

An initiative to improve the effectiveness of wound healing within GP Practices

KEY WORDS

- ▶▶ Complex wound clinic
- ▶▶ GP Practice
- ▶▶ Practice Nurses
- ▶▶ Wound healing

Background: The greatest burden of community based wound care falls on nurses working within GP Practices. Despite the common treatment of wounds by Practice Nurses little formal guidance is available to this cohort and significant gaps in practice have been reported. **Local problem:** Objective was to improve wound management and so help reduce the number of patients with wounds seen by the GP Practices. **Methods:** **Interventions:** Two complex wound clinics established in GP Practices in South Wales with one-to-one support provided to Practice Nurses by an experienced wound clinician. **Results:** Within one of the GP Practices data was collected pre- and post-implementation of the wound clinic with healing increased from 33.3% to 67.3% post-implementation. The mix of wounds treated was similar pre- and post-implementation of the complex wound clinic with venous leg ulcers, surgical wounds, traumatic wounds and leg wounds being the common frequently reported aetiologies. The cost of wound treatment was similar pre- and post-implementation of the complex wound clinic. **Conclusions:** This quality improvement project identified that wound care delivered within GP Practices may result in low healing rates which can be markedly improved through development and introduction of a wound clinic. The approach was successful within the two wound clinics established within the project with healing rates around 70% in both clinics, while the cost of wound treatment did not appear to be markedly changes before or after wound clinic introduction. Expansion of this model may enable GP Practices to successfully treat the wounds of the many thousands of patients who present with wounds in their GP Practice each year.

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The annual cost of managing wounds within the UK NHS may reach £5.3 billion (Guest et al, 2015) with most of wound care delivered by clinicians in the community. Within Guest et al's retrospective database review (2015), the greatest burden of community-based wound care fell on nurses working within GP practices; with 18.6 million Practice Nurse visits and 7.7 million visits to a GP compared with 10.9 million community nurse home visits. Despite the common treatment of wounds by Practice Nurses little formal guidance is available to this cohort — a competency framework was produced by the Royal College of General Practitioners (2012), which covered treatment

of uncomplicated wounds and suture removal, however, managing more complex wounds such as leg ulcers was considered to require additional, and unspecified, training. A later update of the competency framework (Royal College of General Practitioners Wales, 2015) highlighted key annual training requirements for Practice Nurses, however, wound management was not included in this list. Given lack of investment in training of Practice Nurses (and other community care staff) in wound management it was not surprising that significant gaps in practice exist, for example only 16% of patients with a leg or foot wound had a differential diagnosis of the cause of their wound (Guest et al, 2015).

This quality improvement project was initiated in 2012 by a single GP Practice in South Wales with the objective being to improve wound management and so reduce the number of patients with wounds seen by the GP Practice. There were no established models of practice to follow when considering the development of Practice Nurse-led complex wound clinics in General Practice and so the GP Practice approached the Welsh Wound Innovation Centre (WWIC) for guidance and advice on how to improve their existing provision of wound care. This manuscript describes the model of care jointly developed by the GP Practice and WWIC and reports post-implementation changes in the outcomes of wound management within the GP Practice. The development of the model of care delivery within the GP Practice precluded the capture of pre-intervention data, and this led to the model of care developed in this project being applied within a second GP Practice in South Wales both to explore the generalizability of the model and to capture pre- and post-intervention data.

METHODS

This quality improvement project has been reported following the SQUIRE (Standards for Quality Improvement Reporting Excellence) guidelines (Goodman et al, 2016). In 2012, the GP Practice where the development of a Practice nurse-led complex wound clinic occurred provided care to a population of 7153 patients and employed two Practice Nurses within a team of 15 staff. The first step in developing the complex wound clinic was to try and establish the number of patients currently receiving wound treatment within the Practice. However, this was not achieved given that wound care was not included in the Practice's regular audit reports due to the lack of financial reimbursement for wound treatment. This was confounded by the non-systematic coding of patient attendances for wound treatment. Therefore, at the outset of the project there was a lack of information on the number of wounds treated by the Practice and the aetiology of these wounds.

