

CLINICAL REPORT

Diabetic amputations in the VA: Are there opportunities for interventions?

Gregory G. Fotieo, MD; Gayle E. Reiber, MPH, PhD; Janette S. Carter, MD; Douglas G. Smith, MD
Albuquerque VA Medical Center, Albuquerque, NM 87109; Department of Medicine, University of New Mexico, Albuquerque, NM 87113; VA Puget Sound Healthcare System, Seattle, WA 98108; Departments of Health Service and Epidemiology and of Orthopedic Surgery, University of Washington, Seattle, WA 98014

Abstract—Lower limb amputation (LLA) is a devastating complication experienced by some veterans with diabetes. The Veterans Affairs (VA) Healthcare system has identified the prevention of LLA as a priority goal. This study was designed to describe the sources of outpatient care received by veterans with diabetes who have undergone LLA, to determine whether these persons would have been impacted by a VA amputation prevention program. This study was also designed to describe prior amputation history, footwear history, and the pivotal events that led to these amputations. We found that the vast majority of these subjects identified the VA as their primary source of care, and thus would have been available for enrollment in a prevention program. Since over one-half of them had had a prior amputation, diabetics with a prior amputation should be particularly targeted for foot care interventions. Lastly, prescription of protective footwear has the potential to reduce the incidence of shoe-related ulcers and amputations.

Key words: *amputation, diabetes mellitus, foot ulcer, pivotal event.*

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Address all correspondence and requests for reprints to: Gregory G. Fotieo, MD, Albuquerque VA Medical Center, 111-GIM, 1501 San Pedro, SE, Albuquerque, NM 87109; email: fotieo.gregory@albuquerque.va.gov

INTRODUCTION

Diabetes mellitus (DM) affects approximately 15.7 million Americans (1); it and its complications are estimated to account for 13 percent of medical expenses, with annual costs reaching \$26 billion. Lower limb ulceration is a well-recognized complication of DM, affecting 15 percent of all persons with the disease during their lifetimes (2). While the majority will successfully epithelialize their ulcers, lower limb amputation (LLA) will be performed on 15-20 percent (3). The inpatient cost of a single LLA exceeds \$25,000, and there are additional outpatient expenses for physical therapy and follow-up care (3,4). Amputations also have tremendous functional and psychological impact: activity limitation is observed in 81 percent of persons with LLA (5).

The Department of Veterans Affairs (VA) performed approximately 7,500 LLAs annually in FYs 1989-91, over one-half of them for complications of DM (Table 1).

In response, prevention of LLA and other complications of diabetes is a subgoal of the VA Veterans Integrated Service Network (VISN) directors. It has been estimated that more than 50 percent of LLAs due to diabetes could be prevented by timely intervention (6-8). To achieve this goal, a comprehensive management strategy of foot care for

Table 1.
Department of Veterans Affairs lower limb amputations (LLA) during FYs 1989-1991.

Year	LLA	Subjects	Discharges
1989			
Diabetes	4,521	3,379	3,787
No Diabetes	3,375	2,542	2,749
Total	7,896	5,921	6,536
1990			
Diabetes	4,493	3,439	3,818
No Diabetes	3,524	2,378	2,585
Total	8,017	5,817	6,403
1991			
Diabetes	4,374	3,300	3,696
No Diabetes	2,988	2,049	2,225
Total	7,362	5,349	5,921

Source: Reiber GE, Cheadle A, del Aguila MA. Unpublished data from VA patient treatment files.

veterans at high risk of limb loss is needed. However, such a program would have little impact in the VA system if the majority received no VA care prior to amputation and were simply transferred to the VA for that operation, and it has been documented that veterans with only Medicare coverage may have their care transferred to VA medical centers when they present with complicated and expensive medical problems (9). A veteran with diabetes and an ulcer requiring amputation might be a prime candidate for transfer of care. Therefore, it is important to understand the extent to which this occurs in those undergoing amputation in the VA. Also, pivotal events leading to ulceration and amputations need to be identified to allow design of a program that addresses risk factors and behaviors for amputations. Therefore, this study was conducted to describe the sources of prior outpatient care received by a population of diabetic veterans undergoing LLA at three VA hospitals and to describe the pivotal events leading to these amputations.

