

Caring for the Diabetic Foot in Primary Care

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Introduction

Non-insulin dependent diabetes mellitus (NIDDM) is a common condition affecting 10% of the world population¹, a further 10-15% of adults aged over 40 years having pre-diabetes and thus carrying an increased high risk of progression to the condition². Major complications in NIDDM are mainly of vascular nature, the renal, ophthalmic, and nervous (peripheral and autonomic) complications arising mainly secondary to microvascular complications while macrovascular pathology being responsible to cerebrovascular, peripheral vascular and coronary heart pathology.

Foot ulcers in diabetics are common and serious³, and likely to increase in the coming years with increasing incidence of diabetes in the community⁴. As the diabetic foot syndrome leads to amputations, disability and reduced quality of life⁵, lower extremity complications in persons with diabetes have become an increasingly significant public health concern in both the developed and developing world.⁶ Indeed the prevalence of the diabetic foot varies between 9% to 15% according to the population studied,^{7,8} with an estimated annual incidence lying between 1-4% and a lifetime risk of 15%.^{9,10} Viewed differently the risk of lower limb amputation in a diabetic is 50-100 times that of the general population¹¹ claiming about 50% of non-traumatic, lower extremity amputations.¹²

The Public Health impact of these numbers is significant. While in the U.K. this is estimated to cost the NHS around £12.9 million per annum,¹³ in the United States an estimated 4% of patients diagnosed with diabetes account for 46% of annual hospitalisations for foot ulcers.¹⁴ Equally of concern is the high mortality of patients with diabetic foot ulcers. Five-year mortality rates in these patients have been reported between 43% and 55%, spiralling up to 74% in patients with lower-extremity amputation. These rates are higher than those for several types of cancer including prostate, breast, colon, and Hodgkin's disease.¹⁵ In patients previously hospitalized with a diabetic foot, mortality is often related to cardiovascular disease. In one study the cause of death was mainly due to acute myocardial ischaemia (24.2%), infection (21.2%) and cerebrovascular accident (10.6%), the prevalence of cardiovascular disease calculated at 70.1%.¹⁶ Thus new-onset diabetic foot ulcers should be considered as a marker for significantly increased mortality and should be aggressively managed locally, systemically, and psychologically.¹⁷

A number of factors are involved in the development and maintenance of a diabetic foot ulcer. These include polyneuropathy, mechanical overload, peripheral arterial disease and infection.¹⁸ In up to 85% foot ulcers precede amputations in diabetic patients.¹⁹ Since evolution of the disease is slow, it is possible to implement prevention and control measures,²⁰ but as patient outcomes (such as amputation and death) occur erratically, widespread adoption of auditing this aspect of diabetic care emerges as crucial.²¹ Indeed, examination of the feet in a diabetes clinic setting is notoriously known to leave much to be desired,^{22,23,24} but good results may be attained if appropriate measures are taken.²⁵ Despite treatment up to 15% of ulcers fail to heal within 6 months in established specialised ulcer clinics,²⁶ hence the importance of prevention.

Role of Gp in Management

Proficient in managing chronic diseases, family physicians can work to address this situation. In the Netherlands over 75% of all patients with type 2 diabetes mellitus are being treated by a diabetes team in general practice,²⁷ while in the United Kingdom over 90% of family doctors provide diabetes care. In the latter setting, strategies in primary care for reducing diabetes related amputations include screening for the foot at-risk, extra review and education for those at risk, and prompt referral to a multidisciplinary foot care team should complications occur.²⁸

Despite the available literature, much remains to be done to improve foot care in Malta. In over 140 publications related to Diabetes in Malta, only one article discussed diabetic foot problems,²⁹ a situation that only improved recently by the publication of an additional article.³⁰ An audit of type 2 diabetes care at Health Centres failed to include foot care as one of the studied parameters.³¹ This situation persists in spite of the fact that the tragic consequences of amputations in Maltese Diabetic patients are well known. In an unpublished study conducted at St Luke's Hospital, 30% of diabetics undergoing amputations were found to die within the first two months of operation, only 50 % surviving after one year.³² The foreseeable impact on loss of income to families, hospital expenses and loss of life remains unquantified and unaddressed. That there is significant scope for progress in this area is revealed by an audit carried out amongst 28 Maltese doctors from the private and public sector participating on the ICGP Distance Learning

Certificate in Diabetes. Here only 196 (36%) of the 540 patients had their foot examined. Calculated relative to the number of appointments, an average of 0.6 foot examinations per patient were carried out, which together with a 0.49 BMI calculation per patient constituted the worse results of the variables studied.³³ These results are worrying because in the same study 4.4% were recorded as having one or more foot ulcers, 3.14 times the rate recorded in a similar audit carried out in Ireland.³⁴

Interventions need to be evidence-based and in line with international standards. The NICE guidelines on the management and prevention of foot problems in NIDDM³⁵ satisfy these condition by detailing care of the feet (pulses, sensation) and other (smoke, social deprivation) factors that are related and important, also promoting management and education according to assessment of foot risk. A holistic approach needs to be implemented in adopting such guidelines as physicians should also strive to improve function and co-morbidities such as sleep disorders, anxiety, and depression,^{36,37} the latter also associated with increased mortality.³⁸

Audit Objectives

In line with the above, an audit was performed at the Paola Health Centre Diabetes Clinic to document parameters relevant to the practice of foot care, identify factors that influence its provision and consequently intervene by implementing measures aimed at improving such care.

