

# A Profile of Patients in a VA Amputee System of Care Clinic

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Between December 15, 2010, and September 21, 2011, the regional amputation center at the Hunter Holmes McGuire VAMC in Richmond, Virginia, enrolled 50 subjects for a study that focused on the use of health services and satisfaction levels. This report is the first of its kind to provide details of a range of clinical and patient characteristics and service delivery factors for patients with limb loss.

In the U.S., between 1988 and 1996, surgeons performed 133,235 amputations annually.<sup>1</sup> In 2005, about 1.7 million persons lived with the loss of a limb. This figure is predicted to more than double to 3.6 million persons by the year 2050.<sup>2</sup> The majority (82%) of these amputations are caused by vascular conditions and often occur with cardiovascular disease, diabetes mellitus, and renal insufficiency.<sup>1</sup> Additionally, there is a growing population of young, healthy individuals with traumatic amputations as a result of the conflicts in the Middle East with more than 1,621 amputations resulting from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF).<sup>3-5</sup>

To meet the needs of these wounded warriors, a significant in-

vestment has been made by the DoD and VA for veterans and service members with limb loss, with the goal to restore and maintain function to the fullest extent possible.<sup>6,7</sup> Although this expanded care system was initially developed for the OIF/OEF population, the goals and programs developed benefit all amputees, regardless of etiology. The VA's Amputation System of Care (ASoC) was fully implemented in 2007 and includes an integrated network of Regional Centers of Excellence (Regional Amputation Centers [RAC]), supported by more than 100 additional clinical centers (Polytrauma Amputation Network Sites [PANS], Amputation Care Teams [ACTs], and Amputation Points of Contact [APCs]) across the U.S. This ASoC is closely integrated into the DoD am-

putation centers with an emphasis on optimizing function through the use of advanced technology and skilled, compassionate care.<sup>8</sup> Paramount in this schema is the patient-centric focus of VA and DoD care.

Prosthetic care is a vital part of the total patient-centric, interdisciplinary amputation rehabilitation process.<sup>7,9,10</sup> To individualize prosthetic prescription and usage, clinicians must consider demographic and clinical characteristics of patients to determine how to best tailor the clinic to meet the patients' needs. The goal of this investigation was to describe the demographics and care experience of all service members and veterans who received amputation care at a RAC.

## METHODS

### Study Participants

Subjects were selected from consecutive patients referred to the RAC at the Hunter Holmes McGuire VAMC in Richmond, Virginia, between December 15, 2010, and September 21, 2011. A total of 50 subjects were consented and enrolled. The VAMC in Richmond, Virginia, is part of the VA's ASoC as 1 of 7 RACs in the coun-

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**Table 1. Patient characteristics**

	Mean	SD	P value
<b>Age (y)</b>			
Acute	64.1	8.5	
Chronic	61.9	14.9	= .53
<b>Distance from VA (miles)</b>			
Acute	44.6	34.8	
Chronic	53.3	60.5	= .52
<b>Amputee clinic visits (N)</b>			
Acute	2.1	1.4	
Chronic	1.3	0.7	= .02 <sup>a</sup>
<b>VA visits in past year (N)</b>			
Acute	15.3	11.7	
Chronic	14.2	11.6	= .73
<b>Time from surgery to prosthesis (months)</b>			
Acute	5.1	3.0	
Chronic	30.6	96.4	= .22
<b>Prostheses in last 3 years (N)</b>			
Acute	1.6	0.8	
Chronic	2.9	2.8	= .13
<b>Satisfaction level (1-4)</b>			
Acute	3.2	0.7	
Chronic	3.1	0.9	= .90

<sup>a</sup>Significant.  
SD = standard deviation.

try. Referrals are received from surrounding VA facilities both in person and via telehealth services. Each individual with an amputation is evaluated in an interdisciplinary amputee clinic by an attending and resident physician, a prosthetist, and a care coordinator. Physical and occupational therapists, who work closely with the patient, are also available in the clinic. The clinic team helps coordinate all aspects of the rehabilitation process, including proper fitting, alignment, and maintenance of the prosthesis. The process also includes progressive therapy and exercise (both clinical and community based), community reintegration, vocational rehabilitation, and pain management to assure that each patient is satisfied and able to use

the prosthetic limb to improve daily function.