Six changes were introduced to the Practice to support the establishment of a complex wound clinic:

- ▶▶ Working together the Lead Practice Nurse and the WWIC Director of Education and Training

established educational needs related to wound healing and introduced a one-to-one training programme supplemented with web-based education

- ▶▶ Resources to support the wound clinic were identified and sourced. This last step was facilitated by the Practice Manager who identified appropriate income streams to obtain equipment such as a Doppler ultrasound to enable differential diagnoses of leg ulcers to be performed

- ▶▶ Referral pathways were developed within the Practice to facilitate early access to WWIC and the national lymphoedema network in Wales

- ▶▶ The local University Health Board's wound dressing and limb compression formulary was adopted and integrated into the Practice's care delivery system. Contacts were developed with the manufacturers of the products listed on the formulary to ensure correct product use

- ▶▶ Documentation was developed to obtain consent for wound photography

- ▶▶ A database of wound-relevant descriptors was introduced to allow accurate documentation of wound diagnosis, assessments and to facilitate audit.

The complex wound clinic was opened in March 2012 with initial joint working between the Lead Practice Nurse and the WWIC Director of Education and Training. Over time the dual working was reduced and the Practice Nurse ran the clinic independently.

In 2014, a second GP Practice expressed interest in opening a Practice Nurse-led complex wound clinic, this Practice located 16 miles from the first participating Practice cared for 8,818 patients with two Practice Nurses among a team of 22 staff. Within the second GP Practice, the number of patients with wounds, their aetiology, outcomes and costs of treatment were captured for four months prior to initiating the complex wound clinic and for five months after the clinic had opened. In the first participating GP Practice data on the use of wound treatments was collected from the Practice Nurse's clinic records while in the second GP Practice wound treatments were derived from the Practice records and costs assigned using the 2012–13 version of the Wound Care Handbook (Cowan, 2013). Staff (GP and

Table 1. Visits to the initial complex wound clinic established during the project, cost of wound treatment and outcome by wound aetiology

Aetiology	Number of patients	Clinic visits (4 or fewer: more than 4)	Cost of wound treatment: mean £ (SD)	Outcome (Healed: unhealed)
Venous leg ulcer	16	9:7	170.9 (138.9)	12:4
Surgical wound	10	7:3	85.9 (23.5)	9:1
Traumatic wound	7	5:2	71.2 (22.7)	7:0
Foot wound	2	0:2	143.4 (9.8)	0:2
Leg wound	1	0:1	105.5	0:1
Pressure ulcer	1	1:0	71.0	0:1
Venous eczema	1	1:0	131.9	1:0
Malignant wound	1	0:1	246.6	0:1
Burn	1	1:0	58.0	1:0
Skin tear	1	0:1	127.9	0:1
Unreported	1	1:0	68.2	1:0

SD = Standard deviation

Practice Nurse) costs were costed per visit using the PSSRU Unit Costs of Health and Social Care (Curtis, 2013) at £45 for the first visit with £13 per subsequent GP Practice visits. Both staff and product costs were held constant across both GP Practices to facilitate comparison despite the time interval between the first and second Practices opening their complex wound clinics.

Across both GP Practices there were similar issues related to their wound management practice before implementation of their complex wound clinics:

- ▶▶ No formalised wound assessments
- ▶▶ No recent education or training on tissue viability
- ▶▶ Patients with wounds integrated into general appointment time slots
- ▶▶ No knowledge of how many patients had active wounds
- ▶▶ Limited knowledge of wound dressings and their role and reliance on antimicrobial dressings
- ▶▶ No differential diagnosis of leg ulcers
- ▶▶ Poor wound care documentation and no wound care planning
- ▶▶ Limited ability to clinically diagnose wound infection
- ▶▶ No link with local Tissue Viability Nurse services
- ▶▶ No wound photography.

Permission to operate the complex wound clinics was provided by both GP Practices.

RESULTS

The results of the project are divided into two phases; post-implementation in the initial participating GP Practice, and pre- and post-implementation of the complex wound clinic in the second GP Practice.

First GP Practice: post-implementation of the complex wound clinic

In the first GP Practice, 53 patients with wounds attended the complex wound clinic between the 28th March 2012 and 30th April 2013. Of these, eight only attended the clinic on one occasion and were removed from further analysis. The 45 patients who attended the wound clinic on more than one occasion presented with predominantly venous leg ulcers (n=17), surgical and traumatic wounds (n=10 and n=7 respectively). The remaining 11 patients presented with a range of wounds including unspecified foot wounds (n=7) and single cases of a leg wound, pressure ulcer, venous eczema, malignant wound, burn and a skin tear. The aetiology of one wound was unreported. One patient with a venous leg ulcer died and two with foot wounds had surgery to amputate the wounded region.

