

Lessons to be learnt from data collection in a high risk foot clinic

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Abstract

This study was undertaken to describe the patients treated by the Austin Health High Risk Foot Clinic for diabetes related foot ulcers and to illustrate the evolution of data collection within this service, highlighting specific data for inclusion. Prospective collection of data for all patients with diabetes and a foot ulcer attending the High Risk Foot Clinic between January 2000 and February 2005 were reviewed retrospectively. During this period 162 patients with a foot ulcer related to diabetes were seen and referral was predominantly from the outpatient clinic of the hospital. Over 70% of patients were aged >60 years and almost two thirds were men. Over 75% were diagnosed with diabetes for <25 years. In those where location of ulceration was noted, over 50% developed in the forefoot. Peripheral neuropathy was present in just over 75% of cases. The majority of management included pressure redistribution and wound treatment. Initial data captured basic demographic information. It has become clear that new data should include information about aetiology of ulceration and healing rates, to allow the practitioners to assess the efficacy of current management practices. The process of meaningful data collection requires ongoing evaluation and change in order to keep information relevant and up to date. Our experience reveals the clear need for objectives to be set prior to collecting data, with regular assessment of data to ensure that the targeted outcomes are being captured.

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Introduction

The presence of a foot ulcer in a person with diabetes necessitates the referral to a multidisciplinary high risk foot clinic in order to ensure best outcomes¹. The Austin Health High Risk Foot Clinic (Austin HRFC) commenced in 1995. Previously this tertiary hospital podiatry service provided for nail and callus foot hygiene for inpatients and outpatients with diabetes. Austin HRFC was established to provide specialised care for those patients with diabetes foot complications. Utilising the existing staff, a specialist podiatrist was recruited and the service prioritised its provision of care to see people with diabetes and active foot problems. The clinic operated one day a week and was located in the outpatient department in a tertiary hospital setting. As this was one of the first services of its kind to be established, data collection was initiated to identify the patients referred.

Currently, Austin HRFC continues to operate in the outpatient department one day a week. The clinic is staffed by three podiatrists and one orthotist. Regular consultations occur with an orthopaedic surgeon, an endocrinologist and wound nurse consultant, as triaged by the podiatrists. The clinic also fosters communication with the vascular unit to allow quick facilitation of care of urgent cases.

Aim

This paper aims to describe the evolution of data collection, from general demographic, to data that can effect change in clinical practice.

Methods

The data for all patients seen by Austin HRFC were collected prospectively by staff of the service for the period between January 2000 and February 2005. Only the data for patients with diabetes and foot ulcers are provided in this paper. All patients were referred with a variety of foot conditions, and were assessed following a foot health assessment tool formulated by Austin HRFC. This included neurological and vascular assessment. Basic patient information was collected which included demographic data, referral source, presenting problem and management of foot ulceration. As time progressed, staff recognised that further information was relevant, including duration and location of ulceration. As a result data is incomplete for some parameters.

Results

Patients seen at the Austin HRFC

During the study period, 514 patients were seen at the Austin HRFC. Of these 162 patients with diabetes presented with a foot ulcer, referred principally from the outpatient department. The demographic data of the patients are detailed in Tables 1 and 2; 80% had diabetes for <25 years.

New evidence based research determined risk factors and aetiology of foot ulcer formation and lower extremity amputation²⁻¹². Presence of diabetes associated peripheral neuropathy was described as a reduced ability to sense a 10g monofilament in one of four areas (Table 3). Peripheral arterial disease (PAD) was diagnosed either by a vascular surgeon using Doppler ultrasound technique or angiogram showing significant stenosis/stenoses; or by ankle-brachial index (ABI) <0.8, which was arbitrarily chosen by the practitioners in 1995 and was standard practice at the time (Table 4). The primary

Age Group (years)	Frequency	Percent
<40	6	3.7
41-50	13	8.0
51-60	31	19.1
61-70	49	30.2
>71	63	38.9
Sex (n=152)		
Male	106	65.4
Female	56	34.6

Table 1. Frequency and percent of age group of participants with a foot ulcer (n=162).

presenting problem in patients was noted as ulceration in over 90% of cases.

