The SCI-DC form: Does its use improvediabeticfootstratification?

Joanne McCardle, Matthew Young

Introduction

Successful risk stratification of the diabetic foot should allow the healthcare professional to target care to those at high risk of developing related complications such as painful diabetic peripheral neuropathy. In this article Joanne McCardle and Matthew Young present data which demonstrate that using the Scottish Care Information – Diabetes Collaboration (SCI-DC) screening form improves the quality of diabetic foot stratification. This allows people at low to medium risk of developing diabetic foot-related complications to be referred to community-based carers, thus freeing up clinic time for the care of those at high risk.

Ulceration of the diabetic foot does not occur spontaneously; it is a consequence of interactions between environmental hazards and specific pathologies of the lower limb (Boulton et al, 2000). It has been established for a long time that ulceration of the diabetic foot is usually a result of peripheral vascular disease (PVD), peripheral neuropathy, infection or a combination of these (Adler et al, 1999). Abnormalities of foot pressure, loading of the foot and psychosocial elements are increasingly recognised as important additional risk factors (Boyko et al, 1999; Boulton et al, 2000; Peters et al, 2001). Previous research has identified a direct correlation between risk factors and ulceration or amputation, and shown that screening and clarifying risk status may reduce amputations (Young et al, 1994; McNeely et al, 1995; Abbott et al, 2002).

Aims and objectives

The number of referrals of people with diabetic foot ulcers to the authors' diabetic foot clinic at the Edinburgh Royal Infirmary was, and is, increasing. Therefore, it was necessary to determine if all the referred patients currently attending the clinic were in need of specialist care – if not they should be referred back to be cared for in the community.

A retrospective clinical audit was carried out in the authors' foot clinic in order to determine if the existing screening form allowed rapid determination of Scottish Intercollegiate Guidelines Network (SIGN) risk categories. A re-audit was carried out 1 year later, after the introduction of the new Scottish Care Information – Diabetes Collaboration (SCI-DC) form, to see if this improved the ability to categorise patients.

Clinic attendees who had never had an ulcer and were at low or medium risk of future ulceration were returned to community-based care to receive appropriate podiatric care. This allowed those of a higher risk status to be allocated treatment that would be based on need and not expectation, this being the cornerstone of SIGN's diabetes guidelines for Scotland (SIGN, 2001) and of the National Service Framework for diabetes for England and Wales (Department of Health, 2001).

Data collection

A total of 455 sequential case notes of people with diabetes currently attending Edinburgh Royal Infirmary's foot care or foot ulcer clinic up to February 2004 were retrospectively audited (Audit 1). This method reduced the potential for sampling bias and ensured the results would be representative of the population studied.

Audit 2 was based on all case notes from

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1 Ulceration of the diabetic foot does not occur spontaneously; it is a consequence of interactions between environmental hazards and specific pathologies of the lower limb.

2 Research has identified a direct correlation between risk factors and ulceration or amputation, and that screening and clarifying risk status may reduce amputations.

3 Risk stratification of the diabetic foot will allow patients at high risk of developing ulcers to be allocated treatment based upon need and not expectation.

KEY WORDS

- **Risk stratification**
- **Scottish Care Information – Diabetes Collaboration (SCI-DC) form**
- **Retrospective audit**
- **Peripheral neuropathy**
- **Peripheral vascular disease**

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410 clinic attendees screened using the new SCI-DC form between February 2004 and December 2004. Data collection was in compliance with the Data Protection Act of 1998.

Risk classification of the diabetic foot (see *Table 1*) was based on a review of the recommended guidelines published by SIGN (2001), the International Working Group on the Diabetic Foot (IWGDF; 1999) and a prospective study by Peters and colleagues (2001).

Recommended screening

Screening methods should be quick, simple, economical and non-invasive (National Screening Committee, 2003). Screening for neuropathy should be done using 10g monofilaments, vibration perception thresholds or clinical neuropathy disability scores (Edmonds and Foster, 2003). PVD should be assessed by palpation of pulses or Doppler ultrasound. Temperature gradient, skin colour and texture should also be quantified. A thorough history (one which includes a medical history, and information on current or previous ulceration, foot deformities and psychosocial elements) should also be obtained.