METHODS

This descriptive study enrolled consecutive veterans with diabetes undergoing LLAs at the Albuquerque, San Antonio, and Puget Sound (Seattle) VA hospitals from April 1994 to April 1995. Subjects were identified through a surveillance network established and monitored by a research assistant

(RA) at each of the sites. The surveillance included multiple visits each week to all clinics where potential subjects might be identified, frequent communication with the clinic coordinators and staff about potentially eligible persons, and a daily review of surgical schedules and new hospital admissions for foot ulcers and lower limb conditions that might result in amputations. Inclusion criteria were subjects with diabetes presenting with a lesion that required LLA.

Table 2.
Number and proportion of amputations by anatomic site.

Site	Number
Toe	
1st	16 (20%)
2nd	4 (5%)
3rd	2 (2.5%)
4th	5 (6%)
5th	10 (13%)
Multiple toes	4(5%)
Total	41 (52%)
Midfoot	9 (11%)
Heel	2 (2.5%)
Ankle	8 (10%)
Transtibial	14 (18%)
Transfemoral	5 (6%)
Total=79 (100%).	

Table 3.
Subject-perceived pivotal events leading to ulceration.

Event	Prior LLA N=40	No Prior LLA N=39	Total N=79
Shoe-related	15 (38)*	6 (15)	21 (27)
Circulation problems	8 (20)	13 (33)	21 (27)
Self-care mistake	9 (23)	4 (10)	13 (16)
Blister	5 (13)	7 (18)	12 (15)
Other minor injury	7 (18)	4 (10)	11 (14)
Other	6 (15)	3 (7)	9 (11)
Don't know	2 (5)	5 (13)	7 (9)
Provider mistake	5 (13)	1 (3)	6 (8)
Ingrown/Infected toenail	1 (10)	1 (3)	5 (6)
Cut	0	2 (5)	2 (3)
Pressure sore	0	2 (5)	2 (3)
Puncture	0	1 (3)	1 (1)

Number of subjects (%); *p=0.026.

An amputation was defined as the removal of the terminal, nonviable portion of a limb (3). Veterans were excluded if they were unable to provide informed consent.

The RAs from each of the three sites were similarly instructed on administration of the questionnaire, data collection, and data entry. After obtaining informed consent and prior to the operation, the RA collected standardized information from each subject regarding footwear history, insurance benefits, and pivotal events that the veteran thought led to his or her amputation. Subjects were asked to describe in their own words the situation that led to their ulcer, then they uniformly completed questions on other potential pivotal events. The interview and medical records were used to determine previous amputation history and health care utilization in the preceding 24 months. The data were entered into Paradox for Windows. A descriptive analysis was performed using SAS.

RESULTS

Seventy-nine subjects who underwent one or more LLA were enrolled during the study interval. All eligible individuals contacted agreed to participate. Their mean age was 64 years (range 37 to 80), and they included 78 men and 1 woman. The majority (84 percent) had sought care for their current foot problem in the 3 mo preceding their LLA. The VA was identified as the source of foot care by 92 percent, and the usual source of outpatient care by 85 percent, of the subjects. In terms of health care insurance and benefits, 97 percent had VA healthcare

benefits, 50 percent had Medicare, 18 percent private insurance, and 3 percent had Medicaid. Among these veterans, there were no reported changes in insurance benefits during the 2 years prior to LLA.

The anatomic sites of the LLAs are listed in **Table 2**. The majority (52 percent) were of the toe, followed by transtibial (18 percent). Forty (51 percent) subjects reported at least one prior LLA. Relative to the prior amputation, the current amputation was on the contralateral limb in 22 (55 percent) and on the ipsilateral limb in 18 (45 percent).

