

Quality of medical care provided to service members with combat-related limb amputations: Report of patient satisfaction

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Abstract—A group of 158 service members who sustained major limb amputations during the global war on terrorism were surveyed on their satisfaction with the quality of care received from the Walter Reed Army Medical Center (WRAMC) Amputee Clinic from the time of their injury to their inpatient discharge. Of these participants, 96% were male, 77% were Caucasian, 89% were enlisted personnel, and 68% had sustained lower-limb amputations. WRAMC inpatient therapy, peer visitors, overall medical care, and pain management received particularly high satisfaction ratings. Age, race, rank, and level and side of amputation had little effect on overall satisfaction ratings. Significant differences, however, were found by location of injury (Iraq vs Afghanistan, Cuba, and Africa) regarding satisfaction with care received while in Europe and with the education process at WRAMC. Study findings strongly support the rehabilitation-based, integrative care approach designed by the U.S. military to care for service members with amputations.

Key words: global war on terrorism, limb amputation, outcomes, patient satisfaction, quality of care, rehabilitation, satisfaction survey, service members, VA, Walter Reed Army Medical Center.

INTRODUCTION

The advancement of medical knowledge, especially rehabilitation services, historically has been associated

with times of war [1–3]. The disciplines of psychiatry, physical and occupational therapy, rehabilitation engineering, and vocational rehabilitation were largely formed in response to the needs of injured soldiers returning from the first and second World Wars [2–5]. Technological advances in assistive devices, such as wheelchairs, prostheses, and orthoses, were largely discovered to improve the lives of veterans with paralysis and limb loss [4–6]. Further, the determination of many veterans with disabilities to return to highly active lifestyles has greatly contributed to improved access of all individuals with disabilities to sports and recreation [7–8].

Since the United States began its efforts in the global war on terrorism (GWOT) in 2001, 737 military service members as of January 1, 2008 have sustained major limb amputations associated with military operations in Iraq and Afghanistan [9]. Most ($n = 540$, 73.3%) of these service

Abbreviations: DOD = Department of Defense, GWOT = global war on terrorism, IRB = institutional review board, QoC = Quality of Care, VA = Department of Veterans Affairs, WRAMC = Walter Reed Army Medical Center.

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members have been treated in Washington, DC, at Walter Reed Army Medical Center (WRAMC), a healthcare center that offers a highly structured and interdisciplinary program of care for individuals with amputations. Providers from multiple services, such as surgical, medical, and rehabilitation specialties, are integrated with psychosocial support groups, vocational counselors, peer visitors, recreational and sports groups, and various other public and private organizations to deliver the highest quality of care. The remaining service members were treated at Brooke Army Medical Center in San Antonio, Texas, and at the Naval Medical Center San Diego in San Diego, California. The study reported in this article was conducted solely at WRAMC.

Patient satisfaction is one of the most vital quality outcome measures in the assessment of the performance of healthcare systems and personnel [10]. Previously used as a management tool by the Department of Defense (DOD), satisfaction surveys assess patient satisfaction with the healthcare services provided [11–12]. Similarly, the WRAMC Amputee Clinic has established multiple methods of evaluation and feedback to improve and maintain the excellence of its services. Quality outcomes have been established for several domains of medical, surgical, and rehabilitative care and, in particular, the peer component of all aspects of recovery. To ensure quality of inpatient care and promote performance improvement, the staff of the Physical Medicine and Rehabilitation Service at WRAMC created a Quality of Care (QoC) Questionnaire to administer to service members during their initial outpatient visits to the WRAMC Amputee Clinic. This survey contained 23 questions on key aspects of medical and rehabilitative care (i.e., psychological support, pain management, medical care, education, and accommodations); each question was rated on a 10-point Likert scale [13]. Questions focus on the period of time from the service member's initial injury to his or her discharge from inpatient services at WRAMC.