Location of ulceration was also collected at a later date (see Table 5). Previous history of amputation is shown in Table 6. When ulcer diagnosis was ascertained, the ulcers were treated following evidence based management¹³⁻¹⁶. Management of ulceration is shown in Table 7. As each patient may have had more than one management strategy per ulcer, there are four different management categories collected in Table 7.

Discussion

The clinicians established data collection for Austin HRFC to determine service users. Initially, data regarding demographics and referral sources were included. Then, factors known to increase risk and aetiology of foot ulceration were also included, such as presence of neuropathy, arterial disease and limited joint mobility; followed by wound factors

Year group	Frequency	Percent
2000+	12	7.9
1990s	59	39.1
1980s	51	33.8
1970s	21	13.9
1960s	6	4.0
Pre-1960	2	1.3

Table 2. Duration of diabetes by decade (n=151).

DPN present	Frequency	Percent
Yes	125	84.5
No	23	15.5
Not tested	14	8.6

Table 3. Presence of peripheral neuropathy associated with diabetes (DPN) (n=162)

such as ulcer location, history of amputation, presentation at initial appointment and management. These factors began to provide the clinicians with better information regarding the type of patients seen by their service and the type of treatment they required.

Data collected by Austin HRFC

Approximately one-third of patients seen by Austin HRFC had foot ulcers. As with other services, Austin HRFC showed a one-third greater prevalence of ulceration in males^{17,18}. Greater than two thirds of patients with foot ulcers were aged >60 years and almost 40% were aged >70 years. It is of note that very few patients were aged <50 years, even though current research suggests that Type 2 diabetes is being diagnosed much sooner¹⁹. This suggests that while still not evident, in future years we would expect younger patients developing these complications. The majority of patients had diabetes for >10 years, and this confirms previous research that the longer the presence of diabetes the greater the prevalence of foot complications²⁰. The majority of patients had peripheral neuropathy, which is the single most important factor leading to foot ulcer formation in people with diabetes^{12,21}. Assessment of arterial disease was not undertaken in over one-third of patients. One of the main reasons was that at the time, pulse palpation was used as the assessment of presence of PAD^{17,22}. In addition, when ABI assessments increased in frequency in the clinic, the efficacy of this test as an assessment tool for PAD in people with diabetes was debated, with considerable concerns raised regarding arterial calcification rendering this test ineffective²³⁻²⁶. At Austin HRFC very few patients were identified as having significant arterial disease, perhaps suggesting that this is not a significant problem here. However, the missing data may contain many patients with arterial disease. This difficulty may be circumvented by access to alternative methods of arterial assessment. Austin HRFC is currently investigating potential alternative methods.

Data indicated that >50% of patients presented with ulceration of the forefoot, agreeing with other studies that show the forefoot is more commonly ulcerated¹⁷. Very few patients

required amputations and the majority of amputations were minor; occurring in the forefoot and mostly involving digits. As ulceration precedes amputation in the majority of cases²¹ and most ulcers occurred in the forefoot, these data are unsurprising.

For the most part, primary management was classified as wound management. Assessment for aetiology of ulceration was also commonly described. On retrospectively evaluating the data, this provided little useful information. While debridement of fibrotic tissue and callus is essential to ensuring adequate healing²⁷, the type of wound dressings used and healing rate will provide more useful information. Standard pressure redistribution was undertaken using 20–40mm of felt. Alternative pressure redistribution using casting, walkers, boots and orthotics were used when felt padding was deemed unsuitable or insufficiently redistributive. Other management such as Dermagraft™ (Smith and Nephew) and hyperbaric oxygen were rarely used, with no other advanced technologies documented. Advanced technologies were expensive and used in a small number of specific cases. The information collected showed that simple strategies were predominantly used to heal wounds, although effectiveness of such strategies was anecdotal.