The pivotal events identified as leading to the current amputation are listed in **Table 3**. The most frequently cited were shoe-related and peripheral ischemia. A shoe-related event was reported

Table 4.
Shoe-related events with and without protective footwear.

Category	% SR	% Not SR	Number (%)
Prior LLA	N=15	N=25	
Without PF	53%	47%	19 (100)
With PF	33%	67%	21 (100)
No Prior LLA	N=6	N=33	
Without PF	17%	83%	30 (100)
With PF	11%	89%	9 (100)

SR=shoe-related; LLA=lower limb amputation; PF=protective footwear.

significantly more frequently by those who had undergone a prior LLA than those who had not (38 percent vs. 15 percent, $p=0.026$). No other pivotal event achieved statistical significance comparing those with and without a prior amputation.

Table 4 shows the incidence of shoe-related pivotal events in those who did and did not use protective footwear, by amputation history. Protective footwear (custom shoes, extra depth-width shoes, custom inserts, and over-the-counter inserts) was used by 53 percent (21/40) of those with a prior LLA and by 23 percent (9/39) of those without. Shoe-related events were less frequently described by subjects reporting use of protective footwear. Although not statistically significant, protective footwear was associated with a 21 percent and 17 percent reduced risk of shoe-related events in those with and without a prior LLA, respectively.

DISCUSSION

VA was the primary source of both foot care and outpatient health care for most of the diabetic veterans we interviewed who underwent amputation at three VA hospitals. Few received their primary or foot care outside the VA system: they were not coming to the VA because of a loss of insurance benefits or an unwillingness of non-VA providers to care for them once they developed an ulcer or required an amputation. Previous reports by Hisnanick found that one in five admissions to the VA could be viewed as "patient dumping" from non-VA providers (9). However, this does not appear to be the case for our study population. It may be that our population was unique within the VA system and did not experience transfer of care to the VA. However, a more plausible explanation may be that our study population represents VA patients with many comorbid conditions who were "dumped" to the VA more than 2 years prior to their amputation or were never cared for by other providers because of their costly and complex medical conditions.

Since our data indicate that the majority of these veterans had been receiving care through the VA system, a VA intervention program leading to improved foot care and decreased ulcer incidence could lower amputation rates in this group. Over half of those enrolled had a prior amputation history. This is consistent with previous studies that found that 9-20 percent of persons with diabetes who have one

amputation will have another within 12 mo. Therefore, diabetics with a history of prior amputation should be targeted for intensive VA foot care programs.

The most common pivotal events leading to amputation were shoe-related events and peripheral vascular disease. While treatments of vascular insufficiency are complex and costly, improvements in footwear are more easily implemented and much less expensive. Protective footwear was used by only one-half of subjects with an amputation history and by fewer than a quarter of those without prior LLA. Previous studies have shown that ulceration can be reduced through the use of protective footwear (6,10,11). Although not statistically significant, there was a trend toward a reduced risk of shoe-related events in subjects using protective footwear in both study subgroups, suggesting that prescription of acceptable protective footwear in the diabetic population could reduce the incidence of shoe-related ulcers and, potentially, of amputations. Also, a number of the other frequently cited pivotal events may be potentially preventable through a comprehensive foot care program.

We used subject self-report to define these events. Clearly, many factors can influence a person's perception of pivotal events, including insight, education level, comments from providers, and input from family members. Unfortunately, there is no way to validate a subject's report. However, this information was obtained uniformly across all subjects.

In conclusion, improvements in VA foot care for veterans with diabetes could decrease the LLA rate, because the VA is the ongoing source of care for these high-risk patients. Since over 50 percent of the study participants had an amputation history, these subjects could be specifically targeted for foot care intervention and case management. Prescription of protective footwear needs to be a primary goal of the foot care program.

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