This study analyzed satisfaction ratings on the various aspects of medical and rehabilitative care provided to military service members who sustained limb amputations during military operations in the GWOT. In particular, the survey investigated the importance of support and peer groups in the treatment of patients with amputations. While the Department of Veterans Affairs (VA)/DOD practice guidelines for rehabilitation suggest use of peer support groups as a rehabilitation method, other studies make stronger claims about the import of such peer

groups.* One study that investigated the importance of peer visitation found the visitations to have even greater impact than education [14], while others researchers indicated that peer groups enabled patients to better cope with depression, fear, and helplessness [15–16]. In contrast, other programs attempted to balance professional therapy with peer therapy and found a coordinated multidisciplinary approach to be most effective [17–18]. The outcomes of this study will be used to promote performance improvement and quality of care for the service members who receive care at the WRAMC Amputee Clinic and to shed greater light on how peer groups, counseling, and daily rehabilitation improve patient outcomes.

METHODS

Study Design

A retrospective analysis was conducted of the service members' satisfaction survey results collected from November 2003 through March 2005. Service members who received inpatient healthcare services and peer support from the WRAMC Amputee Clinic were surveyed, and these data were analyzed for this study.

Subjects

Subjects were service members who visited the outpatient amputee clinic at WRAMC in Washington, DC, from November 2003 through March 2005. Administration of the satisfaction survey is part of routine medical and rehabilitation care at the WRAMC Amputee Clinic. Since the study analyzed retrospective data regarding satisfaction, the institutional review board (IRB) waived the requirement of obtaining consent forms from the study participants. However, the IRB limited our data analysis to 158 service members who received outpatient care from November 2003 through March 2005.

Outcomes

The QoC Questionnaire (see **Appendix**, available online only at www.rehab.research.va.gov/jour/08/45/7/pdf/contents.pdf) was devised and then distributed to all service members who had experienced one or more

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amputations from military operations during the global war on terrorism. The QoC Questionnaire was developed through a combined effort of the many disciplines specialized in the provision of amputation care. The QoC Questionnaire was distributed during the service member's initial visit to the outpatient amputee clinic. Each service member was asked to anonymously rate his or her satisfaction on 16 parameters of care by using a Likert scale from 1 ("very poor satisfaction") to 10 ("excellent satisfaction") [19]. Each service member was also asked to remark on his or her agreement with seven specific statements on a Likert scale from 1 ("strongly disagree") to 10 ("strongly agree"). Service members could choose to not answer questions that did not apply or that they did not feel comfortable answering.

Although we made no attempt to standardize the QoC Questionnaire, we determined content validity of the questionnaire with the first 10 service members. These participants rated their level of satisfaction and understanding of the QoC Questionnaire. This procedure was conducted to determine whether the service members understood the different aspects of the questionnaire.

While participants were completing the QoC Questionnaire, one of the authors, a trained nurse (TC), was available to assist in the event of any questions or problems. The questionnaire represented eight major domains and assessed subjects' satisfaction related to promptness of medical care, care received in Europe, medical care received at WRAMC, rehabilitation received at WRAMC, education received at WRAMC, psychosocial support provided at WRAMC, accommodations provided at WRAMC, and overall satisfaction with care provided by the U.S. Army. We obtained a composite satisfaction score for each of these domains.

Data Analysis

We performed multiple separate analyses by grouping participants according to the following independent variables:

1. Age at time of injury. Participants were divided in two age groups: <30 years and ≥ 30 years.
2. Military rank. Participants were categorized as being either enlisted service members or officers.
3. Geographic location where injured. Participants were dichotomized as either injured in Iraq or injured in locations other than Iraq (Afghanistan, Cuba, and Africa).
4. Area of amputation. Participants were categorized as having an upper-limb amputation, a lower-limb amputation, or both upper- and lower-limb amputations.

5. Side of amputation. Participants were dichotomized as having either a unilateral or bilateral amputation.
6. Level of amputation. Level of amputation was compared within either type of limb amputation (i.e., upper vs lower). Service members with upper-limb amputations were categorized as having partial hand, transradial, transhumeral, and shoulder disarticulation amputations. For those with lower-limb amputations, comparisons were made between foot, transtibial, knee disarticulation, transfemoral, and hip disarticulation amputations.