The remaining 42 patients made between 2 and 29 visits to the GP Practice for wound care (median 4 visits). *Table 1* details wound aetiology, number of clinic visits, outcome and total cost of

Table 2. Visits to the second participating GP Practice, cost of wound treatment, cost of leg compression and outcome by wound aetiology prior to the introduction of a complex wound clinic

Aetiology	Number of wounds (number of patients)	Clinic visits by patient (7 or fewer: more than 7)	Cost of wound treatment per patient: mean £ (SD)	Cost of leg compression per patient: mean £ (SD)	Outcome per patient (Healed: unhealed)
Surgical wound	14 (13)	6:7	244.7 (259.6)	2.3 (7.2)	7:6
Venous leg ulcer	12 (9)	3:6	548.4 (376.6)	135.2 (145.1)	1:8
Leg wound	8 (6)	4:2	220.4 (151.0)	13.8 (19.3)	3:3
Traumatic wound	2 (2)	1:1	283.8 (295.8)	11.2 (15.9)	1:1
Back wound	2 (2)	2:0	145.5 (13.7)	0 (0)	1:1
Head wound	2 (2)	2:0	135.2 (3.0)	0 (0)	0:2
Foot wound	2 (1)	1:0	97.8	0	0:1
Arm wound	1 (1)	1:0	94.1	0	0:1
Pressure ulcer	1 (1)	0:1	570.6	141.8	0:1
Mixed aetiology leg ulcer	1 (1)	0:1	499.1	0	0:1
Skin tear	1 (1)	0:1	196.4	0	0:1

SD = Standard deviation

wound treatment for the 42 patients who attended the first complex wound clinic. As revealed in *Table 1*, most venous leg ulcers, surgical and traumatic wounds healed during treatment with 73.8% (n=31) of all patients having healed wounds following attendance in the complex wound clinic. In this evaluation, a wound was considered to have healed if there was complete restoration of epithelial cover. The cost of wound treatment was significantly lower among patients with healed wounds (mean cost healed wounds £105.1 (SD 78.8), mean cost unhealed wounds £175.4 (SD 129.1), Mann-Whitney U=77.5, Z=-2.67, p (2-tailed)=0.008).

In the second GP Practice participating in this quality improvement study, it was possible to gather cost and outcome data both pre- and post-introduction of the complex wound clinic.

Second GP Practice: pre-implementation of a complex wound clinic

Fifty patients attended the GP Practice for wound treatment over the period from 10th March 2014 to 25th April 2014 with the final date for wound treatment pre-introduction of the complex wound clinic being 23rd June 2014. Eleven patients only attended their GP Practice once for wound treatment and this group were excluded from

subsequent analysis. The 39 patients who attended on more than one occasion for wound treatment had a mean age of 65.2 years (SD 18.9; range 25 to 88 years) and were predominantly male (n=23; 59.0%). Most patients had a single wound (n=32) while 7 had two wounds. Where patients had two wounds, typically these presented with the same aetiology affecting both legs or had two surgical wounds. Only one patient had two wounds of different aetiology (pressure ulcer and a toe wound). The most common wound aetiologies treated pre-complex wound clinic were surgical wounds (n=14), venous leg ulcers (n=12), and unspecified leg wounds (n=8). The mean number of visits to the GP Practice per patient was 9.3 (SD 6.9), median 7 visits. The number of GP Practice visits, costs of wound treatment, costs of leg compression and outcome are shown in *Table 2* by patient (n=39), where a patient had two wounds both had to have healed for the patient to have an outcome of 'healed'. One-third of patients attending the GP Practice prior to the introduction of the complex wound clinic healed (33.3%), with most healed wounds being surgical or unspecified leg wounds. Only one-ninth of patients (11.1%) with a venous leg ulcer healed during treatment with the generally unsuccessful treatment costing on average £548.4, of which £135.2 was consumed by the cost of leg compression therapies. The cost of wound

Table 3. Visits to the second participating wound clinic, cost of wound treatment, cost of leg compression and outcome by wound aetiology post introduction of a complex wound clinic