Baseline data collection

The case notes of all 455 people who attended the clinic up to February 2004 were examined for evidence of screening. The screening form should be found at the beginning of all case notes, thus enabling rapid evaluation of an individual's status. The data collection sheet included:

- date of birth
- gender
- presence of neuropathy
- presence of PVD
- details of any current ulcers and their classification
- details of any previous ulcers and their date of onset, healing or both
- details of any amputations
- details of any foot deformities
- details of any limited joint motion
- details of any other associated complications such as poor glycaemic control, and renal and ophthalmologic complications
- whether risk status could be deduced from the previous recorded information, and if so, into which category.

The majority of data required a 'yes', 'no' or 'not available' as an answer, apart from date of birth, gender and risk categorisation.

Many of the patients had been in attendance at the clinic for a number of years, and upon examination of their case notes it became apparent that, because screening criteria have been refined over time, the screening forms in many cases were varied, with regard to information noted in them. In these instances, the case notes were investigated further and recorded information from the first contact with a podiatrist was examined. This helped in determining whether a sufficient history had been taken and recorded in the treatment notes. If an item of information was not documented in the screening form but could be identified from within the notes it was designated as 'yes' but as 'not available from the original screening form'.

Additionally, a patient's exclusive attendance at the routine foot clinic or previous attendance at the ulcer clinic was recorded. Attendance at the routine foot clinic indicated there was no previous history of ulceration, Charcot neuroarthropathy, foot infection or any other condition that required a consultant's intervention (the authors' clinic is divided into routine follow-up and care of people at high risk of developing diabetic foot problems, and therefore those attending the routine clinic would not have had an ulcer or any other diabetic foot-related problems).

In Audit 2 baseline data collection was repeated using the same format as that of Audit 1 (*Appendix 1* shows the SCI-DC form).

Table 1. Diabetic foot risk classification.

- Risk level 1: no presence of neuropathy.
- Risk level 2: individual has neuropathy but no deformity or peripheral vascular disease (PVD).
- Risk level 3: individual has neuropathy, deformity or PVD.
- Risk level 4: individual has a history of foot ulceration or lower extremity amputation.

Demographics

Audit 1

The mean age of Audit 1's population (N=455) was 66.8 years; 264 were male (58%). One hundred and twenty-nine people (60 males) attended routine foot clinics only; 326 people (204 males) attended both routine foot and ulcer clinics.

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Audit 2

The mean age of Audit 2's population (N=410) was 65.0 years; 230 were male (56%). One hundred and seventy-eight (86 males) attended routine foot clinics only; 232 people attended both clinics (144 males). There were no statistically significant demographic differences between the audits.

Methods of statistical analysis

Data were collated and entered onto a spreadsheet prior to analysis. Numerical data, such as date of birth, were analysed separately. Categorical data were coded and analysed to give raw data of percentages for the total population and for each clinic group (the routine foot and ulcer clinics). Between-group comparisons were then performed on the original data using Pearson Chi-square tables with Yates correction for small numbers when appropriate. Statistical significance was set at $P<0.05$.

Results

Table 2 summarises all data collected for both audits. The identification of the presence or absence of neuropathy or PVD was high when using either form. Neuropathy classification was clear in 352 patients (77%) in the old forms versus 365 (89%) in the new ($P<0.05$). Similarly, in the old forms the recognition of the presence or absence of PVD was found in 386 patients (85%) versus 394 (96%) in the SCI-DC forms ($P=0.02$).

Clear documentation of painful peripheral diabetic neuropathy (PPDN) was present in only 31 patients (7%) using the old forms compared with 349 (85%) with clearly identifiable absence or presence of PPDN using the SCI-DC form ($P=0.01$).

On admission to the clinic, the old screening forms established that 109 people (24%) had active ulceration and 62 (14%) did not. However, it was also apparent that an additional 61 (13%) had current ulceration that was not declared in the screening form. One hundred and seventy-eight people (39%) without current ulceration were not identified by screening. Furthermore, no information regarding active foot disease was available for 42 people (9%) using the old form. Audit 2 showed that 394 (96%) clearly showed this information (258 with active foot disease).