Statistical Analysis

The type of statistics chosen for the analysis of all ordinal satisfaction rating scores depended on the number of categories or levels of the grouping variable. For example, when service members were grouped by age at the time of injury, only two categories were used (i.e., those younger than 30 and those 30 or older). Thus, Mann-Whitney *U* statistics were used to compare ordinal satisfaction ratings between the two groups. Other two-level grouping variables examined with Mann-Whitney *U* statistics were military rank (enlisted vs officers), geographic location at time of injury (Iraq vs other locations), and side of injury (unilateral vs bilateral). We used Kruskal-Wallis statistics when comparing variables with three or more levels. For example, when comparing service members by area of amputation, which had three levels (i.e., upper limb, lower limb, or both limbs), we chose Kruskal-Wallis statistics. After separating the service members by upper- or lower-limb amputation, we also used Kruskal-Wallis statistics to compare service members according to level of amputation. Upper-limb levels included hand, wrist disarticulation, transradial, elbow disarticulation, transhumeral, and shoulder disarticulations. Similarly, those with lower-level amputations could be categorized in one of five different levels. All statistical analyses were performed with SPSS 15.0 (SPSS, Inc; Chicago, Illinois) with a predetermined alpha level of $p < 0.05$.

RESULTS

Demographics

Data from 158 service members, 152 males and 6 females, were used for these analyses. All data are shown as mean \pm standard deviation unless otherwise indicated. The average age at time of injury was 26.3 ± 6.5 years. Eighty-nine percent were enlisted service members

and eleven percent were officers. One civilian participated in the study. Service members were more likely to have sustained lower-limb amputations (68%) than upper-limb amputations (29%). However, 3 percent of participants had had amputations of both their upper and lower limbs. The most frequent amputation was a transtibial amputation (32%). Forty-eight percent had right-sided amputations, forty-one percent had left-sided amputations, and eleven percent had bilateral amputations. Of those surveyed, 77.0 percent were Caucasian, 8.2 percent were Hispanic, 8.0 percent were African American, 1.3 percent were Asian/Pacific Islanders, 0.6 percent were Middle Eastern, and the remaining 4.9 percent did not specify their race.

Quality of Care Questionnaire Scores

Questions 1 through 16 were ranked on a Likert ordinal scale from 1 to 10, with a score of 1 corresponding to “very poor satisfaction” and a score of 10 corresponding to “excellent satisfaction.” Questions 17 through 23 were also ranked on a Likert ordinal scale from 1 to 10, with a score of 1 corresponding to “strongly disagree” and a score of 10 corresponding to “strongly agree.” Average scores for all items are displayed in **Table 1**.

In general, satisfaction was rated highly for many of the services provided at or en route to WRAMC. The parameter regarding therapy received while an inpatient at WRAMC was given a mean score of 9. Eighteen items received a mean score between 7 and 8 (“very good”). The lowest response score was received by the question pertaining to education received about the Medical Board Process, which received a mean score of 4.9.

Age at Time of Injury

No significant differences were found among the variables except for satisfaction related to medical care at WRAMC. Older patients (≥ 30 yr) were significantly more satisfied with the quality of medical care provided at the Amputee Clinic than were their younger counterparts (< 30 yr) (8.93 ± 1.30 vs 8.35 ± 1.60 , respectively; $p = 0.04$).

Military Rank

No significant differences were found in satisfaction ratings of any variables between those who served as enlisted service members versus those who served as officers during time of injury.

Geographical Location of Injury

When we compared satisfaction ratings according to the location of the service member at the time of his or her injury, we found significant differences in two variables: (1) care provided in Europe and (2) education provided at WRAMC. For medical care in Europe, individuals injured in Iraq reported significantly higher satisfaction rating scores than those injured in other locations such as Afghanistan, Cuba, and Africa (7.83 ± 2.22 vs 6.17 ± 2.68 , respectively; $p = 0.04$). In contrast, individuals injured in other locations were more satisfied with the educational process at WRAMC than were those injured in Iraq (8.47 ± 1.04 vs 7.06 ± 1.89 , respectively; $p = 0.02$). Refer to **Table 2**, which displays the different satisfaction ratings.

