend to be less satisfied with prostheses. The results also support recent findings that women veterans have different needs regarding prosthesis design and related care. This study is the largest sample of surveyed veterans with limb loss to date. Though the findings suggest veterans are generally happy with prosthetic related services, they point to several areas where their experiences with services or prostheses can be improved.

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*Fed Pract.* 2024;41(11).

Published online November 15.

doi:10.12788/fp.0526

Limb loss is a significant and growing concern in the United States. Nearly 2 million Americans are living with limb loss, and up to 185,000 people undergo amputations annually.<sup>1-4</sup> Of these patients, about 35% are women.<sup>5</sup> The Veterans Health Administration (VHA) provides about 10% of US amputations.<sup>6-8</sup> Between 2015 and 2019, the number of prosthetic devices provided to female veterans increased from 3.3 million to 4.6 million.<sup>5,9,10</sup>

Previous research identified disparities in prosthetic care between men and women, both within and outside the VHA. These disparities include slower prosthesis prescription and receipt among women, in addition to differences in self-reported mobility, satisfaction, rates of prosthesis rejection, and challenges related to prosthesis appearance and fit.<sup>5,10,11</sup> Recent studies suggest women tend to have worse outcomes following amputation, and are underrepresented in amputation research.<sup>12,13</sup> However, these disparities are poorly described in a large, national sample. Because women

represent a growing portion of patients with limb loss in the VHA, understanding their needs is critical.<sup>14</sup>

The Johnny Isakson and David P. Roe, MD Veterans Health Care and Benefits Improvement Act of 2020 was enacted, in part, to improve the care provided to women veterans.<sup>15</sup> The law required the VHA to conduct a survey of  $\geq 50,000$  veterans to assess the satisfaction of women veterans with prostheses provided by the VHA. To comply with this legislation and understand how women veterans rate their prostheses and related care in the VHA, the US Department of Veterans Affairs (VA) Center for Collaborative Evaluation (VACE) conducted a large national survey of veterans with limb loss that oversampled women veterans. This article describes the survey results, including characteristics of female veterans with limb loss receiving care from the VHA, assesses their satisfaction with prostheses and prosthetic care, and highlights where their responses differ from those of male veterans.

## METHODS

We conducted a cross-sectional, mixed-mode survey of eligible amputees in the VHA Support Service Capital Assets Amputee Data Cube. We identified a cohort of veterans with any major amputation (above the ankle or wrist) or partial hand or foot amputation who received VHA care between October 1, 2019, and September 30, 2020. The final cohort yielded 46,646 potentially eligible veterans. Thirty-three had invalid contact information, leaving 46,613 veterans who were asked to participate, including 1356 women.

### Survey

We created a survey instrument de novo that included questions from validated instruments, including the Trinity Amputation Prosthesis and Experience Scales to assess prosthetic device satisfaction, the Prosthesis Evaluation Questionnaire to assess quality of life (QOL) satisfaction, and the Orthotics Prosthetics Users Survey to assess prosthesis-related care satisfaction.<sup>16-18</sup> Additional questions were incorporated from a survey of veterans with upper limb amputation to assess the importance of cosmetic considerations related to the prosthesis and comfort with prosthesis use in intimate relationships.<sup>19</sup> Questions were also included to assess amputation type, year of amputation, if a prosthesis was currently used, reasons for ceasing use of a prosthesis, reasons for never using a prosthesis, the types of prostheses used, intensity of prosthesis use, satisfaction with time required to receive a prosthetic limb, and if the prosthesis reflected the veteran's self-identified gender. Veterans were asked to answer questions based on their most recent amputation.

We tested the survey using cognitive interviews with 6 veterans to refine the survey and better understand how veterans interpreted the questions. Pilot testers completed the survey and participated in individual interviews with experienced interviewers (CL and RRK) to describe how they selected their responses.<sup>20</sup> This feedback was used to refine the survey. The online survey was programmed using Qualtrics Software and manually translated into Spanish.