In Audit 1, documentation of previous ulceration status was only present in 119 people (26%); 101 of these attended the ulcer clinic. This leaves 336 patients with no record of whether or not there was a history of ulceration on the screening form. Although this information was found in the first point of contact with the podiatrist in 36% of the case notes, it was unavailable for 37% of the patients. A dramatic improvement was observed in Audit 2, where 95% of ulcer history was documented. Interestingly, a massive 63% (258 patients) were recorded to have no history of ulceration and 33% had current ulceration. Neither audit found ulcer classification, and onset and healing dates recorded on the relevant forms.

As a result of the information provided in the old screening forms, only nine patients (2%) could be positively categorised into risk status. However, by using the information provided elsewhere in the case notes, the risk status of a further 146 patients (32%) were identified. In contrast, the SCI-DC forms allowed over 93% of all patients, and nearly 96% of foot ulcer patients to be risk categorised.

Discussion

The IWGDF states that the most important aspect of preventing amputations is the identification of at-risk patients (IWGDF, 1999). The results of Audit 1 conclusively showed that there was an inability to risk categorise individuals by using the old screening forms. The major discrepancy was not entirely due to the inadequate completion of forms; it was in part due to the forms not distinctly requesting information regarding ulcer status (previous or current). Previous ulceration has a high correlation with existing ulceration and amputation (Adler et al, 1999; Peters et al, 2001). The SCI-DC forms clearly demonstrated significant improvement in the documentation of all risk factors associated with ulceration and amputation. The primary improvement was the recording of ulcer history, which

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2 Audit 1 provided unexpected results: risk categorisation could not be easily clarified. The introduction of the SCI-DC forms achieved a radical improvement.

3 At present a paper version of the Scottish Care Information – Diabetes Collaboration (SCI-DC) form is being used. Once the computerised version is finalised, and available to the primary and secondary care sectors, with compulsory fields to complete, it is hoped that 100% of patients will be successfully stratified and, therefore, receive appropriate care and education.

4 With the results found the authors recommend that the SCI-DC form, modified if required, is used in other specialist centres.

allowed patients to be easily classified into SIGN status.

The high number of clinic attendees who were stratified at low or medium risk status was unexpected. These included those individuals with no history of ulceration, other complications or risk factors.

SIGN (2001) and the National Institute for Health and Clinical Excellence (formerly the National Institute for Clinical Excellence; 2004) both say that 'risk 4' should only be allocated if active foot disease is present; previous ulceration constitutes a 'risk 3' status. However, these national guidelines have been adapted to regional requirements at the Edinburgh Royal Infirmary in compliance with local standards.

As a direct result of screening with the SCI-DC forms, we were able to discharge 74 patients (18%) to appropriate community-based podiatric care, thus freeing up appointment time, which meant that those patients with a greater need could be seen more frequently in the specialised foot clinic. In the event of presentation of ulceration, we are also striving to consistently record Texas grade classification, and onset and healing date of ulcers. This was lacking in data collection using both forms and future recording of this will, in the authors' opinions, provide accurate healing times.

Conclusion

The evidence base in screening and risk factors associated with ulceration have strong implications for practice. Audit 1 provided unexpected results: risk categorisation could not be easily identified. The introduction of the SCI-DC forms achieved a radical improvement.

At present a paper version of the form is being used. Once the computerised version is finalised, and available to the primary and secondary care sectors, with compulsory fields to complete, it is hoped that 100% of patients will be successfully stratified and, therefore, receive appropriate care and education. With the results found we, at the Edinburgh Royal Infirmary, recommend that this screening form, modified if required, is used in other specialist centres. ■

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Table 2. Data from the analysis of case notes of people attending the authors' foot clinic. The comparison was between older screening forms for the recording of diabetic foot-related problems in an individual's case notes and the newer Scottish Care Information–Diabetes Collaboration screening form.

