

Community leg ulcer clinics: a comparative study in two health authorities

Deborah A Simon, Louise Freak, Annette Kinsella, Julia Walsh, Chris Lane, Louise Groarke, Charles McCollum

Abstract

Objective—To compare the outcome and cost of care for leg ulcers in community leg ulcer clinics in Stockport District Health Authority with Trafford District Health Authority as a control.

Design—Detailed cost and efficacy studies conducted prospectively over a three month period in both districts both before and one year after the introduction of five leg ulcer clinics in Stockport.

Setting—Two large district health authorities of broad socioeconomic mix and total population of 540 000.

Patients—All patients receiving treatment for an active leg ulcer, irrespective of the profession or location of their carer.

Main outcome measures—The proportion of ulcerated limbs completely healed within three months and total cost of leg ulcer care.

Results—The introduction of community clinics in Stockport improved healing of leg ulcers from 66/252 (26%) in 1993 to 99/233 (42%) in 1994 ($P < 0.001$) compared with in Trafford, where 47/203 (23%) healed in 1993 and only 43/213 (20%) in 1994. This improved result in Stockport was achieved while the annual expenditure on care of leg ulcers was reduced from £409 991 to only £253 371. In the same year the cost of leg ulcer care in Trafford increased from £556 039 to £673 318.

Conclusion—In the first year after the introduction of community clinics, before most patients in Stockport had access to these clinics, healing of leg ulcers was already improved whereas costs were reduced.

Introduction

In the first year of the Stockport and Trafford leg ulcer study a mechanism was established to measure the cost and effectiveness of leg ulcer care prospectively across both health authorities of total population 540 000.¹ The previous approach in both these authorities was believed to reflect the service throughout the United Kingdom and was both expensive and ineffective.

Accurate assessment of patients with sustained elastic compression for venous ulcers is essential but depends on thorough training.² Convenient and acceptable care is also imperative as the compliance of patients is vital to success. Specialist community leg ulcer clinics were developed in the Riverside study; they offered nurse training and research based innovations in ulcer care to local patients.³ Healing rates equivalent to those in specialist ulcer clinics based in hospital were achieved throughout the entire population of patients in the Riverside community.

The cost and effectiveness of leg ulcer care was carefully documented throughout Stockport and Trafford in 1993.¹ This study now compares the impact of five community clinics throughout Stockport District Health Authority on leg ulcer healing and the cost of the

service with the natural evolution of care in Trafford, where no coordinated attempt was made to change current practice.

Methods

In a preliminary study methods were developed to measure clinical outcome and cost of all leg ulcer care delivered over three months throughout the entire populations of two health authorities.¹ In each health authority a register of possible care locations and key staff was prepared. They were then visited by the project nurse to gather information on patients receiving treatment for leg ulcers. To identify patients treating themselves advertisements and posters were placed in local papers, chemist shops, surgeries, and day centres. Period prevalence was similar at 1.11/1000 in Stockport and 1.08/1000 in Trafford. Demographic data and information on ulcers were compared and no significant differences found.

AUDITING COST OF CARE AND OUTCOMES

A prevalence study was undertaken to identify all patients receiving treatment for an active leg ulcer defined as "an open sore on the skin of the lower leg, ankle region, or dorsum of the foot, excluding only those clearly due to pressure necrosis of the heel or bony high points, neoplasia, or severe arterial disease with digital ischaemia." Precise records of the care each patient received were maintained prospectively over three months (13 weeks), irrespective of the location in which they received their care and the profession of their carer. These records included dressing materials, where these were obtained (on prescription or from other sources), nursing or other staff time, use of health authority transport, inpatient care, and pharmaceuticals used. Computerised databases were set up to manage this information and reference files constructed listing all products used in ulcer care and their cost depending on the amount of product used and its source, allowing calculation of the material cost incurred in the care of each patient. Staff costs were calculated from the number of hours attending to leg ulcer patients and the mean hourly cost of nursing or other staff time including overheads, travel, and administration costs. The cost of inpatient care was conservatively calculated from daily hospital hotel costs and the total number of inpatient days. Annual costs were calculated by multiplying those during the three month audit by four.

A clinical assessment was performed at the start and end of the three month period, including measurement of the area of leg ulcers by computer planimetry from acetate tracings.