**Measures**

Demographic and clinical data were abstracted from medical records, and subjects were surveyed on a number of outcome measures. Demographic information included age, gender, distance from VA hospital, number of visits to the amputee clinic in the last year, and number of visits to all VA clinics in the last year. Clinical information included amputation etiology (vascular, traumatic, or other), amputation level (below knee, above knee, below elbow, above elbow, or multiple) and range of motion (full vs contracted). Surveyed outcome measures included time from most recent amputation to first amputation clinic

visit, time from last surgery to first prosthesis, number of hours daily prosthesis worn, number of prostheses fitted in the past 3 years, phantom pain (none, mild, moderate, or severe), type of pain medication usage (none, gabapentin, ibuprofen, hydrocodone, acetaminophen-oxycodone, or acetaminophen with codeine), and level of satisfaction of overall current prosthesis (very satisfied, satisfied, dissatisfied, or very dissatisfied).

**RESULTS**

**Demographic Data**

Participants were 50 male, community-dwelling veterans and service members seen at the RAC. The mean age of patients in the study was 63.0 years (standard deviation [SD] = 12.1 years; range 30-91 years). Etiology of amputation was traumatic (28%), vascular (58%), and other (14%). Eight (16%) of the 50 veterans had multiple limb amputations. Four veterans had single-limb upper extremity amputation, 1 above elbow (2%), and 3 below elbow (6%). The remaining 38 (76%) veterans had single-limb lower extremity amputations, 26 below knee, and 12 above knee. Veterans studied lived a mean distance of 48.9 miles (SD = 49.1) from the RAC, were scheduled for a total of 14.96 VA health care visits, and attended 14.74 of these visits, including 1.7 amputee clinic visits, in the prior year.

The mean time since the most recent amputation was 123.7 months (SD = 180.6) with 40% occurring within the past 12 months and half occurring within the past 24 months. The mean time from surgery to receiving the prosthesis was 18.4 months (SD = 70.1) with more than half the veterans returning within 4 months. The mean number of prostheses dispensed per veteran in the last 3 years was 2.4 (SD = 2.4),

and the mean wearing time per day was 9.2 hours (SD = 4.3). Eighty-three percent of the veterans reported that they were either “satisfied” or “extremely satisfied” with the prosthesis received as part of RAC care, attributed, in part, to 88% evidencing no limb contractures, 62% indicating either no phantom pain or mild phantom pain, and 60% of subjects taking no pain medications.

Analysis of variables between the cohorts that received acute (within 24 months of amputation) or chronic (longer than 24 months) care was performed to assess group differences. The acute group more closely resembles the typical populations reported in the extant literature (Table 1). An independent-samples *t* test indicated only a few differences between the 2 groups. As expected, the numbers of amputee clinic visits were fewer, and the time from amputation to prosthetic fitting was significantly longer for chronic amputees. Of note, although veterans who received their amputations more than 24 months (chronic group) before clinic evaluation by visual inspection may have appeared to have a significant delay in receiving the prosthesis compared with the acute group (less than 24 months), this delay is because a result of several outliers in the chronic group that resulted in a large SD.

Correlational analyses were performed and Spearman coefficients indicated a significant inverse relationship between pain and age ( $r(50) = -.356; P = .011$ ), time since amputation and number of amputee clinic visits ( $r(50) = -.358; P = .011$ ), and number of prostheses tried in last 3 years and number of amputee clinic visits ( $r(36) = -.359; P = .031$ ). A positive correlation was found between time since amputation and time from surgery to prosthetic fitting ( $r(46) = .329; P = .026$ )

and between time since amputation and hours a prosthesis was worn daily ( $r(35) = .356; P = .036$ ).

## DISCUSSION

This study describes consecutive patients seen at a RAC within VA's ASoC, focusing on the use of health services and on satisfaction levels. The study also represents the first detailed report outlining the range of clinical and patient characteristics with service delivery factors. Despite the focus of the ASoC on acute, young, combat-injured amputees and the proximity of the RAC to the major military treatment facility for OIF/OEF injured, the study identified a wide range of veterans and service members being cared for by the RAC. Overall, patients required only a limited number of clinic visits to achieve a high level of satisfaction with clinic care and functionally meaningful prosthetic usage.