	Scottish Care Information – Diabetes Collaboration (SCI-DC) form						Older forms					Significance (percentages of recorded information in the SCI-DC versus the older forms)
Form entry	Recorded as 'No'	Recorded as 'Yes'	No – found elsewhere in case notes	Yes – found elsewhere in case notes	Not recorded anywhere	Not required	Recorded as 'No'	Recorded as 'Yes'	No – found elsewhere in case notes	Yes – found elsewhere in case notes	Not recorded anywhere	
All patients												
Neuropathy	20%	69%	0%	0%	11%	0%	11%	67%	0%	1%	22%	0.05
Painful neuropathy	69%	16%	0%	0%	15%	0%	1%	6%	0%	3%	88%	0.01
Peripheral vascular disease	57%	39%	0%	0%	5%	0%	30%	55%	0%	0%	15%	0.02
Current ulceration	63%	33%	0%	0%	3%	0%	14%	24%	39%	13%	9%	0.001
Texas grade	2%	5%	0%	0%	30%	63%	21%	3%	0%	0%	55%	0.005
Previous ulceration	63%	32%	0%	0%	4%	2%	7%	19%	31%	5%	37%	0.0001
Onset date	0%	4%	0%	0%	29%	67%	15%	4%	0%	0%	2%	NS
Healed date	2%	4%	0%	0%	29%	66%	17%	1%	0%	0%	2%	NS
Previous amputation	78%	14%	0%	0%	8%	0%	87%	10%	0%	0%	2%	NS
Deformity	24%	63%	0%	0%	13%	0%	5%	43%	0%	1%	50%	—
Limited joint mobility	6%	23%	0%	0%	72%	0%	8%	19%	0%	0%	73%	NS
Other complications	51%	40%	0%	0%	9%	0%	7%	54%	0%	0%	39%	0.005
SIGN category determined	0%	94%	0%	0%	6%	0%	2%	2%	5%	32%	60%	0.01
Ulcer clinic patient	43%	56%	0%	0%	0%	0%	28%	0%	0%	0%	72%	—
Patients attending the routine foot clinic only												
Neuropathy	33%	59%	0%	0%	6%	0%	13%	66%	1%	1%	19%	0.05
Painful neuropathy	81%	10%	0%	0%	10%	0%	0%	5%	0%	0%	94%	NS
Peripheral vascular disease	66%	30%	0%	0%	3%	0%	36%	48%	0%	1%	15%	NS
Current ulceration	87%	8%	0%	0%	5%	1%	17%	3%	66%	2%	12%	NS
Texas Grade	2%	0%	0%	0%	11%	88%	3%	0%	0%	0%	0%	NS
Previous ulceration	77%	15%	0%	0%	5%	3%	10%	4%	53%	2%	32%	NS
Onset date	0%	2%	0%	0%	16%	82%	3%	1%	0%	0%	0%	NS
Healed date	1%	2%	0%	0%	16%	81%	3%	0%	0%	0%	0%	NS
Previous amputation	91%	4%	0%	0%	5%	0%	98%	2%	0%	0%	1%	NS
Deformity	30%	55%	0%	0%	13%	0%	3%	50%	0%	0%	47%	NS
Limited joint mobility	9%	13%	0%	0%	79%	0%	2%	20%	0%	0%	78%	NS
Other complications	64%	31%	0%	0%	6%	0%	5%	54%	0%	0%	41%	NS
SIGN category determined	0%	89%	0%	0%	10%	0%	3%	4%	6%	5%	82%	NS
Patients attending the foot ulcer clinic and the routine foot clinic												
Neuropathy	11%	74%	0%	0%	15%	0%	10%	67%	0%	1%	22%	NS
Painful neuropathy	60%	21%	0%	0%	19%	0%	2%	7%	0%	4%	86%	0.05
Peripheral vascular disease	50%	45%	0%	0%	6%	0%	28%	57%	0%	0%	14%	0.02
Current ulceration	44%	53%	0%	0%	2%	0%	12%	32%	29%	18%	8%	NS
Texas grade	2%	10%	0%	0%	45%	45%	28%	4%	0%	0%	3%	NS
Previous ulceration	53%	44%	0%	0%	3%	1%	6%	25%	23%	6%	40%	0.02
Onset date	1%	6%	0%	0%	38%	56%	19%	5%	0%	0%	3%	0.02
Healed date	3%	5%	0%	0%	38%	54%	23%	1%	0%	0%	3%	NS
Previous amputation	68%	21%	0%	0%	11%	0%	83%	14%	0%	1%	2%	0.03
Deformity	20%	67%	0%	0%	14%	0%	6%	40%	0%	2%	52%	0.01
Limited joint mobility	4%	30%	0%	0%	67%	0%	10%	18%	0%	1%	71%	NS
Other complications	42%	48%	0%	0%	11%	0%	7%	54%	0%	0%	39%	0.01
SIGN category determined	1%	96%	0%	0%	4%	0%	1%	1%	4%	42%	51%	0.0001

