
Prevalence of leg ulceration in a London population

C.J. MOFFATT¹, P.J. FRANKS¹, D.C. DOHERTY¹, R. MARTIN²,
R. BLEWETT² and F. ROSS³

From the ¹Centre for Research & Implementation of Clinical Practice, Thames Valley University, London, ²Wandsworth Primary Care NHS Trust, St Johns Therapy Centre, London, and ³Nursing Research Unit, King's College London, London, UK

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Summary

Background: Current prevalence estimates of chronic leg ulceration are frequently based on studies from the 1980s. During the last decade, major changes have occurred in the application of evidence-based practice to this condition.

Aim: To determine the prevalence and cause of leg ulceration in a defined geographical population after 8 years of providing standardized evidence based protocols of care.

Design: Prospective survey.

Methods: Patients with leg ulceration of >4 weeks duration) within an integrated acute and community leg ulcer service were ascertained, interviewed and clinically assessed, using a standardized questionnaire on medical history, ulcer details and non-invasive vascular investigation to describe causes. Ulcers were classified by aetiology.

Results: We identified 113 patients in a population of 252 000, giving a crude prevalence of 0.45/1000

(95%CI 0.37–0.54/1000): 0.34/1000 in men, 0.54/1000 in women. Rates were highly dependent on age, increasing to 8.29 (men) and 8.06/1000 (women) in those aged >85 years. Of the responders, 62/113 (55%) had their ulcer for >1 year. Uncomplicated venous ulceration was observed in only 59/138 (43%) ulcerated limbs; a further 21 had ulceration primarily due to arterial disease. Complex causes were present in 48 (35%) limbs, mostly venous disease in combination with diabetes (35%), lymphoedema (42%) and rheumatoid arthritis (26%).

Discussion: Our prevalence of chronic leg ulceration is approximately one-third of that predicted by previous studies using similar methodologies in the 1980s. Patients with ulceration have more complex aetiologies than previously recognized, which may be a consequence of both increasing ulcer chronicity and age.

Introduction

Leg ulceration is a chronic wound on the leg which fails to heal. There are over 40 reported causes of leg ulceration, however, most ulcers in Western populations are related to vascular diseases such as venous disease and peripheral arterial disease.^{1,2} In the mid 1980s, two studies estimated the prevalence of leg ulceration in the UK at 1.48/1000 and 1.79/1000,^{3,4} suggesting a patient population of 90 000–110 000 patients with active ulceration in the UK, and a further

three times that number with healed ulceration at risk of recurrence.³ Studies from other parts of Europe and other Westernized countries, using similar methodologies, have broadly confirmed these results.^{5–8} In the US, this would translate to >400 000 patients with active ulceration at any one time.

The last 15 years have seen major developments in leg ulcer treatment and service delivery.⁹ Innovations in assessment and treatment have

Address correspondence to Professor P.J. Franks, Centre for Research & Implementation of Clinical Practice, Thames Valley University, 32–38 Uxbridge Road, London W5 2BS. e-mail: peter.franks@tvu.ac.uk

included the introduction of Doppler ultrasound to aid diagnosis,¹⁰ development of modern wound care dressing materials, and technological advances in high-compression bandaging.^{11,12} There has also been a considerable shift in culture, with new treatment therapies subjected to evaluation by randomized clinical trials,^{13,14} paralleled by the development of service models to rationalize ulcer management.^{15,16} In the UK, previously disparate care services provided by a number of different agencies, have now been integrated into new services, which span the acute and community boundaries, and ensure patients are treated with evidence based practice, irrespective of the place of treatment. The epidemiological studies of the 1980s highlighted that >80% of care in the UK was provided in the community, and new initiatives such as the Riverside project have sought to improve community care.¹⁵ This project was also designed to ensure that patients had access to further investigations and specialist hospital treatment when required. Studies such as this have demonstrated major improvements in a range of health outcomes with minimal investment.^{15–18}