Method

An audit on diabetic foot care was carried out on clients scheduled to attend the Diabetes Clinic at this Centre during the period 1 March 2008 and 18 April 2008. A total of 397 persons (representing around 25% of the 1556 patients scheduled for appointment in the first six months of the year) were included in the audit. Considering that patients often receive a twice yearly appointment, this percentage approximates the proportion of total patients seen at the relevant clinic. Audit criteria as identified in the NICE guidelines together with others obtained from several clinics related to diabetic foot care were adapted to the local situation and criteria were defined relating to deformity, pulses, foot condition, vibration, risk assessment, referral to podologist, and education provision.³⁹

Results and Interventions

First Cycle

The audit population was found to have more males (211, 53.15%) than females (186, 46.85%). Except for 10 patients, all patients were above 51 years of age, the majority (70.28%) in the 61-80 age group. In cases where the relevant data entry existed, it was found that only 19 (4.79%) were on insulin, 265 (66.75%) were on oral hypoglycaemic agents while 113 (28.46%) managed by diet alone. This picture is explained by the fact that the Diabetes Clinic at Mater Dei Hospital usually continues to manage insulin dependent diabetic patients and those below 35

years of age. Only 11 patients (2.77%) enrolled in the first audit cycle had their feet examined. Of these 7 were described as having a good general condition in their feet, a further patient recorded as having dry skin. Six were recorded as having sensation to touch but no record to vibration was recorded. All 11 patients had their pulses recorded; in ten they were described as good while in one patient they were noted as 'weak'. While four patients were referred to a podologist there was no record of any educational advice given. Four were noted to have foot deformity while no deformity was recorded for a further four. Interestingly, one was recorded as having long nails, one had varicose veins and another had an ankle ulcer.

Interventions

When reviewed it was immediately evident that foot examination in the said clinic left much to be desired. Furthermore in cases where feet were examined there was no indication of any foot assessment being done; recorded details were independent of recommendations given in international guidelines. Even from this limited data it emerged that problems were present and that urgent intervention was necessary to implement effective and appropriate diabetic foot care in this clinic. A specially designed single page form was designed for collecting and recording audit data, but also included other parameters that retain it useful in case of future studies. The decision to issue a new form was taken as none of the available diabetic record sheets available at the health centres allowed an appropriate recording of all the criteria identified above and none allowed for risk assessment. Doctors were personally informed that an audit was in place and encouraged to participate. The second audit cycle was launched soon after the MCFD accredited seminar 'Saving the Diabetic Foot' to help boost participation. A purposely made note attached to the notice board of the Diabetes Clinic served as a reminder to all that an audit was in process. After the implementation of the proposed measures was considered complete (end of June 2008), the files of the patients included in the first cycle audit were located and the date of first appointment identified. Review of the files was made on the latter date until the end of December 2008.

Results in Second Audit Cycle

The results of the second audit cycle were as shown in Table 1. Seven patients (1.76%) died between the first and second audit cycle with a mean age at death (72.42 years) that was slightly lower than the life expectancy in the general population.⁴⁰ Ten patients (2.52%) had their appointment scheduled for 2009. Forty three patients (10.83%) did not make an appointment by the end of June 2008. A further three made an appointment with other government diabetic departments. Grouped together these 63 patients (15.87%) were unable to have a scheduled second diabetic review at Paola Health Centre for the purposes of this audit. This left 334 patients (84.13%) with a scheduled appointment after the first audit cycle. Seven patients (1.76%) did not turn up. As to the remaining patients, 105 (26.45%) had

a record of a foot examination done while 222 (55.92%) had no note done of any foot examination. Viewed differently, the physician carried out a foot examination on 105 out of the 327 patients attending, or roughly 32%. In view of the lack of local studies available on diabetic foot care, the results of the foot examinations carried out and interventions as outlined in the audit criteria are being illustrated in Tables 3 and 4.