STOCKPORT—COMMUNITY LEG ULCER CLINICS

Five leg ulcer clinics were established in easily accessible health centres over a six month period after the baseline audit (1993). These clinics were staffed by district nurses supported by specialist nurses from both the vascular sur-

University Department of Surgery, University Hospital of South Manchester, West Didsbury, Manchester M20 8LR

Deborah A Simon, research nurse specialist

Louise Freak, research nurse specialist

Annette Kinsella, data manager

Louise Groarke, research nurse specialist

Charles McCollum, professor of surgery

Stockport District Health Authority Community Unit, Fourth Floor Maternity Unit, Stepping Hill Hospital, Stockport SK2 7JE

Julia Walsh, community research sister

Trafford District Health Authority Community Unit, Basford House, Stretford Memorial Hospital, Manchester M16 0DU

Chris Lane, community research sister

Correspondence to: Professor McCollum.

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gical service at South Manchester University Hospital and the Stockport Community Unit. The cost of staff training by the vascular surgical service has not been included. Each clinic was managed by at least two clinic coordinators who were responsible for maintaining supplies and arranging patients' appointments. Both the coordinators and district nurses completed a training programme comprising workshops followed by one month of supervised practice in their clinic. Approval was sought in advance from general practitioners for the clinics to operate an open access policy.

At their initial attendance all patients underwent a structured assessment including measurement of ankle-brachial pressure index. Those patients assessed as having ulceration of predominantly venous origin and ankle-brachial pressure index >0.8 were treated weekly in the community clinic with multilayer compression by using the four layer bandage.⁴ Patients were given information leaflets stating contact telephone numbers, clinic details, and advice regarding exercise and elevation (which was also regularly reinforced orally).

Healing was monitored objectively by regular wound tracings on to acetate, which were then measured by computer planimetry. General practitioners were kept informed of progress and when complete healing had been achieved. After healing of venous ulcers patients were fitted with class II compression stockings below the knee, and those patients willing to consider surgery were offered venous assessment in the vascular studies unit at South Manchester University Hospital. If healing did not progress, or if initial assessment proved unequivocal or identified problems (for example, ankle-brachial pressure index < 0.5, ulcer appearance atypical or suggestive of neoplasia), the patient was immediately referred for vascular surgical or dermatological care.

TRAFFORD—CONTROL HEALTH AUTHORITY

This health authority was selected as a similar population on the south edge of the Manchester conurbation with an equal mix of social classes and both urban and rural areas. Although also neighbouring the South Manchester district, Trafford is separated from Stockport by 6-8 km, limiting the risk of crossover effects. No coordinated attempt was made to influence the approach to the treatment of leg ulcers in Trafford, care evolving naturally as in most of the United Kingdom.

SECOND STUDY (1994)

One year after the first audit, treatment costs and outcome were again recorded in both health authorities by using identical methodology. To allow direct comparison between the two audits the same reference 1993 prices were used in the calculation of all costs. In addition to the total costs incurred in each district over three months the mean cost per treatment was calculated, as some patients healed before three months and others were identified only mid-way through the period and audited from that point on.

Results

The five specialist community leg ulcer clinics were opened progressively over a six month period. This

number had been selected to meet the future needs of patients in Stockport with leg ulcers once most had been healed. As each half day clinic can handle only 12 to 15 patients, just under half the Stockport patients had achieved access to a specialist community ulcer clinic by the time of the second detailed audit of treatment outcomes and cost in 1994. Only a few patients are referred to the vascular surgical service at South Manchester University Hospital, and during the period of this study there were no such referrals.

TREATMENT OF PATIENTS

The number of actively ulcerated limbs in Stockport was reduced by 9% during the study from 252 in 1993 to 233 in 1994, but in Trafford it increased 5% from 203 to 213 over the same period. The reduction in Stockport was due to the improvement in rates of healing achieved in the specialist community clinics.

The mean frequency of redressing in Stockport reduced noticeably over the one year of these studies from 2.55 a week in 1993 to 1.6 a week in 1994 throughout the district and to only 1.01 a week for patients attending the community ulcer clinics (table 1). There was little change in the frequency of redressing in Trafford at around 2.2 a week.

In 1993 we had identified 36 different primary dressings, 28 bandages, and 59 topical agents being used in leg ulcer care in Stockport alone making a total of 123 products. In 1994, although fewer than 10 different products were used in community ulcer clinics, the total number of products being used throughout the health authority was still 74. Over the same period the number of products in use in Trafford fell from 103 to 79. We specifically examined what proportion of patients assessed as having venous ulcers were receiving compression treatment (either hosiery class I-III or a compression bandage of class 3a-d used either alone or in combination with other bandages). In Stockport the proportion of patients with venous ulcers receiving compression increased from 42% to 81%, with a smaller increase in Trafford from 38% to 52%.