**TABLE 1.** Survey Respondent Demographics

Characteristic	Total (N = 4981)	Men (n = 4151)	Women (n = 158)
Age, mean (SD), y <sup>a</sup>	67.3 (11.0)	67.3 (10.7)	58.3 (11.4)
Race, No. (%)			
White	3843 (77.2)	3264 (78.6) <sup>b</sup>	109 (69.0)
Black	613 (12.3)	469 (11.3) <sup>b</sup>	21 (13.3)
Declined to answer	154 (3.1)	128 (3.1)	3 (1.9)
Unknown	119 (2.4)	103 (2.5)	3 (1.9)
Other/multiple	109 (2.2)	83 (2.0)	8 (5.1)
Asian	19 (0.4)	16 (0.4)	2 (1.3)
Service era, No. (%)			
OEF/OIF	2234 (44.9)	1845 (44.4)	91 (57.6) <sup>c</sup>
Other	2627 (52.7)	2225 (53.6)	56 (35.4) <sup>b</sup>
Did not answer	119 (2.4)	83 (2.0) <sup>b</sup>	11 (7.0) <sup>b</sup>
Amputation level, No. (%)			
Below the knee and above the ankle	2287 (45.9)	2063 (49.7) <sup>b</sup>	65 (41.1)
At or above the knee	1555 (31.2)	1379 (33.2) <sup>b</sup>	53 (33.5)
Partial foot or toes	699 (14.0)	622 (15.0) <sup>b</sup>	28 (17.7)
At or above the elbow	373 (7.5)	41 (1.0)	0 (0)
Below the elbow and above the wrist	169 (3.4)	149 (3.6)	6 (3.8)
Partial hand or fingers	149 (3.0)	128 (3.1)	5 (3.2)
Did not answer	129 (2.6)	112 (2.7)	6 (3.8)
Amputation location, No. (%)			
Lower extremity, any level	4291 (86.1)	3843 (92.6)	142 (89.9)
Upper extremity, any level	428 (8.6)	369 (8.9)	16 (10.1)
Amputation etiology (may be > 1), No. (%)			
Infection	1554 (31.2)	1377 (33.2) <sup>b</sup>	54 (34.2)
Noncombat related traumatic injury or accident	1451 (29.1)	1309 (31.5) <sup>b</sup>	49 (31.0)
Diabetes	1012 (20.3)	920 (22.2) <sup>b</sup>	16 (10.1) <sup>c</sup>
Vascular disease	996 (20.0)	897 (21.6) <sup>b</sup>	28 (17.7)
Combat-related traumatic injury or accident	881 (17.7)	786 (18.9) <sup>b</sup>	17 (10.8)
Other	602 (12.1)	515 (12.4)	34 (21.5) <sup>b</sup>
Did not answer	358 (7.2)	37 (0.9) <sup>b</sup>	1 (0.6) <sup>c</sup>
Cancer	114 (2.3)	99 (2.4)	7 (4.4)
Burn	49 (1.0)	41 (1.0)	2 (1.3)

Abbreviation: OEF/OIF, Operation Enduring Freedom/Operation Iraqi Freedom.

<sup>a</sup>Missing 121 responses; 4067 men and 147 women responded.

<sup>b</sup>P ≤ .001.

<sup>c</sup>P ≤ .01.

Given the multimodal design, surveys were distributed by email, text message, and US Postal Service (USPS). Surveys were emailed to all veterans for whom a valid email address was available. If emails were undeliverable, veterans were contacted via text message or the USPS. Surveys were distributed by text message to all veterans without an email address but with a cellphone number. We were unable to consistently identify invalid numbers among all text message recipients. Invitations with a survey URL and QR code were sent via USPS to veterans who had no