The present study was undertaken within the boundaries of the previous Wandsworth Community NHS Trust (London, UK), which covers a population derived from Census data of 252 000. Community Trusts in the English NHS provide services in community nursing to a defined geographical population to support patients at home, providing treatment, prevention and surveillance. Wandsworth is the largest Inner London Borough, with a high proportion of residents from ethnic minority groups (20%). It has a higher proportion (34.8%) than the national average of people living alone, with an overall high level of deprivation, leading to a shorter life expectancy in this borough compared with Greater London as a whole. Rates of disability are also higher, with 12% reporting long-term illness in the 1991 census.¹⁹

Since the mid 1990s, patients with leg ulceration in Wandsworth have been treated in an integrated service based on the Riverside model developed in the late 1980s.¹⁵ The service includes community leg ulcer clinics within health centres, staffed by community nursing and treatment room services. Housebound patients are treated in their homes, using the same assessment and treatment, by fully trained nursing staff. Support is also provided to general practices and practice nurses throughout the area. Specialized support to community and hospital patients is provided by a leg ulcer support team comprising a dermatologist, a vascular surgeon, a nurse consultant and a specialized nursing team. A dedicated leg ulcer clinic for referral

of patients with complex management issues is run within the hospital. Evidence-based guidelines support the treatment of all patients throughout the service. These are based on a systematic review of the evidence, and reflect the UK national and Scottish (SIGN) guidelines.^{20–22}

While the short term benefits of adopting this approach have been seen in improved healing rates,^{15,16,23,24} little attempt has been made to evaluate such strategies on the total burden of leg ulceration to a population over prolonged periods. Improved healing should result in a lower prevalence, although this reduction may be modified by changes in demography and risk factors associated with ulcer development. Increasing numbers of the elderly in the population may lead to a corresponding increase in numbers of patients with leg ulceration, as the highest prevalence occurs in the most elderly. These changes may also be associated with an increased risk of concurrent chronic illness, and changing levels of complexity. The aim of this paper is to report on the current prevalence and classification of leg ulceration in the London Borough of Wandsworth.

Methods

Design

Case ascertainment by health professionals was used to identify patients suffering from a current leg ulcer within the geographical area (population 252 000). Case ascertainment identifies patients suffering from disease through defined sources, and has been successfully used in a number of studies of leg ulceration.^{3,4,6–8} The study design was submitted to, and approved by, the local research ethics committee.

Case ascertainment

Leg ulceration was defined as ‘an open wound on the leg which had not healed within the last four weeks’. This definition excluded patients with isolated foot ulceration. Questionnaires were mailed to the health professional groups (community nurses, general practitioners, hospital wards, specialist out-patient services) with a covering letter asking them to complete a form for each patient they were aware of with leg ulceration. The questionnaire asked for key information on all patients they had contact with who were suffering from a leg ulcer over the previous 4-week period. This included key demographic details of the patients, together with information about current care provision. For patients in hospital,

questionnaires were sent to designated heads of out-patient departments and wards where patients were likely to be identified, including care of the elderly hospitals, psychiatric long-stay hospitals, social service homes and day care centres. Specific clinical areas that were excluded from this study were paediatric wards, day case surgery, Accident & Emergency department, facial and ENT surgery, and obstetrics. The remaining hospital wards and departments were contacted and visited by the research nurses (DCD, CJM) to identify patients in their care. The hospital and community information systems were used to supplement this information. A coding system was developed to prevent double counting of patients who were treated by more than one health professional. Follow-up of questionnaires was undertaken by telephone to ensure completeness of data. A register of patients was compiled using the information. The age and gender distribution of the population of Wandsworth was estimated from Census data (1991).

Patient interviews

Four research nurses were trained to interview and assess the identified patients using a standardized methodology, including training in photoplethysmography by a vascular technologist. The interview questionnaire was divided into sections, which included a number of validated questionnaires. The full questionnaire was piloted on six patients prior to full use. All patients provided written informed consent. Clinical visits were arranged to assess the patients in whichever venue suited them. Any failing to keep appointments were re-contacted and offered a further appointment. The questionnaire captured data on the demographic, clinical and psychosocial status of the patient. The questions reflected the scientific literature on leg ulceration, and included validated psychometric tools where available. Each interview took between 45 and 70 min. The clinical assessment comprised: general medical history, risk factors for leg ulceration, cardiovascular disease including presence of arterial leg disease, rheumatoid arthritis and diabetes. These histories were based on the medical and nursing notes together with patients' self-reported history. Patients were asked to grade their own mobility, using a scale that has been used previously.¹⁵ The patients' actual mobility was assessed, and those who could walk were asked to do so. Assessment of ankle mobility was made and graded. Concomitant factors that reduced mobility were also recorded. The present paper reports only on the demographic details and clinical assessment of the patients.