HEALING OF LEG ULCERS

Over the study period the number of patients healing completely within three months improved significantly in Stockport from 66/252 (26%) to 99/233 (42%) ($P<0.001$) but remained unchanged in Trafford at 47/203 (23%) and 43/213 (20%), respectively. In those patients who were treated in community ulcer clinics the best healing rate at three months was 65%.

Analysis of time to healing by life tables showed that in 1993 the time to healing was similar in the two health authorities (fig 1(top)). More patients in Stockport healed completely in 1994, and their time to healing was significantly faster than in either district in 1993 and shorter than in Trafford in 1994, where time to healing had deteriorated (fig 1(bottom)).

COSTS

Table 2 gives a summary of the detailed cost analysis.

Dressing materials, bandages, and topical applications—The mean cost of materials for each episode of treatment was higher in both districts in 1994, having increased from £3.51 to £4.29 in Stockport and from £4.76 to £5.16 in Trafford. As the frequency of redressing in Stockport fell noticeably from 1993 to 1994 (table 1), however, the mean weekly cost of materials also reduced from £8.95 in 1993 to £6.86 in 1994, whereas the equivalent weekly cost in Trafford increased over the same period from £10.71 to £11.24. As a result the mean (95% confidence interval) expenditure per patient on all materials including dressings, bandages, cleaning solutions, and any topical applications over three months in Stockport fell from

Table 1—Frequency of redressing leg ulcers in community clinics

Detail	Trafford		Stockport		Community clinics overall
	1993	1994	1993	1994	
No of ulcerated limbs audited	203	213	252	233	65
No of treatments recorded in 3 months	4062	4321	6022	3561	490
Mean frequency (per patient per week)	2.25	2.18	2.55	1.6	1.01
Mean duration of a treatment (minutes)	19.7	24.3	19.8	20.9	18.2

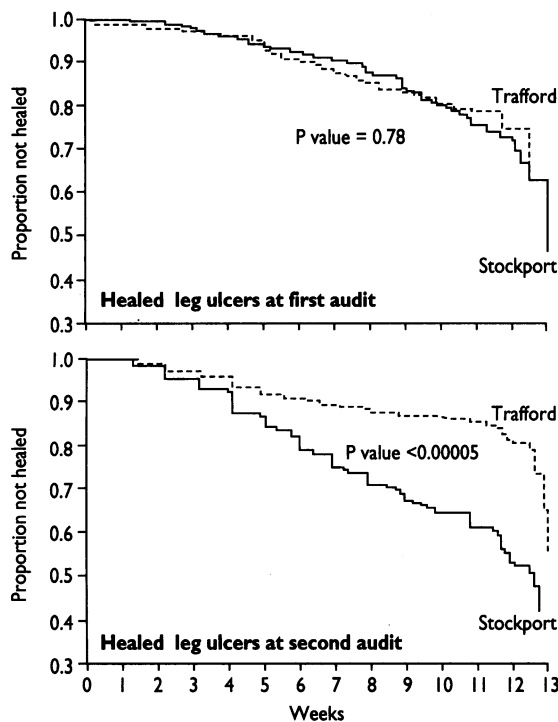


Fig 1—Top: Proportion of patients healing by life table was almost identical in the two health authorities during first audit in 1993 at 26% in Stockport and 23% in Trafford over three month period. Bottom: Even though only half the patients in Stockport gained access to community ulcer clinics by second audit in 1994, healing by life table significantly improved when compared with Stockport in 1993 and with Trafford in 1993 and 1994. Three month healing rate in Stockport improved from 26% in 1993 to 42% in 1994 after five community leg ulcer clinics were opened

£94.62 (£78.10 to £111.14) in 1993 to £74.54 (£62.72 to £86.36) in 1994. This cost increased in Trafford from £103.95 (£75.31 to £132.59) to £115.03 (£87.69 to £142.37) in the same time period. Overall, from 1993 to 1994 annual expenditure on materials for the management of wounds fell from £84 777 to £61 127 (27.9%) in Stockport, whereas costs in Trafford increased by 15.4% from £77 337 to £89 262. The proportion of this spent on products prescribable through the NHS fell in both districts from 78% to 56% in Stockport and from 72% to 66% in Trafford over the year of study. The bigger change in Stockport was mainly due to the purchase of bandages making up the four layer system by the community unit as these are not available through the NHS.