**TABLE 2.** Prosthesis Characteristics and Use

Criteria	Total (N = 3867)	Men (n = 3447)	Women (n = 124)
Primary prosthesis type, No. (%)			
Everyday	3081 (79.7)	2861 (83.0) <sup>a</sup>	88 (71.0)
Did not answer	580 (15.0)	417 (12.1) <sup>a</sup>	24 (19.4)
Water-specific	529 (13.7)	493 (14.3) <sup>b</sup>	21 (16.9)
Activity-specific	468 (12.1)	424 (12.3)	21 (16.9)
Sports-specific	259 (6.7)	241 (7.0)	16 (12.9) <sup>b</sup>
Other	139 (3.6)	124 (3.6)	4 (3.2)
Cosmetic or passive	131 (3.4)	110 (3.2)	9 (7.3)
Current prosthesis use, No. (%)			
Yes	3391 (87.7)	3064 (88.9) <sup>a</sup>	100 (80.6)
No	444 (11.5)	382 (11.1)	24 (19.4) <sup>b</sup>
Did not answer	27 (0.7)	0 (0)	0 (0)
Intensity of daily prosthesis use, No. (%)			
≤ 2 h	189 (4.9)	165 (4.8)	10 (8.1)
3-4 h	181 (4.7)	165 (4.8)	6 (4.8)
5-8 h	421 (10.9)	375 (10.9)	19 (15.3)
9-11 h	812 (21.0)	744 (21.6)	27 (21.8)
≥ 12 h	1717 (44.4)	1599 (46.4) <sup>a</sup>	38 (30.6) <sup>b</sup>
Did not answer	545 (14.1)	393 (11.4) <sup>a</sup>	24 (19.4)
Days using prosthetic per wk, No. (%)			
< 1	65 (1.7)	58 (1.7)	4 (3.2)
1	27 (0.7)	29 (0.8)	1 (0.8)
2	54 (1.4)	48 (1.4)	5 (4.0)
3	69 (1.8)	65 (1.9)	2 (1.6)
4	88 (2.3)	79 (2.3)	3 (2.4)
5	135 (3.5)	110 (3.2)	9 (7.3)
6	116 (3.0)	99 (2.9)	8 (6.5)
7	2772 (71.7)	2571 (74.6) <sup>a</sup>	68 (54.8) <sup>a</sup>
Did not answer	541 (14.0)	393 (11.4) <sup>a</sup>	24 (19.4)

<sup>a</sup>P ≤ .001.<sup>b</sup>P ≤ .01.

valid email address or cellphone number. Targeted efforts were made to increase the response rate for women. A random sample of 200 women who had not completed the survey 2 weeks prior to the closing date (15% of women in sample) was selected to receive personal phone calls. Another random sample of 400 women was selected to receive personalized outreach emails. The survey data were confidential, and responses could not be traced to identifying information.

### Data Analyses

We conducted a descriptive analysis, including percentages and means for responses to variables focused on describing amputation characteristics, prosthesis characteristics, and QOL. All data, including missing values, were used to document the percentage of respondents for each question. Removing missing data from the denominator when

calculating percentages could introduce bias to the analysis because we cannot be certain data are missing at random. Missing variables were removed to avoid underinflation of mean scores.

We compared responses across 2 groups: individuals who self-identified as men and individuals who self-identified as women. For each question, we assessed whether each of these groups differed significantly from the remaining sample. For example, we examined whether the percentage of men who answered affirmatively to a question was significantly higher or lower than that of individuals not identifying as male, and whether the percentage of women who answered affirmatively was significantly higher or lower than that of individuals not identifying as female. We utilized  $\chi^2$  tests to determine significant differences for percentage calculations and *t* tests to determine significant differences in means across gender.

Since conducting multiple comparisons within a dataset may result in inflating statistical significance (type I errors), we used a more conservative estimate of statistical significance ( $\alpha = 0.01$ ) and high significance ( $\alpha = 0.001$ ). This study was deemed quality improvement by the VHA Rehabilitation and Prosthetic Services (12RPS) and acknowledged by the VA Research Office at Eastern Colorado Health Care System and was not subject to institutional review board review.