Previous ulcer history included the age at first ulceration, number of episodes and length of current duration of ulceration. Previous investigations and interventions related to the ulceration were also recorded. Skin changes associated with venous disease such as staining, atrophe blanche, ankle flare, varicose eczema and lipodermatosclerosis were noted, as were treatment-related conditions such as contact dermatitis and maceration. Clinical cellulitis was recorded and confirmed by bacteriology. Secondary conditions such as lymphoedema were also noted.

The classification of ulceration used in this study has been previously described and published.² Ulcer aetiology was defined using clinical findings and results from non-invasive vascular investigations. In this study, vascular investigations included the use of hand-held Doppler ultrasound to record ankle brachial pressure index (ABPI) and photoplethysmography to determine the presence and distribution of venous disease. The presence of popliteal reflux was determined using the standardized method described by Nicholaides,²⁵ using a Rheo Dopplex II (Huntleigh Ltd). Results were recorded on the software programme available with this device. A normal refilling time was defined as ≥ 25 s, and abnormal as < 25 s. A number of patients underwent duplex scanning to confirm the findings.

Ulcer size was used to describe the severity of ulceration, since this is a recognized risk factor for ulcer healing.^{26,27} Each ulcer was individually traced around the line of epithelium using acetate paper and an indelible pen. Limbs with several ulcers were individually traced, and each ulcer labelled. The total area of ulceration on each limb was calculated using a digital planimeter (Placom Ltd).

Results

The ascertainment of patients from clinical areas was achieved within a 4-week period. Patients interviews were arranged, and completed within a further 4 weeks. Data were available from all acute and community settings. In total, 113 patients were identified with an open area of ulceration on the leg that had been present for > 4 weeks. This gives a crude ascertainment of 0.45/1000 population (95%CI 0.37–0.54/1000). Seventy-two (64%) were women, with a mean age in all patients of 75 (range 31–94) years. The majority of patients were treated in the community, with only six (5%) treated in a hospital or residential setting. Over 70% had been referred to hospital for specialist leg ulcer

Table 1 Case ascertainment in Wandsworth by age and sex

	Leg ulcer patients		Population	Rate (/1000)
	<i>n</i>	%		
<i>Male</i>				
<65 years	9	22	106 070	0.08
65–74 years	17	41	8060	2.11
75–84 years	8	20	4468	1.79
85 years +	7	17	844	8.29
Total	41	100	119 442	0.34
<i>Female</i>				
<65 years	8	11	111 170	0.07
65–74 years	12	17	10 544	1.14
75–84 years	28	39	8331	3.36
85 years +	24	33	2976	8.06
Total	72	100	133 021	0.54

advice within this integrated service. Two patients identified were treating their own ulcers, using class III compression hosiery.

Crude ascertainment in men was 0.3/1000 compared with 0.5/1000 in women (Table 1). As expected, the rates were highly age-dependent, increasing to 8.29/1000 in men aged >85 years and 8.06/1000 in women of the same age. Of the total, 95 (84%) were White British, with 17 (15%) Black and only one patient with South Asian ethnicity.

Ulcer details

Bilateral ulceration was present in 25 (22%) of patients, giving a total of 138 ulcerated limbs. Of the total, 62/113 (55%) patients had suffered from their ulcer for >1 year, with 34% having had their ulcer for >18 months. Median ulcer duration was 8 months, with range 1 month to 12 years. More than 60% reported suffering between two and ten episodes of ulceration, with eight having had >10 episodes, and one patient having >30. Age of first ulceration ranged from 10 years in a patient with sickle cell disease to 94 years (median age of first ulceration 67 years). Overall, 16 (14%) had their ulcer before the age of 40, and 58 (46%) before the age of 65.