Area of Amputation

Comparisons between individuals with only upper-limb amputations, only lower-limb amputations, and with upper- and lower-limb amputations found significant differences in satisfaction scores related to the educational process at WRAMC and the psychosocial support provided. Regarding the WRAMC educational process, service members with both upper- and lower-limb amputations were the least satisfied compared with those with only lower-limb amputations (5.54 ± 0.66 vs 7.37 ± 1.82 , respectively; $p = 0.03$). Furthermore, individuals with both upper- and lower-limb amputations were less satisfied with the psychosocial support provided at WRAMC than were service members with only lower-limb amputations (5.88 ± 1.67 vs 7.99 ± 1.67 , respectively; $p = 0.03$). Also, service members with only upper-limb amputations reported significantly lower satisfaction scores regarding psychosocial support than those with only lower-limb amputations (7.28 ± 1.8 vs 7.99 ± 1.67 , respectively; $p = 0.02$). However, no differences in satisfaction related to the educational process were found between the group with both upper- and lower-limb amputations and the group with only upper-limb amputations (6.83 ± 1.97 , $p = 0.14$).

Side of Amputation

Individuals with unilateral (upper- or lower-limb) amputations did not differ in satisfaction ratings for all areas of health services when compared with those with bilateral amputations.

Level of Amputation

No significant differences were found when data were compared by level of amputation within the upper-limb

Table 1.

Average satisfaction ratings of 158 service members with major limb amputations. Questions were ranked on 1–10 scale (for questions 1–16, 1 = “very poor satisfaction” and 10 = “excellent satisfaction”; for questions 17–23, 1 = “strongly disagree” and 10 = “strongly agree”).

| Survey Question | Mean Rating |
|---|-------------|
| 1. Time from your injury until you received medical attention. | 8.3 |
| 2. Medical attention you received en route from Iraq to Europe. | 7.9 |
| 3. Pain management you received en route from Iraq to Europe. | 7.5 |
| 4. Medical care you received in Europe. | 7.7 |
| 5. Pain management you received in Europe. | 7.8 |
| 6. Therapy you received while an inpatient in Europe. | 6.9 |
| 7. Medical care you received during air evacuation to United States. | 7.3 |
| 8. Accommodations (flight, bus, meals, etc.) you received during air evacuation to United States. | 6.5 |
| 9. Pain management you received during air evacuation to United States. | 7.0 |
| 10. Medical care you received while an inpatient at WRAMC. | 8.6 |
| 11. Therapy you received while an inpatient at WRAMC. | 9.0 |
| 12. Pain management you received while an inpatient at WRAMC. | 8.4 |
| 13. Education you received about your amputation while an inpatient at WRAMC. | 8.2 |
| 14. Education you received about the Medical Board Process while an inpatient at WRAMC. | 4.9 |
| 15. Support your family received during your hospitalization. | 7.6 |
| 16. Your current accommodations (room, meals, etc.). | 7.7 |
| 17. It was clear when you were discharged from WRAMC whom you could go to with medical questions. | 7.6 |
| 18. It was clear when you were discharged from WRAMC what your follow-up instructions were. | 7.7 |
| 19. Peer support group was helpful. | 6.8 |
| 20. Psychological support you received as an inpatient was helpful. | 7.4 |
| 21. Support you received from amputee peer visitor was helpful. | 8.7 |
| 22. Overall, you are very satisfied with the medical care you have received from WRAMC. | 8.5 |
| 23. Overall, you are very satisfied with the medical care you have received from the U.S. military. | 8.1 |

WRAMC = Walter Reed Army Medical Center.

Table 2.

Comparison of satisfaction ratings (mean \pm standard deviation) by geographical location of injury among 158 service members with major limb amputations. Variables were rated on 1–10 scale; higher numbers represent higher satisfaction.

| Variable | Location | | p-Value |
|---|-----------------|-----------------|---------|
| | Iraq | Other | |
| Promptness of Care | 7.62 \pm 2.04 | 6.25 \pm 2.60 | 0.08 |
| Care in Europe | 7.83 \pm 2.21 | 6.17 \pm 2.68 | 0.04* |
| Medical Care at WRAMC | 8.44 \pm 1.60 | 9.20 \pm 0.87 | 0.18 |
| Rehabilitation at WRAMC | 9.03 \pm 1.33 | 9.30 \pm 0.82 | 0.82 |
| Accommodation/Education at WRAMC | 7.06 \pm 1.88 | 8.47 \pm 1.03 | 0.01* |
| Psychosocial Support at WRAMC | 7.71 \pm 1.75 | 7.98 \pm 1.85 | 0.60 |
| Overall Satisfaction with Care from U.S. Military | 8.22 \pm 1.88 | 7.50 \pm 2.50 | 0.42 |

*Statistically significant difference.