### RESULTS

Surveys were distributed to 46,613 veterans and were completed by 4981 respondents for a 10.7% overall response rate. Survey respondents were generally similar to the eligible population invited to participate, but the proportion of women who completed the survey was higher than the proportion of women eligible to participate (2.0% of eligible population vs 16.7% of respondents), likely due to specific efforts to target women. Survey respondents were slightly younger than the general population (67.3 years vs 68.7 years), less likely to be male (97.1% vs 83.3%), showed similar representation of Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) veterans (4.4% vs 4.1%), and were less likely to have diabetes (58.0% vs 52.7% had diabetes) (Table 1).

The mean age of male respondents was 67.3 years, while the mean age of female respondents was 58.3 years. The majority of respondents were male (83.3%) and White (77.2%). Female respondents were less likely to have diabetes (35.4% of women vs 53.5% of men) and less likely to report that their most recent amputation resulted from diabetes (10.1% of women vs 22.2% of men). Women respondents were more likely to report an amputation due to other causes, such as adverse results of surgery, neurologic disease, suicide attempt, blood clots, tumors, rheumatoid arthritis, and revisions of previous amputations. Most women respondents did not serve during the OEF or OIF eras. The most common amputation site for women respondents was lower limb, either below the knee and above the ankle or above the knee.

Most participants use an everyday prosthesis, but women were more likely to report using a sports-specific prosthesis (Table 2). Overall, most respondents report using a prosthesis (87.7%); however, women were more likely to report not using a prosthesis (19.4% of women vs 11.1% of men;  $P \leq .01$ ). Additionally, a lower proportion of women report using a prosthesis for > 12 hours per day (30.6% of women vs 46.4% of men;  $P \leq .01$ ) or using a prosthesis every day (54.8% of women vs 74.6% of men;  $P \leq .001$ ).

In the overall sample, the mean satisfaction score with a prosthesis was 2.7 on a 5-point scale, and women had slightly lower overall satisfaction scores (2.6 for women vs 2.7 for men;  $P \leq .001$ ) (Table 3). Women also had lower satisfaction scores related to appearance, usefulness, reliability, and comfort. Women were more likely to indicate that it was very important to be able to wear jewelry and accessories (20.2% of women vs 11.6% of men;  $P \leq .01$ ), while men were less likely to indicate that it was somewhat or very important that the prosthesis not restrict clothing or shoes (95.2% of women vs 82.9% of men;  $P \leq .001$ ). Men were more likely than women to report being comfortable or very comfortable using their prosthesis in intimate contact: 40.5% vs 29.0%, respectively ( $P \leq .001$ ).

Overall, participants reported high satisfaction with appointment times, wait times,

**TABLE 3.** Satisfaction and Prosthesis Considerations

Criteria	Total	Men	Women
TAPES, No. <sup>a</sup>	3710	3503	121
Appearance, mean (SD)	2.9 (1.3)	2.9 (1.3) <sup>b</sup>	2.7 (1.4)
Weight, mean (SD)	2.6 (1.3)	2.6 (1.3)	2.5 (1.4)
Usefulness, mean (SD)	2.9 (1.2)	2.9 (1.2) <sup>b</sup>	2.7 (1.4)
Reliability, mean (SD)	2.9 (1.3)	2.9 (1.3) <sup>b</sup>	2.8 (1.3)
Fit, mean (SD)	2.7 (1.2)	2.7 (1.2)	2.6 (1.2)
Comfort, mean (SD)	2.5 (1.3)	2.5 (1.3) <sup>c</sup>	2.4 (1.2)
Overall satisfaction, mean (SD)	2.7 (1.2)	2.7 (1.2) <sup>b</sup>	2.6 (1.2)
Wearing jewelry/accessories, No. (%)	3867	3447	124
Very important	444 (11.5)	400 (11.6)	25 (20.2) <sup>c</sup>
Somewhat important	301 (7.8)	272 (7.9)	12 (9.7)
Not at all important	2134 (55.2)	1992 (57.8) <sup>b</sup>	56 (45.2)
Don't know/not sure	676 (17.5)	620 (18.0)	25 (20.2)
Prosthesis not restricting clothing or shoes, No. (%)	3867	3447	124
Very important	1991 (51.5)	1837 (53.3) <sup>b</sup>	74 (59.7)
Somewhat important	1109 (28.7)	1020 (29.6) <sup>b</sup>	44 (35.5)
Not at all important	491 (12.7)	465 (13.5) <sup>b</sup>	3 (2.4) <sup>b</sup>
Don't know/not sure	108 (2.8)	96 (2.8)	3 (2.4)
Comfort with intimate contact, No. (%)	3867	3447	124
Very comfortable	638 (16.5)	606 (17.6) <sup>b</sup>	15 (12.1)
Comfortable	839 (21.7)	789 (22.9) <sup>b</sup>	21 (16.9)
Don't know/not sure	994 (25.7)	910 (26.4) <sup>c</sup>	41 (33.1)
Uncomfortable	638 (16.5)	596 (17.3) <sup>b</sup>	18 (14.5)
Very uncomfortable	568 (14.7)	503 (14.6)	28 (22.6)
Prosthesis reflect gender, No. (%)	3867	3447	124
Yes	1036 (26.8)	955 (27.7) <sup>b</sup>	43 (34.7)
No	1771 (45.8)	1637 (47.5) <sup>b</sup>	61 (49.2)
Don't know/not sure	893 (23.1)	831 (24.1) <sup>b</sup>	20 (16.1)