The sample had a wide age range with a relatively high number of traumatic amputations reflecting the combat support role of the ASoC, both for the Vietnam and Gulf War veterans as well as the current OIF/OEF combatants. This is also supported by the finding that more than one-quarter of the patients had either upper limb or multilimb amputations. Interestingly, veterans traveled nearly a 100 miles roundtrip to receive care, a testimony to the value placed on VA care. With an average of 15 total VA care visits annually, this is further indication of the premium placed by veterans on the total VA care system. The mission of the ASoC is reinforced by these indicators.

A review of the clinical factors demonstrated that the subjects had slightly less prosthetic wearing when compared with previous studies.<sup>11-13</sup> However, the subjects were still able

to wear the prostheses for up to 9 hours daily, allowing for adequate functionality. In addition to most likely being the more physically active of the sample, these veterans have also integrated prosthetic limb usage in their customary daily routines, including nonambulatory activities (eg, transfers, leisure pursuits, vocational). While this study did not look directly at return to work, Millstein and colleagues found that a comfortable prosthesis was one of the best predictors of return to work.<sup>14</sup> The high level of satisfaction with prostheses in this study suggests that, in contrast to prior investigations that reported 63% to 85% having phantom pain, the sample was relatively pain free, and most did not use pain medications to the extent noted by other investigators.<sup>7,12,13,15-18</sup> These findings are important, because prior research has supported that individuals with phantom pain viewed their prosthesis as less favorable.<sup>13</sup> Of note, the 2008 study by Ketz found that gabapentin was the most frequently prescribed medication, which was also true of the cohort.<sup>16</sup>

Patient satisfaction levels and prosthetic use can be used as a health care quality measure.<sup>9</sup> Satisfaction with clinic care was high: 88% of individuals in this study reported they were “very satisfied” or “satisfied” with their prosthesis. Prior studies demonstrated that 80% of Vietnam veterans and 88% of OIF/OEF veterans were satisfied with their prosthesis.<sup>7,10</sup> In civilian patients, the range of satisfaction with prosthetic satisfaction was 43.5% and 75.7%.<sup>11,13</sup> Early prosthetic fitting has been shown to be beneficial with increased satisfaction and hours of use. While in this study, the average time between amputation and fitting of first prosthesis was 18 months, satisfaction and wearing time were still comparable

with published results. Despite that other studies reported 4 to 9 amputee clinic visits per year, per patient, and patients in this study were only seen annually, this study achieved comparable positive outcomes.<sup>11,13</sup> Differences in the type and number of visits to the prosthetist and other ancillary support professionals may explain this apparent discrepancy. Missed amputee clinic visits were negatively correlated with distance from the VA. This seems initially counterintuitive but may suggest that those veterans living farther away place greater importance on keeping appointments due to the time and energy required.

The negative correlation of age and pain would suggest that older veterans experience less pain than do younger patients, which may relate to accepting the limb loss or accommodating pain through learned coping mechanisms. The associations between time since amputation and both number of amputee clinic visits and time to prosthetic fitting are intuitive and would parallel care received in civilian populations. In contrast, the inverse relationship between number of prostheses tried and number of clinic visits is unexpected and less easily explained. This may reflect that veterans who are not satisfied with the fit and function of their appliance may be seeking additional care outside the ASoC. However, this is a concept that requires more detailed cross-validation across the system of care.

Initially the dichotomization into acute or chronic amputation cohorts was based on clinical experience and the consensus of the authors. Subsequently this was discovered to be an exact cut point for the sample. Only a few differences existed between the 2 groups; namely, the number of amputee clinic visits were fewer, and the time from amputation to prosthetic

fitting were significantly longer for chronic amputees. These differences were not unexpected and support the notion that early recruitment and enrollment of amputees into specialty clinics fosters optimized care.

Limitations of this study include the limited sample size, gender bias inherent in veteran populations, single-site setting, limitations in data collection methods, short enrollment period, lack of sample homogeneity on several factors, and broad inclusion criteria. Future studies may productively include both veteran and civilian patients in multiple sites, include an equal number of women, consider a wider array of variables, and be longitudinal in nature. ●

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