WRAMC = Walter Reed Army Medical Center.

amputation group and within the lower-limb amputation group. However, as displayed in **Table 3**, study participants with shoulder disarticulation amputations tended to answer with higher levels of satisfaction in five of seven variables investigated by upper-limb amputation level. Full results are provided in **Tables 3** and **4**.

DISCUSSION

Overall, the results of this QoC satisfaction questionnaire suggest that the medical and therapeutic treatment programs established by the WRAMC are largely meeting the needs of injured service members who sustained

Table 3.

Comparison of satisfaction ratings (mean \pm standard deviation) among 46 service members with different levels of upper-limb amputations. Variables were rated on 1–10 scale; higher numbers represent higher satisfaction.

| Variable | Partial Hand (<i>n</i> = 8) | Transradial (<i>n</i> = 21) | Transhumeral (<i>n</i> = 13) | Shoulder Disarticulation (<i>n</i> = 4) |
|---|---------------------------------|---------------------------------|----------------------------------|---|
| Promptness of Care | 6.17 \pm 2.36 | 7.90 \pm 1.56 | 6.98 \pm 2.73 | 8.85 \pm 1.81 |
| Care in Europe | 7.38 \pm 2.17 | 7.81 \pm 1.89 | 7.88 \pm 1.61 | 8.88 \pm 2.25 |
| Medical Care at WRAMC | 7.79 \pm 1.52 | 8.60 \pm 1.39 | 8.33 \pm 1.51 | 8.42 \pm 1.91 |
| Rehabilitation at WRAMC | 8.43 \pm 1.81 | 8.85 \pm 1.53 | 8.33 \pm 1.67 | 9.50 \pm 1.00 |
| Accommodation/Education at WRAMC | 5.59 \pm 0.85 | 7.04 \pm 2.31 | 6.85 \pm 1.77 | 8.19 \pm 1.34 |
| Psychosocial Support WRAMC | 7.00 \pm 1.75 | 7.33 \pm 1.98 | 7.08 \pm 1.71 | 8.19 \pm 1.34 |
| Overall Satisfaction with Care from U.S. Military | 7.50 \pm 1.51 | 7.86 \pm 2.65 | 8.58 \pm 1.44 | 7.25 \pm 2.50 |

WRAMC = Walter Reed Army Medical Center.

Table 4.

Comparison of satisfaction ratings (mean \pm standard deviation) among 112 service members with different levels of lower-limb amputations. Variables were rated on 1–10 scale; higher numbers represent higher satisfaction.

| Variable | Foot (<i>n</i> = 5) | Transtibial (<i>n</i> = 51) | Knee Disarticulation (<i>n</i> = 4) | Transfemoral (<i>n</i> = 46) | Hip Disarticulation (<i>n</i> = 6) |
|---|-------------------------|---------------------------------|--|----------------------------------|---|
| Promptness of Care | 7.40 \pm 2.40 | 7.13 \pm 2.12 | 6.77 \pm 2.30 | 8.11 \pm 2.02 | 7.97 \pm 1.09 |
| Care in Europe | 8.03 \pm 1.32 | 7.33 \pm 2.47 | 7.08 \pm 2.74 | 7.95 \pm 2.61 | 9.00 \pm 0.00 |
| Medical Care WRAMC | 8.67 \pm 2.61 | 8.44 \pm 1.65 | 8.11 \pm 2.14 | 8.67 \pm 1.57 | 8.50 \pm 0.96 |
| Rehabilitation WRAMC | 9.80 \pm 0.45 | 9.09 \pm 1.28 | 8.33 \pm 2.08 | 9.33 \pm 1.02 | 9.00 \pm 0.89 |
| Accommodation/Education at WRAMC | 7.95 \pm 2.72 | 7.40 \pm 1.81 | 5.75 \pm 1.39 | 7.26 \pm 1.76 | 7.04 \pm 1.86 |
| Psychosocial Support at WRAMC | 8.38 \pm 1.72 | 7.87 \pm 1.62 | 7.83 \pm 2.02 | 7.93 \pm 1.91 | 7.81 \pm 1.20 |
| Overall Satisfaction with Care from U.S. Military | 8.40 \pm 2.61 | 8.08 \pm 1.93 | 8.00 \pm 2.16 | 8.45 \pm 1.70 | 8.50 \pm 1.38 |