Abbreviation: TAPES, Trinity Amputation Prosthesis and Experience Scales.

<sup>a</sup>5-point scale (1, not at all satisfied; 5, very satisfied).

<sup>b</sup> $P \leq .001$ .

<sup>c</sup> $P \leq .01$ .

courteous treatment, opportunities to express concerns, and staff responsiveness. Men were slightly more likely than women to be satisfied with training ( $P \leq 0.001$ ) and problem discussion ( $P \leq 0.01$ ) (Table 4). There were no statistically significant differences in satisfaction or QOL ratings between women and men. The overall sample rated both QOL and satisfaction with QOL 6.7 on a 10-point scale.

## DISCUSSION

The goal of this study was to characterize the experience of veterans with limb loss receiving care in the VHA and assess their satisfaction with prostheses and prosthetic care. We received responses from nearly 5000 veterans, 158 of whom were women. Women veteran respondents were slightly younger and

**TABLE 4.** Satisfaction With Services<sup>a</sup>

Criteria	Total	Men	Women
Prosthesis appointment time, mean (SD)	4.0 (1.2)	4.0 (1.2)	4.1 (1.1)
Courtesy and respect, mean (SD)	4.4 (1.0)	4.4 (1.0)	4.5 (0.8)
Time to be seen, mean (SD)	4.0 (1.2)	4.0 (1.2)	4.2 (0.8)
Informed about choices, mean (SD)	3.8 (1.3)	3.8 (1.3)	3.7 (1.3)
Opportunity to express concerns, mean (SD)	4.1 (1.2)	4.1 (1.2)	4.0 (1.2)
Responsive to concerns, mean (SD)	4.2 (1.1)	4.2 (1.1)	4.2 (1.0)
Training satisfaction, mean (SD)	3.9 (1.3)	3.9 (1.3)	3.8 (1.4)
Problem discussion, mean (SD)	3.8 (1.3)	3.8 (1.3)	3.7 (1.3)
Appointment coordination, mean (SD)	3.5 (1.6)	3.5 (1.6)	3.6 (1.5)
Partner in decisions, mean (SD)	3.8 (1.3)	3.8 (1.3)	3.7 (1.4)

<sup>a</sup>5-point scale (1, not at all satisfied; 5, very satisfied).

less likely to have an amputation due to diabetes. We did not observe significant differences in amputation level between men and women but women were less likely to use a prosthesis, reported lower intensity of prosthesis use, and were less satisfied with certain aspects of their prostheses. Women may also be less satisfied with prosthesis training and problem discussion. However, we found no differences in QOL ratings between men and women.