Gaps in data

There are a number of obvious gaps in the information collected. A significant point is that there was no clear objective for the data collection. Currently, this data provides descriptive details of a small group of patients with ulcers seen by Austin HRFC. This can be useful for managers to identify how many patients are seen and their demographics,

ABI reading (arbitrary descriptives of the ABI levels)	Frequency	Percent
<0.45 (critical ischaemia)	1	1
0.46-0.80 (significant arterial disease)	15	15
0.81-1.00	Normal	14
1.00-1.20	Normal	50
>1.20 (incompressible)	18	18
Not determinable	27	17
Not undertaken	37	23

Table 4. ABI of patients with ulcers (n=162).

but information related to efficacy of care and identifying areas requiring improvement was lacking. For example, it is difficult to ascertain the primary aetiology of the foot ulcer and whether patients have had more than one ulcer episode. By including this information, an understanding of the main reasons for foot ulcers can be ascertained and implementing preventative measures to target key problem areas may be possible. It is increasingly important for health professionals to evaluate current practice with a view to identifying areas that require improvement. In this way patient management

Ulcer location	Frequency	Percent
1st IPJ	12	12
Digital (other)	19	19
Plantar mtpj	20	20
Heel	10	10
Other	16	16
Multiple	21	21
Location not noted	64	39

Table 5. Ulcer location (n=162)

can improve, resulting in accelerated healing and reduced adverse events. Therefore, the data collection tool was evaluated with a view to adding factors that would provide information on efficacy of care.

The data set

The data set collected included both ulcerated and non-ulcerated patients, making it cumbersome. To facilitate easier data assessment a separate data set should be produced for those people with foot ulcers. Each new incident could be included as a separate entry. In this way, the important components can be ascertained for each episode and more practical data can be collected.

Some of the data, for example age and duration of diabetes, were collected as groups rather than simple numerical age or years diagnosed with diabetes. This made comparisons between factors difficult and statistical analysis complicated. Future data collection should involve collecting simple numerical figures for these variables.

Including data to improve clinical practice

In order to assess the effect of management, target outcomes must be quantified²⁸. This can allow comparisons between

Previous LEA	Frequency	Percent
Digit	18	72
All digits	1	4
Ray	2	8
Below knee amputation	4	16
None	130	84

Table 6. History of previous lower extremity amputation in patients with diabetes (n=155).

patients²⁹ and different management techniques²⁸. One of the simplest ways of undertaking this is to measure wound area and healing rates.

Measurement of healing rates

The measurement of healing rates can vary, depending on the calculation used³⁰. Therefore, it is important that a simple, fast and precise technique is carried out. It is not within the scope of this article to provide a full review of the various different methods, with a number of different techniques suggested by the literature^{28,30}. It is important to be aware that initial ulcer size and shape will impact on area calculated and this must be taken into consideration²⁸.

Inclusion of factors known to influence healing rates

Healing rates will be different for patients with PAD or with comorbidities and medications known to impair healing. Previous work has focused on patients with relatively simple ulcer aetiologies and comparisons are not possible²⁹. New information must be collected to include patients with other variables in order to be able to compare rates of healing in these subgroups.

Duration of ulceration prior to presentation and duration of ulceration until healing, if healing occurs, are important factors known to affect healing rates³¹. Including these factors may provide information regarding the time taken for patients to attend the service after an ulcer forms. This information can be used to formulate strategies to target those patients who do not receive appropriate management early if identified in the community (ie specific GPs, or specific cultural groups).

Infection is a component that significantly delays healing and is very common in these ulcer types³². Comparisons of infection rates between different clinics may be useful to identify those clinics that have higher numbers of infection.