NHS Lothian

PODIATRY SERVICE

Diabetes Assessment and Risk Classification Form

Section A PATIENT DETAILS	Section B GENERAL PRACTITIONER
	GP Name .....
	GP Address .....
	.....
	.....

Section C DIABETES DETAILS (Tick appropriately)

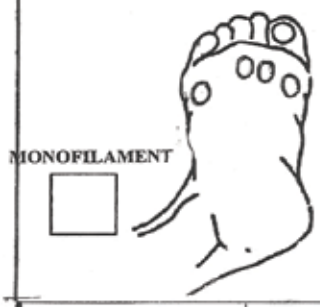
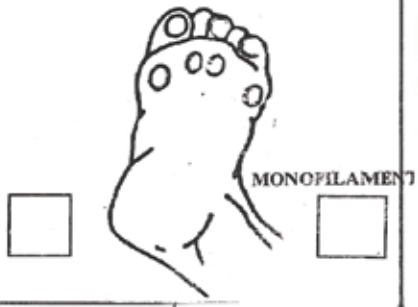
Type I ❑	Type II ❑	Date of Diagnosis (if known)	Diet Control ❑	Diet/Medication Control ❑	Insulin Control ❑

Section D VASCULAR SIGNS & SYMPTOMS (Tick appropriately)

RIGHT FOOT			LEFT FOOT	
Absent ❑	Present ❑	Dorsalis Pedis	Present ❑	Absent ❑
Absent ❑	Present ❑	Posterior Tibial	Present ❑	Absent ❑
No ❑	Yes ❑	Intermittent Claudication	Yes ❑	No ❑

Attends Vascular Clinic Yes ❑ No ❑ — 2 or less pulses present = ? ? Vascular Disease

Section E NEUROLOGICAL ASSESSMENT

RIGHT FOOT		LEFT FOOT	
	VPT 0-15 NORMAL 16-24 RAISED 25-49 ABNORMAL Reidel Seiffer Tuning Fork / Neurosthesiometer Mark reading in box		
No ❑	Yes ❑ Painful Neuropathy	Yes ❑	No ❑

Section F STRUCTURAL ASSESSMENT (Tick appropriately)

Absent ❑	Present ❑	Foot Deformity	Present ❑	Absent ❑	
Previous ❑	Present ❑	None ❑	Ulceration	None ❑	Present ❑	Previous ❑
Metatarsal ❑	Digital ❑	None ❑	Amputation	None ❑	Digital ❑	Metatarsal ❑
Forefoot ❑	TransTib ❑	Trans Fem ❑		Trans Fem ❑	TransTib ❑	Forefoot ❑
Diabetes ❑	Other ❑		Amputation Cause	Other ❑	Diabetes ❑	

Section G ADDITIONAL INFORMATION (Tick apprcpriately)

Absent ❑	Present ❑	Callus	Present ❑	Absent ❑
Absent ❑	Present ❑	Anhydrosis	Present ❑	Absent ❑
Absent ❑	Present ❑	Oedema	Present ❑	Absent ❑

SMOKER	SELF NEGLECT	IMPAIRED VISION	RECEIVING PODIATRY	FOOTWEAR
Y ❑ N ❑	Y ❑ N ❑	Y ❑ N ❑	Y ❑ N ❑	Fine ❑ Inappropriate ❑ Prescribed ❑

Comments:

Section H RISK CATEGORY (Tick appropriately)

LOW RISK ❑	MODERATE ❑	HIGH RISK ❑	ACTIVE FOOT DISEASE ❑	Advice Leaflet Given Y ❑ N ❑

Assessing Clinician Name.....Signed..... Date:...../...../20.....

Appendix 1. The Scottish Care Information – Diabetes Collaboration screening form.