WRAMC = Walter Reed Army Medical Center.

service-related traumatic limb amputations during the GWOT. In particular, these pilot data support the conclusion that factors such as age, race, rank, level and side of amputation, and geographic location at the time of injury have little effect on the determination of satisfaction with medical and rehabilitation care provided. These findings support the findings from previous studies [20–23], in that service-connected healthcare systems are universally accessible regardless of age, race, and rank. Despite the relatively high satisfaction scores, we have used the valuable information from these results to make programmatic improvements. For example, issues relating to the Medical Evaluation Board process were brought to the attention of the military command, leading to implementation of a new system designed to improve the process. Also, service members indicated that they preferred peer visitors who were close in age. The rehabilitation program then instituted a peer-support training program at WRAMC to attract younger peer visitors. In addition,

several results warrant further analyses of the possible reasons for differences.

Soldiers aged 30 or older were more satisfied with the care they received at WRAMC than were younger soldiers, possibly because of their previous healthcare experiences. Also, the peer-support visitors who visited these service members were older, and although no significant differences were found between the younger and older service members' satisfaction with peer support, this factor may have affected the satisfaction ratings of the care received at WRAMC.

Satisfaction with the time between injury and receipt of medical care differed significantly among participants injured in different geographic locations. Participants injured in Iraq were considerably more satisfied than those injured in other locations (Afghanistan, Cuba, and Africa). However, given the significant differences in sample sizes, drawing any pertinent conclusions from these data is difficult. One hypothesis may be that since more wounded service men and women are currently

coming from Iraq, the system has had time to streamline the evacuation and transport services.

Several possibilities could explain why all participants from our study reported highest satisfaction with therapy they received in WRAMC. Progression of rehabilitation differs from the traditional civilian rehabilitation model. In WRAMC, rehabilitation progresses from activities of daily living (such as standing and walking) to more complex tasks (such as plyometrics and agility drills) to sports models of rehabilitation. This progression is more appropriate for the young, active population of patients with amputations. Also, the fact that therapists have more time available to interact with their patients is unlike nonmilitary healthcare systems, which experience time pressures from third party payers.

Several limitations of this study are clear. The first limitation is the small sample size recruited for this study. Being retrospective in nature, the approval from the WRAMC IRB provided permission to analyze data from 158 patients without obtaining signed consent forms, because these data were already collected. However, this study could be expanded further to include larger numbers of individuals receiving care at the amputee program in WRAMC. A second probable limitation of this study is the use of a nonstandardized satisfaction questionnaire. However, the questionnaire was developed by expert clinicians (physiatrists, physical and occupational therapists, and prosthetists). Since the model of care of our amputee program is very different from that followed at civilian hospitals, we could only capture WRAMC's unique aspects by using a site-specific assessment rather than a generalized measure. Also, since these data are commonly used to assess the quality of the program, specific components that reflect the actual care but are not currently available in other standardized measurements had to be included in this survey [24]. A third limitation of the study may be the pressure perceived by military personnel to positively rate a DOD service, because of possible fear that a bad rating may reflect badly on them.

CONCLUSIONS

With high satisfaction rates reported by service members who received inpatient services from WRAMC, the results of this study strongly support that the model of care designed by the U.S. military to care for service members with combat-related traumatic amputations is

effective. This model of care was largely designed with a rehabilitation-based integrative care approach [25]. Further, these results demonstrate that patient satisfaction is generally independent of age, sex, race, and military rank. Particularly high rates of satisfaction were observed regarding therapy, peer-support visitation, and overall medical care. The aggressive early rehabilitation, strong therapeutic alliances between therapists and patients, and medical vigilance and attentiveness by physicians and nurses across the spectrum of care, likely contributed greatly to the high satisfaction rates. Specific areas of care that warrant further investigation and improvement have also been identified.

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