Management of ulcer	Management 1 frequency (%)	Management 2 frequency (%)	Management 3 frequency (%)	Management 4 frequency (%)
Wound management ³⁵	117 (84.2)	3 (2.6)	2 (1.4)	1 (0.7)
Cast ³⁶	2 (1.4)	11 (7.9)	1 (0.7)	0 (0.0)
Walker ³⁷	0 (0)	7 (5.0)	2 (1.4)	1 (0.7)
Boot ³⁸	2 (1.4)	12 (8.6)	3 (2.2)	1 (0.7)
Assessment ³⁹	10 (7.2)	47 (33.8)	15 (10.8)	1 (0.7)
Orthotics ⁴⁰	1 (0.7)	11 (7.9)	7 (5.0)	7 (5.0)
Primary care ⁴⁰	3 (2.2)	12 (8.6)	9 (6.5)	0 (0.0)
Education ⁴¹	1 (0.7)	5 (3.6)	5 (3.6)	8 (5.8)
Nail surgery	1 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)
Footwear ⁴¹	0 (0.0)	1 (0.7)	6 (4.3)	1 (0.7)
Dermagraft™ ³⁵	1 (0.7)	2 (1.4)	7 (5.0)	8 (5.8)
Other	0 (0)	2 (1.4)	3 (2.2)	2 (1.4)
Hyperbaric oxygen ³⁵	0 (0)	1 (0.7)	2 (1.4)	2 (1.4)
Missing	1 (0.7)	25 (18.0)	77 (55.4)	107 (77)

Table 7. Primary management of ulcer (n=162).

Identifying the types of pathogenic organisms may also be useful. This information may allow implementation of specific interventions to reduce infection rates.

New research has indicated that perhaps healing rates do not provide enough information regarding efficacy of care³³. Instead, perhaps information regarding 'ulcer-free survival' rates should be collected, as these would provide more holistic information regarding most clinically effective care³⁴. Presence of ulcer recurrence can be used as a means to identify gaps in current practice, including post-discharge care. This needs further clarification and could certainly be included in later patients.

Cost of foot ulcer management

It is important to note that wound dressings, home nursing care, cost of travel to and from appointments and other indirect components, are costs that are borne by the patient when attending the HRFC service. This makes collecting data related to costs of care difficult and may be why there is very little data regarding cost of foot ulcer care in Australia. Within the HRFC, the cost of wound management becomes prohibitive in many cases and limits decisions regarding dressings and pressure redistributive devices. However, to

quantify this effect it would be necessary to compare healing rates and ulcer recurrence rates between those in whom cost is and is not an issue. This information could be used to argue the need for subsidised care.

Comparing data across centres

It is not possible to generalise the data collected, as the patients seen by Austin HRFC may be different to those seen by other services. However, comparisons to other centres may be possible should similar information be collected. Management between centres can then be evaluated for effectiveness in accelerating healing. This may lead to standardised care across centres as clinicians across services adopt these proven methods.

Recommendations

- Collect separate data set specifically for patients seen by the service with foot ulcers.
- Include at least one category describing the primary aetiology of the wound.
- Include each new episode as a separate entry.
- Include a measure of healing rate.

- Include a category for number of episodes of infection noted during attendance to the service, and the pathogenic organism.
- Formulate a new data collection proforma that others can use.

Conclusion

This prospective, retrospectively analysed study showed that the Austin HRFC treated 162 patients with foot ulcers and diabetes. The majority of ulcers had a component of neuropathy and occurred in the forefoot. Management mainly included pressure redistribution and wound care. This data is very similar to other published data, but the usefulness of the data was limited. The Austin HRFC recognised that the aim of data collection needed to be clarified in advance in order to produce meaningful information to evaluate current practice. Review of this data has led to recommendations to expand the data collection further to include wound aetiology, healing rates, ulcer recurrence and wound infection. This will assess overall management outcomes and help to identify areas that require improvement. This information can then be used between similar clinics in an effort to standardise care and provide best management for people with diabetes and foot ulcers.

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