Aetiology	Number of wounds (number of patients)	Clinic visits by patient (6 or fewer: more than 6)	Cost of wound treatment per patient: mean £ (SD)	Cost of leg compression per patient: mean £ (SD)	Outcome per patient (Healed: unhealed)
Venous leg ulcer	18 (15)	4:11	528.7 (442.2)	104.9 (91.4)	8:7
Traumatic wound	11 (11)	9:2	134.9 (55.4)	2.6 (7.1)	10:1
Leg wound	11 (10)	5:5	348.4 (266.8)	72.1 (135.7)	6:4
Surgical wound	8 (8)	4:4	249.2 (159.3)	4.4 (9.8)	5:3
Foot wound	2 (2)	2:0	108.8 (7.1)	19.3 (27.3)	1:1
Back wound	1 (1)	0:1	184.4	0	1:0
Head wound	1 (1)	1:0	109.8	0	1:0
Skin tear	1 (1)	1:0	124.5	0	1:0

SD = Standard deviation

treatment was significantly lower among patients with healed wounds (mean cost healed wounds £222.9 (SD 349.7), mean cost unhealed wounds £351.1 (SD 242.9), Mann-Whitney U=71.0, Z=-2.9, p (2-tailed)=0.004).

Second GP Practice: post-implementation of a complex wound clinic

Fifty patients attended the complex wound clinic for wound treatment over the period from 11th August 2014 to 19th December 2014 with the final date for wound treatment post-introduction of the complex wound clinic being 7th January 2015. One patient only attended the wound clinic once for wound treatment and this patient was excluded from subsequent analysis. The 49 patients who attended on more than one occasion for wound treatment had a mean age of 66.3 years (SD 15.9; range 21 to 88 years) and were evenly split between male (n=24) and female patients (n=25). Most patients had a single wound (n=45) while 4 had two wounds. Where patients had two wounds typically these presented as venous leg ulcers on both legs. Only one patient had two wounds of different aetiology (unspecified calf wound and a scalp wound). The most common wound aetiologies treated in the complex wound clinic were venous leg ulcers (n=18), traumatic wounds (n=11), and unspecified leg wounds (n=11), *Table 3*. The mean number of visits to the complex wound clinic per patient was 9.4 (SD 7.8), median 6 visits. Two thirds of patients attending the complex wound clinic

healed (67.3%) with most healed wounds being traumatic wounds and venous leg ulcers. Over half of patients with a venous leg ulcer healed during treatment with the treatment costing on average £528.7, of which £104.9 was consumed by the cost of leg compression therapies. The cost of wound treatment was significantly lower among patients with healed wounds (mean cost healed wounds £222.7 (SD 181.4), mean cost unhealed wounds £507.1 (SD 442.9), Mann-Whitney U=120.0, Z=-3.07, p (2-tailed)=0.002).

Comparison between the two complex wound clinics established during the project

The two complex wound clinics treated a total of 91 patients (42 in clinic 1 and 49 in the second clinic) with broadly similar healing rates of 73.8% and 67.3% respectively. Both complex wound clinics saw similar wound aetiologies with venous leg ulcers, surgical and traumatic wounds being the most frequent aetiologies in both clinics. Patient follow-up was longer in the first wound clinic (12 months) and 5 months in the second wound clinic with more clinic visits in the second clinic (median number of visits 6 compared with 4 in the first complex wound clinic). In both clinics the cost of healing wounds was significantly lower than the costs associated with unhealed wounds. However, the mean costs of treatment differed between the two clinics, for example the average cost of treatment of venous leg ulcers in clinic 1 was £170.9 whereas in the second clinic the mean cost of VLU treatment was £528.7.

Comparison pre- and post-implementation of a complex wound clinic

Within the same GP Practice, the introduction of a complex wound clinic increased wound healing rate from 33.3% to 67.3%. The mix of wounds treated was similar pre- and post-implementation of the complex wound clinic with venous leg ulcers, surgical wounds, traumatic wounds and leg wounds being the common frequently reported aetiologies. The number of patients seen in the GP Practice and in the wound clinic were relatively similar, 39 patients seen over 4 months in the GP Practice and 49 patients seen over 5 months in the wound clinic with similar numbers of visits to the Practice for wound treatment (median 7 pre-wound clinic and 6 post-wound clinic). The cost of wound treatment was similar pre- and post-implementation of the complex wound clinic (pre clinic mean cost £308.3 (SD 284.9), post clinic mean cost £316.9 (SD 318.0), Mann Whitney $U=945.0$, $Z=-0.09$, p (2 tailed)=0.930).

