Service delivery in complex DFU patients using Single Use Negative Pressure Wound Therapy (NPWT)* - a UK perspective

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Introduction

- There are estimated to be 3.6 million people in the UK with diabetes, which equates to one in every 16 people.[1] Of which, from week to week it is estimated that 2-2.5% of the diabetes population will have an active foot ulcer.[2]

- Guest et al (2017) estimated the mean cost over 12 months of wound care to be £7,800 per diabetic foot ulcer. If nurse contacts were reduced or increased by 25% then the mean value of diabetic foot ulcer management would decrease or increase, respectively, by 10% (range £7,000 - £8,600).[3]

- This poster describes the results of an evaluation which examined the impact of single use NPWT (PICO◇ 7) on improving service delivery to complex DFU patients in a UK NHS Trust, with a particular focus on promoting patient empowerment.

Methods

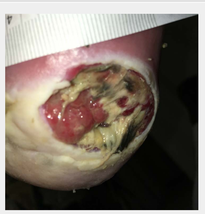
- Service delivery was modified to utilise the new dressing full indicator feature available on the PICO 7 device.

- This was used to allow patients/carers to assess the need for dressing change for exudate management. Pursuant to this, dressing changes were conducted in either out-patient clinics (usually for more mobile patients) or through community nurse visits (more common for housebound patients) to promote patient convenience and optimise resource use.

- The number of clinician contacts were expressed as hours of clinician time by multiplying by published values of average time per visit. For clinician contacts we assumed a 31-minute duration (including travel time).[4] We assumed an equivalent duration for both podiatrist and nurse visits.

- Ethics committee approval was not required for this evaluation.

Results

Details	Case 1 (86 year old male)	Case 2 (81 y.o. male)	Case 3 (51 y.o. male)	Case 4 (65 y.o. male)
Wound location	Right forefoot amputation site.	Left 5th toe amputation due to osteomyelitis.	Right posterior heel ulcer	Left posterior heel
Dimensions	2.5cm x 0.4cm x 0.4cm depth, area=1cm^2	1.2cm x 0.6cm x 0.5cm depth	6cm x 10.5cm x 0.5cm depth (area= 63.5cm^2)	2.5cm x 4.5cm x 0.4cm depth (area= 11.25cm^2)
SINBAD score (0-6)	3 (I, N & A)	3 (I, N & D)	3 (S, N & A)	4 (S, N, B and A)
Wound duration at start of PICO◇ 7 treatment (weeks)	8 weeks post-amputation	22 weeks post-amputation	8 weeks	4 weeks
Comorbidities	• Heterotopic (H/O) amputation (2nd -5th toes on right foot) • Type 2 Diabetes Mellitus • Hypertension • Hyperlipidaemia	• Type 2 Diabetes Mellitus • Bed-bound • Absent foot pulses	• Obesity (BMI >35) • Recent admission due to lower back pain and housebound during evaluation period	• Type 2 Diabetes Mellitus • Charcot Neuroarthropathy
Duration of PICO 7 treatment	4 weeks	12 weeks (4 weeks PICO◇ 7, 2 weeks break, 8 weeks PICO 7)	5 weeks	6 weeks. Patient then discharged out of area.
Final outcome	Ulcer had reduced in area by 31% at end of treatment period (2.3cm x 0.3cm x 0.4cm depth, area = 0.7cm2). Exudate levels and the peri-wound areas were noted to improve during the course of treatment. Pain levels were reported by patient to have reduced when using PICO 7 (from 7/10 to 3/10).	Overall, the ulcer size reduced by 56% during the 12 weeks of treatment with PICO 7. Over the initial 4 week treatment with PICO 7 the ulcer size reduced to 0.14cm^2 (overall 81% area reduction). At this point PICO 7 was discontinued as wound healing was felt to be on the correct trajectory. However over the following 2 weeks the wound deteriorated (area increased to 2cm^2) and PICO 7 was therefore re-started. The ulcer then steadily improved over the following 8 weeks, at which point PICO 7 was stopped as wound healing was stable (ulcer area reduced to 0.32cm^2).	The patient was lost to follow-up due to readmission to hospital. After 5 weeks of PICO 7 treatment the ulcer had reduced in area by 53% (5cm x 6cm x 0.2cm depth, area= 30cm^2). Dressing change frequency was reduced from daily to twice per week. After use of sharp and mechanical debridement, the ulcer bed improved in terms of granulation tissue content.	After 6 weeks of PICO 7 treatment (along with appropriate debridement and off-loading) the ulcer had reduced in area by 56% (2cm x 2.5cm x 0.2cm depth, area = 5cm^2). The wound bed had improved with a reduction in depth and promotion of epilithelisation. The peri-wound area had also improved with a reduction in maceration.
Pre/Post PICO	 	 	 	 

Results

Patients/carers were able to self-assess their dressing status by use of the dressing-full indicator. Contact by phone determined the need for an out-patient clinic or a home visit. Consequently, patients only had to attend out-patient clinics when absolutely necessary and dressings were only changed when needed, thus minimising clinician contact and intervention. Therefore, in all cases the use of PICO◇ resulted in changes to the way the service was delivered, leading to improved efficiency. The table shows details of the weekly clinical contacts for each of the four cases.