Table 2—Expenditure on care of leg ulcers over 13 weeks

Detail	Trafford		Stockport	
	1993	1994	1993	1994
No of patients audited	186	194	224	205
Cost of materials	£19 334.21	£22 315.39	£21 194.14	£15 281.70
Cost of pharmaceuticals	£63.67	£24.57	£184.12	£20.15
Inpatient care:				
No treated as inpatients	19	21	6	3
Total No of inpatient days	638	909	216	46
Total basic hotel cost (£75.89 a day)	£48 417.82	£68 984.01	£16 392.24	£3490.94
Staff cost:				
No of hours recorded as used in ulcer care	3017.65	3046.68	2610.00	1812.88
Total cost (£24.18/hour, including all overheads and travel)	£72 966.78	£73 668.80	£63 109.80	£43 835.52
Patient travel:				
No of km by ambulance (£1.98/km)	367	1680	816	314
No of km by car (£0.40/km)	—	19	—	230
Total travel cost	£727.32	£3336.74	£1617.33	£714.56
Total cost in 13 weeks	£141 509.80	£168 329.51	£102 497.63	£63 342.87

Staff costs—Total staff (predominantly nursing) time in leg ulcer care during the three month period in 1993 was 3018 and 2610 hours in Trafford and Stockport, respectively. In 1994 there was a small increase in Trafford to 3047 hours but a highly significant reduction in Stockport to only 1813 hours. The main cause of this 31% reduction in nursing time in Stockport was the reduction in the number of patients with actively ulcerated limbs and the reduction in frequency of redressing. The mean duration of each treatment was largely unchanged. This resulted in a fall of £77 097 (30.5%) in annual staff costs from £252 439 to £175 342 in Stockport. As the numbers of patients were relatively constant in Trafford the annual staff costs increased by 1% from £291 867 to £294 675.

Inpatient care—In 1993 more patients in Trafford than in Stockport received inpatient care for their leg ulcers (table 2). The total number of inpatient days predominantly due to leg ulceration for the Trafford patients increased further from 638 to 909 days over the three month period of study and had a major influence on the total cost of leg ulcer care in that district. In Stockport inpatient days fell from 216 in 1993 to only 46 over the three month period in 1994. The decision to admit was clearly made by different clinicians in each health authority and for different reasons. We understand that in Trafford admission was the only way to get access to the four layer bandage, which was being purchased by hospital stores but not by community units. Annual inpatient costs for 1994 were calculated to be £275 936 in Trafford and only £13 964 in Stockport, which is just 5% of the Trafford cost.

Patient transport costs—The use of health authority transport in 1994 was lower in Stockport and higher in Trafford compared with 1993 (table 2). As community clinics were opened in Stockport fewer patients were referred to the research leg ulcer clinic in South Manchester University Hospital (only 13-16 km away), whereas referrals from Trafford increased during the same period. Transport to and from the hospital clinic represented the majority of the differences in costs identified in this audit.

Costs of vascular surgical services—Although patients in Stockport had access to this service for further investigation of arterial or venous disease, only a small proportion of such patients consent to or benefit from surgery. The costs of the venous duplex Doppler imaging and ambulatory venous pressure studies were £110 a patient, but no patient was referred for investigation or underwent venous surgery during the study.

Total costs—The total annual cost of leg ulcer care to each district health authority in 1993 and 1994, respectively, was calculated to be £409 991 and £253 371 in Stockport and £556 039 and £673 318 in Trafford, effectively a reduction of 38.2% (£156 619) in Stockport over the same time in which the cost of care in Trafford increased by 21.1% (£117 279).

Discussion

The introduction of community leg ulcer clinics in Stockport improved care and resulted in lower costs than the traditional approach the clinics replaced. Because the practice of wound care does evolve over time, identical studies were undertaken in a control district and showed that this evolution had little impact on either rates of ulcer healing or cost of care. We therefore consider that the major improvements in healing and reductions in costs shown in Stockport were a direct result of the introduction of coordinated community leg ulcer clinics.