Discussion

This audit has revealed that by appropriately intervening, quality foot care at a diabetic clinic can be improved. The number of examinations recorded to have been performed on attending

diabetic patients at Paola Health Centre is now comparable with other primary care settings both locally and abroad, but more remains to be done to provide optimal care for everyone.⁴¹ The relevance and importance of this audit lies in the fact that such examinations are being carried out mainly in a diabetic population which has an age group that coincides with that undergoing the largest number of lower limb amputations in Malta.⁴² The magnitude of correctable or manageable risk factors identified within the local diabetic community necessitates a continuous commitment to improve care to such patients. While this study focuses on a single primary care setting the insights gained from this audit can easily be extrapolated to

Table 1: Outcome of patients during second audit cycle

Patients unable to attend second audit cycle at Paola Health Centre Diabetes Clinic	
Died between 1 st and 2 nd Audit cycle	7
Scheduled for appointment in 2009	10
Scheduled for appointment at another Health Centre	1
Scheduled for appointment at Mater Dei Hospital Diabetes Clinic	2
Patients without appointment by end of June 2008	43
Patients able to attend second audit cycle at Paola Health Centre Diabetes Clinic	
Patient did not attend	7
Note included of foot examination	105
No note was included of foot examination	222

Table 2: Patients identified with foot problems

Foot Problem	Number with problem identified
Foot Deformity	30 (29%)
Pulses	12 (11%)
Skin	27 (26%)
Vibration	19 (18%)

Table 3: Patients with risk factors and management plan adopted

(* These numbers indicate that the related management decision was in some cases adopted independent of foot assessment)

Number of Risk Factors	Number with problem Identified	Number referred to podologist	Number with education given
0	47	55*	69*
1	37	8	11
2	13	4	6
3	7	6	6
4	1	1	1
	Total =105	Total=74	Total=93

other practices. The only way forward is through ensuring that each patient receives a quality assessment of his/her feet at least once a year. By not examining or recording finds, in the above audit the medical profession has emerged as the main limiting factor in the attainment of this goal. Reasons for this situation remain to be determined and studies are needed to evaluate the roles of motivation and physician training within this scenario. Personnel involvement in the audit, degree of practice teamwork, team development of systematic plans to implement change and having a positive attitude to the need to re-audit are all factors that are known to influence audit outcome.⁴³ In a group practice such as in existence at the Health Centre these changes may be obtained by setting up a diabetic team that is self-directed to achieve positive outcomes and implement strategies for improvement. The development, publication and dissemination of clinical practice guidelines, conduction of training courses, and introduction of a monitoring and evaluation system is an alternative approach that has already contributed to major advances elsewhere.⁴⁴

In a Centre where the medical staff is also required to attend acute cases related to general practice, the minimum time to ensure an appropriate diabetic visit needs to be established and protected. As local studies have revealed that nurse filled parameters are better recorded⁴⁵ one may also consider transferring the recording of foot parameters to nurses.⁴⁶ Involvement of other staff (such as podologists) and use of shorter recording template may also be beneficial. Even here, the impact of allotting the necessary human resources to such work emerges as a separate complicating issue.

Administrative interventions will hopefully address the lack of foot assessment being carried out in most of the remaining cases, as logistic support is known to improve care processes.⁴⁷ A national register of diabetics that informs patient management through established guidelines and which allows for recall of defaulters should go a long way to address this problem. An area-wide, computerised diabetes register incorporating a full structured recall and individualised patient management system has already been shown to yield beneficial results.⁴⁸ However, as defaulters may have fewer complications than regular attendees and exhibit a wide range of attitudes to their condition, a specific exercise needs to be implemented

as success in attracting back these potential clients is known to be unlikely without major effort.⁴⁹

Evidence based plans should be studied and adopted to streamline the channelling of patients to different members of the interdisciplinary team to bring about improvement in care associated with the latter. Duplication of work may thus be minimised allowing for appointment to be phased at reasonable intervals. The reasons for the number of patients without appointment several weeks after the first audit cycle may be many, but certainly require further study even if clients are known to make appointments at later dates. Inviting patients to submit their views to improve their visit to the diabetes clinic may address this reality. With patients often requiring several other appointments (such as for blood investigations, review by ophthalmologist and podologist) necessary for a complete diabetic review, factors that may benefit the appointment making process should be identified and improved.

Beyond auditing considerations, the results obtained in this audit have highlighted that a considerable number of diabetic patients have an increased risk of foot problems comparable to the picture found in studies elsewhere.^{50,51} In itself this should be a significant driving force to implement the necessary changes and organise further studies and audits to assess level of care. In concluding this analysis, one must not lose sight that the NICE guidelines had to be adapted to facilities available locally. The setting up of a Foot Care Protection Clinic reserved for patients in Primary Care remains desirable to provide for regular follow-up in non-urgent cases. An agreed management plan that delivers appropriate patient education remains an important criterion in the NICE guidelines. Thus there is urgent need to introduce education programmes in the near future, as has been highlighted by a recent local study.⁵² Brief, individualized educational interventions are known to improve patients' foot care knowledge⁵³ but need to be repeated to increase efficacy.^{54,55}

Conclusions

Foot care is an important aspect of management in the diabetic patient which needs to be developed and adopted further in Malta. Primary care promises to contribute to this field, this audit revealing that changes can be obtained by appropriate interventions. The contribution of every stakeholder is needed as much remains to be done to give to patients the care they deserve.

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