DISCUSSION

If wound healing is to be realistically achieved through GP Practices then both the structure and processes of wound management require to be addressed. Within this quality improvement project similar challenges were observed within both participating GP Practices prior to the implementation of a complex wound clinic. There was limited training and knowledge of wound healing best practices, lack of resource and no referral pathways, no provision of dedicated clinical time for patients with wounds, insufficient documentation of wound care outcomes and lack of awareness of the burden placed on the GP Practice by patients with wounds. These structural and process challenges are reflected in the low healing rates observed in the GP Practice where it was possible to gather pre-wound clinic implementation data — with only one-third of patients with wounds achieving healing over a four month period. Others have commented on the low healing rate for wounds treated in GP Practices; Guest et al (2012) reported 6% to 9% healing rates after six months treatment for venous leg ulcers managed in GP Practices. Within specialist leg ulcer clinics, healing rates are rarely published. One clinic reported a 63% healing rate (281/446

leg ulcer patients healed), however, these wounds are considered more challenging than those seen in GP Practices (Clark et al, 2017). In the current study, the healing rate for venous leg ulcers before implementation of the complex wound clinic was 11% after four months treatment. While data on wound treatment in GP Practices is scant it would appear that the care received by patients with wounds may be sub-optimal with consequent low healing rates.

Within the two complex wound clinics established during this project, healing rates were 73.8% at 12 months and 67.3% after 5 months. These two clinics treated wounds of similar aetiology, however, the costs of wound treatment were higher in the second clinic; for example the mean cost of venous leg ulcer treatment was almost three-times higher in the second clinic (£528.7 compared with £170.9). The difference in treatment cost may reflect the tendency for patients to attend the second wound clinic more frequently (median visits second clinic 7, first clinic 4) but may also reflect the greater degree of detail on product use available within the second GP Practice where prescription data was available rather than reliance on Practice Nurse records within the first clinic. The variation in the costs of GP Practice wound treatment may be one limitation of the present study with cost requiring further clarification across a wider range of GP Practices.

The increased healing rate observed post-implementation of the second wound clinic deserves mention — pre-wound clinic the healing rate was 33.3% rising to 67.3% after introduction of the wound clinic. This marked rise in successful outcomes was achieved without increasing the cost of wound treatment. The data indicates that substantial improvements in the healing of wounds within GP Practices may be achievable without affecting the overall costs to the Practice. Over time there should be cost savings to the GP Practice given the local reservoir of patients with wounds will decrease given the improved outcomes of treatment. These preliminary observations deserve confirmation within a wider sample of GP Practices.

The introduction of complex wound clinics within the two GP Practices has been sustained

with the first GP Practice now acting as a cluster practice for wound care supporting a patient population of up to 50,000. Both GP Practices have received wider recognition for their complex wound clinics, with the first clinic receiving a certificate of excellence from the Royal College of General Practice Wales with the second clinic winning two Journal of Wound Care awards.

The major limitation to the diffusion of the model of GP Practice complex wound clinics was the dependence on one-to-one working between the lead Practice Nurse and the Director of Education and Training at WWIC. For the approach to be adopted more widely across Wales and the UK alternative methods of delivery of training and support for the GP Practices will require development and testing. These alternatives to one-to-one interaction could involve video and on-line teaching coupled with remote contact with WWIC staff to ensure help is on-hand where required by the Practices.

There are a number of limitations to this study; it was only possible to record pre- and post-complex wound clinic data within a single GP Practice and replication of the improvement seen after opening the wound clinic is required to demonstrate the generalisability of the approach to other Practices. Developing a standard approach to collecting the costs of wound treatment may help to reduce the variability in mean treatment costs observed across the two wound clinics established in this project.

CONCLUSIONS

This quality improvement project identified that wound care delivered within GP Practices may result in low healing rates which can be markedly improved through development and introduction of a wound clinic. The approach was successful within the two wound clinics established within the project with healing rates around 70% in both clinics, while the cost of wound treatment did not appear to be markedly changed before or after wound clinic introduction. Expansion of this model may enable GP Practices to successfully treat the wounds of the many thousands of

patients who present with wounds in their GP Practice each year. WUK

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