Findings indicating women were more likely to report not using a prosthesis and that a lower proportion of women report using a prosthesis for > 12 hours a day or every day are consistent with previous research.<sup>21,22</sup> Interestingly, women were more likely to report using a sports-specific prosthesis. This is notable because prior research suggests that individuals with amputations may avoid participating in sports and exercise, and a lack of access to sports-specific prostheses may inhibit physical activity.<sup>23,24</sup> Women in this sample were slightly less satisfied with their prostheses overall and reported lower satisfaction scores regarding appearance, usefulness, reliability, and comfort, consistent with previous findings.<sup>25</sup>

A lower percentage of women in this sample reported being comfortable or very comfortable using their prosthesis during intimate contact. Previous research on

prosthesis satisfaction suggests individuals who rate prosthesis satisfaction lower also report lower body image across genders.<sup>26</sup> While women in this sample did not rate their prosthesis satisfaction lower than men, they did report lower intensity of prosthesis use, suggesting potential issues with their prostheses this survey did not evaluate. Women indicated the importance of prostheses not restricting jewelry, accessories, clothing, or shoes. These results have significant clinical and social implications. A recent qualitative study emphasizes that women veterans feel prostheses are primarily designed for men and may not work well with their physiological needs.<sup>9</sup> Research focused on limbs better suited to women's bodies could result in better fitting sockets, lightweight limbs, or less bulky designs. Additional research has also explored the difficulties in accommodating a range of footwear for patients with lower limb amputation. One study found that varying footwear heights affect the function of adjustable prosthetic feet in ways that may not be optimal.<sup>27</sup>

Ratings of satisfaction with prosthesis-related services between men and women in this sample are consistent with a recent study showing that women veterans do not have significant differences in satisfaction with prosthesis-related services.<sup>28</sup> However, this study focused specifically on lower limb amputations, while the respondents of this study include those with both upper and lower limb amputations. Importantly, our findings that women are less likely to be satisfied with prosthesis training and problem discussions support recent qualitative findings in which women expressed a desire to work with prosthetists who listen to them, take their concerns seriously, and seek solutions that fit their needs. We did not observe a difference in QOL ratings between men and women in the sample despite lower satisfaction among women with some elements of prosthesis-related services. Previous research suggests many factors impact QOL after amputation, most notably time since amputation.<sup>16,29</sup>

### Limitations

This survey was deployed in a short timeline that did not allow for careful sample selection or implementing strategies to increase



response rate. Additionally, the study was conducted among veterans receiving care in the VHA, and findings may not be generalizable to limb loss in other settings. Finally, the discrepancy in number of respondents who identified as men vs women made it difficult to compare differences between the 2 groups.

## CONCLUSIONS

This is the largest sample of survey respondents of veterans with limb loss to date. While the findings suggest veterans are generally satisfied with prosthetic-related services overall, they also highlight several areas for improvement with services or prostheses. Given that most veterans with limb loss are men, there is a significant discrepancy between the number of women and men respondents. Additional studies with more comparable numbers of men and women have found similar ratings of satisfaction with prostheses and services.<sup>28</sup> Further research specifically focused on improving the experiences of women should focus on better characterizing their experiences and identifying how they differ from those of male veterans. For example, understanding how to engage female veterans with limb loss in prosthesis training and problem discussions may improve their experience with their care teams and improve their use of prostheses. Understanding experiences and needs that are specific to women could lead to the development of processes, resources, or devices that are tailored to the unique requirements of women with limb loss.

## Acknowledgments

The authors thank Robert Klocko, Adnan Syed, and Anthony Vehovic for their help with this project.

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## Author disclosures

The authors report no personal or financial conflicts of interest. This study was funded by the US Department of Veterans Affairs as part of Public Law 116-315, Johnny Isakson and David P. Roe, M.D. Veterans Health Care and Benefits Improvement Act of 2020, § 5108 (2)(F).

## Disclaimer

The opinions expressed herein are those of the authors and do not necessarily reflect those of *Federal Practitioner*, Frontline

Medical Communications Inc., the US Government, or any of its agencies.

## Ethics and consent

This study was deemed quality improvement by the VHA Rehabilitation and Prosthetic Services (12RPS) and acknowledged by the VA Research Office at Eastern Colorado Health Care System and was not subject to institutional review board review.

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