Many patients presented with skin changes associated with venous disease, with atrophe blanche present in 47 (42%) (Table 2). Skin problems such as varicose eczema and contact dermatitis were present in >60%, and evidence of clinically established lymphoedema (positive Stemmer's sign) in 39 (35%) patients. The distribution of ulceration was similar between limbs

Table 2 Skin and ulcer assessment (*n*=113)

	<i>n</i>	%
<i>Site of ulcer</i>		
Medial malleoli	45	40%
Lateral malleoli	30	27%
Other gaiter area	55	49%
Circumferential	8	7%
Foot	13	12%
Toes	10	9%
Bilateral	25	22%
<i>Skin changes</i>		
Staining	78	69%
Atrophe blanche	47	42%
Ankle flare	70	62%
Induration	51	45%
Varicose eczema	49	43%
Contact dermatitis	11	10%
Clinical cellulitis	5	4%
Maceration	20	18%
Lymphoedema	39	35%

(67 right, 71 left). There was considerable variation in the size of the ulcer, ranging from 0.5 cm² to 171 cm², with a median size of 4 cm². Eight (7%) patients had circumferential ulceration. Medial malleolus was the most common site, followed by lateral malleolus, with ulceration extending to include the feet and toes in 10% of patients.

Medical history

The medical history of patients reflected their age. Cardiovascular risk factors were common, with 21 (19%) reporting a history of angina or myocardial infarction, and 16 (14%) transient ischaemic attacks or stroke. Reported rheumatoid arthritis was present in 15 (13%), and diabetes in 38 (33%), 22 being insulin-dependent, and 16 being either drug- or diet-controlled. Patients reported a number of manifestations of venous disease. Thirty-two (28%) reported a history of deep-vein thrombosis, 24 (21%) had undergone treatment for varicose veins, and 14 (12%) had a reported history of thrombophlebitis. Twelve (11%) patients had suffered from a fractured neck of femur. Fifty-three (47%) had a family history of varicose veins, with 31 (27%) stating that a close family member had suffered from a leg ulcer.

A mobility deficit was present in 72 (64%), with 41 (37%) stating that they could only walk indoors with an aid, or were chair-bound, and a further 31 (28%) requiring an aid to walk outdoors. In addition to general mobility, there was evidence of reduced ankle function, with 70 (62%) having either reduced movement or a fixed ankle joint. Foot

deformities were common, with 65 (58%) having hallux valgus, and 13 (12%) equinus deformity. In total, 50 patients (44%) had a further major factor (e.g. RA, OA) which affected their mobility.

Ulcer classification

The ankle to brachial pressure index (ABPI) decreased with increasing age. While >90% of patients under the age of 75 years had a reading >0.9, over one-third of those in the older age group had a reduced ABPI. Only 67/113 (59%) of patients were able to undergo the PPG procedure. Venous disease was confirmed in 65/67 (97%) of these patients. The median refill time was low, at 8 s for the right limb and 6 s for the left. Deep-vein incompetence was present in 38 (57%), and occlusion in 4 (6%). Superficial venous disease was common, with 26 (39%) having long saphenous incompetence and 17 (25%) having short saphenous incompetence. Segmental popliteal reflux of >1 s occurred in 37 (49%) of patients.

The causes of ulceration were frequently complex, and involved a number of processes (Table 3). Venous ulceration without any complicating factor was seen in 59 (43%), with a further 21 (15%) having evidence of concurrent arterial disease ($0.5 < \text{ABPI} < 0.8$) and five having ulceration primarily due to peripheral arterial disease ($\text{ABPI} < 0.5$). Two patients had ulceration related to diabetes, one of which was combined with arterial disease. There were three limbs with bandage-induced ulceration. Multi-factorial causes (at least one cause other than arterial or venous disease) occurred in 48 (35%) limbs (Table 3). Most of these patients had confirmed venous disease, which occurred in combination with diabetes (11, 35%) lymphoedema (13, 42%) rheumatoid arthritis (8, 26%) and rarer aetiologies such as peripheral alcoholic neuropathy, Hansen's disease and sickle cell disease.