Table 1

Case	Contacts per week	
	Pre-NPWT	During NPWT
1	3 contacts (1 Pod HV + 2 DN HV)	1 contact (1 Pod HV)
2	2 contacts (1 Pod HV + 1 DN HV)	1 contact (1 Pod HV)
3	7 contacts (1 Pod HV + 6 DN HV)	2 contact (2 Pod HV)
4	3 contacts (1 Pod clinic + CC out-pt)	2 contact (CC out-pt)

Notes: HV = Home visit; DN = District nurse; Pod = podiatrist; CC out-pt = Acute based casting clinic, seen by plaster technician and podiatrist

This gave clear resource benefits associated with a reduced frequency of clinician contacts (an average of just over 2 per patient over the treatment period).

The table below shows the weekly resources associated with patient contacts, in terms of hours of clinician time. The mean weekly release of time across the four cases was estimated to be approximately 4.5 hours of clinician time.

Over a twelve week treatment period the use of PICO could result in the release of 14 clinician hours per patient on average (i.e. 1 hour & 10 minutes per patient on average over 12 weeks = 14 hours) clinician hours per patient on average. Importantly, from a patient perspective, this also leads to an equivalent reduction in their time associated with healthcare appointments and visits.

Table 2

Case	Clinician time (minutes/week) pre-NPWT	Clinician time (minutes/week) during NPWT	Time saving (minutes/week)
1	93	31	62
2	62	31	31
3	217	62	155
4	93	62	31
		Total time saving	279 (4 hours 39 minutes)

Notes: clinician includes podiatrist, nurse and plaster technician

Discussion

- Continually increasing demand for NHS services is imposed by multiple factors. As a consequence, there is a need to increase the capacity of services in order to undertake more activity with similar or reduced resources ("more with less"). Freeing up staff time is therefore a valuable way to increase capacity.

- Increasing service capacity has several important consequences: 1) It may enable the service to better meet current demands, releasing time to allow other activities such as training, administrative duties or spending more time with patients to take place, 2) It may also enable the service to improve its resilience, i.e. the extent to which it is able to deal with peaks and troughs in demand, 3) It may help to ensure that patients receive expert assessment at an earlier stage- decreasing the time to expert assessment is likely to reduce the incidence of severe ulcers, & 4) It provides a way to ensure the sustainability of services for the future.

- Severe ulcers (SINBAD score 3 or more) also cost over four and a half times as much to treat (£77.33 vs. £359.20 per patient per week). The costs are based primarily on the difference between number of dressings required and the amount of the professional's time to treat[2]. For the severe ulcers included in this evaluation, it was observed that the dressing full indicator has the potential to empower the patient to know if the dressing needs changing before their planned review. A treatment choice that balances unit cost with reduced clinician time may result in a reduction in average weekly cost, whilst appropriately maintaining the clinical outcome of the ulceration.

- Approaches that focus on severe chronic wounds are potentially useful for any wound care service striving to increase capacity, because these wounds incur a disproportionate level of resource use. All the ulcers included here fall into this category, and it is encouraging to see that the use of PICO◇ 7 in this evaluation resulted in some clear improvements in service delivery. Importantly, patients/carers were able to make use of the features of PICO 7 to increase empowerment in self-care and were able to optimize the number of clinic visits and dressing changes. This has potential benefits for patients as well as for the wound care service.

References
1. Diabetes UK. 2016. Diabetes Prevalence 2016 (November 2016). Available at https://www.diabetes.org.uk/professionals/position-statements-reports/statistics/diabetes-prevalence-2016. **2.** Kerr, M. Diabetic foot care in England: An economic study. 2017. Insight Health Economics, For Diabetes UK. Available at https://www.diabetes.org.uk/professionals/resources/shared-practice/footcare. **3.** Guest JF, Fuller GW, Vowden P. Diabetic foot ulcer management in clinical practice in the UK: costs and outcomes. Int Wound J. 2018 Feb;15(1):43-52. doi: 10.1111/iwj.12816. Epub 2017 Dec 15. **4.** O'Keeffe M (2006). Evaluation of a community-based wound care programme in an urban area. Poster presented at EWMA Conference, 2006.