The use of compression in the management of venous ulcers increased in both districts. The increase in Trafford, however, was smaller and not matched by any improvement in overall outcome. The choice of compression bandage was limited in Trafford as the

Key messages

- Current leg ulcer care is expensive and ineffective
- The introduction of community leg ulcer clinics improved care and resulted in lower costs than the traditional approach that the clinics replaced
- Planned and coordinated programmes of care can reduce costs substantially while improving healing rates
- Community units and general practitioners should be encouraged to seek alternatives to the standard care for leg ulcers

four layer system was not prescribable on the NHS; access to the appropriate materials, equipment, and training are therefore essential to achieve real improvements in care. Furthermore, we understand that the substantial increase in hospital inpatient care in Trafford in 1994 was a direct result of increased awareness of four layer compression, which was unavailable in the community but which could be obtained in hospital.

The 1994 study was undertaken only six months after opening the fifth and last community leg ulcer clinic in Stockport. Each clinic could see a maximum of three new patients at any one time with initial waiting lists of patients for treatment and nurses for training. Despite this, the prevalence of active leg ulcers in Stockport fell between 1993 and 1994. Studies of ulcer prevalence undertaken on the basis of patients receiving treatment are always liable to underestimate numbers of patients, but the increased profile of leg ulcer care in Stockport after the introduction of community clinics during this project probably increased the number of patients who came forward in 1994. This reduction in prevalence should progress as more chronic ulcers heal and improved health education results in earlier presentation of any recurrences that do occur.⁵ After four years, the prevalence of leg ulcers in the population served by the Riverside community leg ulcer project fell by over 75%.⁶

Community leg ulcer programmes have proved difficult to introduce in the NHS as managers are fearful that multilayer compression systems will incur increased cost. No other community based approach has achieved comparable outcomes; a systematic review of the literature on leg ulcers reflected the paucity of quality studies in this field and failed to offer clear solutions.⁷ The results of this study should convince managers that a cost effective and

community based strategy is available. The frequency of treatments and cost of materials each week in those patients treated with the four layer bandage is considerably less than that previously used in Stockport and much cheaper than care in Trafford. Substantial savings can therefore be made even if no additional ulcers are healed. The greatest savings, however, accrue through progressively healing most of the patients with ulcers and thereby reducing demands on both materials and hard pressed staff.

On the basis of the results of the 1993 study we calculated that leg ulcer care in the United Kingdom was costing £236m annually.¹ To ease comparison between the two studies we have used 1993 costs throughout. Community leg ulcer clinics combine staff training and effective research based practice for all patients to improve healing. As is often the case best care costs less so that a national implementation of this approach, which reduced expenditure in Stockport by 38.2%, could achieve savings of at least £90m annually while also relieving patients of this unpleasant, debilitating problem.

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Department of General Practice, University of Western Australia, Claremont, WA 6010, Australia

Andrew Jeremijenko, general practitioner

Public Health Unit, Albany, WA 6330
Heath Kelly, director

National Centre for Epidemiology and Population Health, Australian National University, Canberra, ACT 0200
Beverly Sibthorpe, epidemiologist
Robyn Attewell, statistician

Correspondence to: Dr Sibthorpe.

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Improving vaccine storage in general practice refrigerators

Andrew Jeremijenko, Heath Kelly, Beverly Sibthorpe, Robyn Attewell

Vaccines are biological products and are susceptible to fluctuations in temperature. In many general practices vaccines are exposed to adverse temperatures.^{1,2} The aim of this study was to determine whether educating one staff member in each practice about correct vaccine storage conditions and nominating that staff member to monitor the refrigerator's temperature would improve vaccine storage in general practices.

Methods and results

A random sample of general practices in a metropolitan division of Western Australia and all general practices in a rural division were invited to participate in the study. Those that already monitored their refrigerators with a maximum-minimum thermometer or did not store vaccines were excluded.

Practices were randomised into control and intervention groups, and their vaccine refrigerators were

monitored for 30 days with a computerised temperature logger. The staff member most responsible for vaccine storage in each practice was then interviewed. In the intervention practices this staff member was educated, given a digital maximum-minimum thermometer, and allowed up to 14 days to adjust refrigerator temperatures if necessary. All practice refrigerators were subsequently remonitored with the computerised temperature loggers for a further 30 days. Monitoring occurred between October 1994 and January 1995.

A refrigerator was designated unacceptable if, during a 30 day monitoring period, more than eight days of logger readings were above 12°C or more than one hour of readings were below -0.5°C. These criteria were chosen to reflect exposure levels that may compromise the potency of vaccines.^{2,4}

McNemar's test was used to assess whether refrigerator temperatures changed from baseline. Logistic regression with random effects⁵ was used to model the