Discussion

The prevalence studies in the 1980s and early 1990s found consistent results using similar methodology to that described in this paper. The high prevalences in these studies were probably a consequence of poor levels of care, little access to specialist services and use of compression therapy, no standardization of care, and little information on outcomes of treatment. This contrasts with the present study, which indicates that prevalence in Wandsworth is only one third of that predicted by the studies undertaken in the mid-1980s, the estimated prevalences from the previous studies falling outside the confidence intervals of the present study. The results in Wandsworth may not be representative of the pattern of ulceration in developed countries, particularly in areas where there has been less investment in service development with the introduction of clinical guidelines, educational initiatives and service models. In this study, we chose not to include patients with isolated foot ulceration. This is because causes and management of this condition are likely to be very different from those of ulceration predominantly on the leg, and it has been the subject of different estimates, particularly in relation to the diabetic foot.

Published population prevalences have varied between 1.1/1000⁷ and 3.1/1000⁶ in studies in Western Europe and Australia. In part, this difference may be explained by the different definitions used, and methodologies adopted. To date, only one study has determined the incidence of ulceration, with rates of 0.76 and 1.42 per 100 years in men and women, respectively.²⁸ In this study, the prevalence of leg ulceration in Wandsworth Community Trust is considerably lower than that in studies using similar methodology undertaken during the 1980s. There is some evidence that the South Asian population has a lower prevalence

Table 3 Causes of leg ulceration for left and right limbs

Cause	Right leg		Left leg		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Venous	25	37%	34	48%	59	43%
Mixed venous/arterial	6	9%	8	11%	14	10%
Mixed arterial/venous	5	8%	2	2%	7	5%
Arterial	4	6%	1	1%	5	4%
Arterial and diabetes	0	0	1	1%	1	1%
Diabetes	0	0	1	1%	1	1%
Traumatic	0	0	0	0	0	0
Pressure (bandage-induced) trauma	1	1%	2	3%	3	2%
Multifactorial (combination)	26	39%	22	31%	48	35%

of leg ulceration than the White population,²⁹ whereas the Black population may be more at risk of ulceration, due to the presence of conditions such as sickle cell disease. While these differences may explain in part some of the difference in prevalence, it is unlikely to explain the substantially lower prevalence in this study. The present prevalence of 0.44/1000 is more likely to be a consequence of the approach to care adopted within the trust over the past 8 years.

Our adopted methodology may underestimate the prevalence of ulceration. It is possible that patients may seek care outside of the catchment area, although St George's Hospital is a tertiary referral centre, so substantial referrals outside the area seem unlikely. Secondly, patients with ulceration may not be seeking help for their ulceration. While this is a real possibility, the magnitude of this effect is impossible to judge using the case ascertainment approach used in this study. True prevalence could only be determined through large random samples of the population. However, even a targeted approach in the over-65s would require a sample of >18 000 patients to identify 50 patients (assuming similar prevalence to the present study). Clearly, this would be an immense undertaking requiring substantial time and resources. Evidence of a true change in prevalence is further supported by results from a simple prevalence study undertaken in the same area in 1997, where >250 patients were identified with active ulceration, compared with the 113 identified in the present study.

In this study, ulceration was frequently complex, with a number of factors contributing to the its development. This may be a consequence of improved assessment and classification, compared to earlier studies which relied on clinical impression, but may also be a consequence of changing risk factor patterns within this patient group.^{3,6} As evidence of the latter, a previous population-based study in the early 1990s with similar age and sex distribution found that only 6.6% of patients suffered from diabetes, compared with 33% in the present study.¹⁵ Other factors known to affect the healing process are also markedly different. In the Riverside study,¹⁵ 43% of patients had a mobility deficit as determined by use of a walking aid, compared with 64% in the present study, with median ulcer durations of 3 months and 8 months, respectively. This might imply a poorer quality service, as patients have protracted periods of ulceration. However, the evidence on prevalence reduction suggests that patients with simple uncomplicated ulceration of short duration will have healed and left the service, leaving the patients with more chronic intractable

wounds. While the ability to reduce the ulcer duration has been used as a quality indicator within a service, other parameters such as the reduction in the number of patients with active ulceration must be considered as better measures of clinical effectiveness.

While short-term projects may result in improvements in patient outcomes, the long term benefits of significant reduction in patient numbers require sustained effort. Reductions in the number of patients will require more strategic and concerted effort for these results to be representative of the international picture.

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