The future

The rise in the incidence and prevalence of diabetes in the Caribbean has been paralleled by the epidemic of obesity. The projections for the coming decades are not encouraging. Already, diabetes, obesity and acanthosis nigricans are increasingly being recognised among younger individuals. With earlier onset of metabolic syndrome, one would anticipate earlier onset of complications. The implications for the economics of the Caribbean and for health sector planning, in particular, are worrying indeed.

Increased awareness, improved diagnosis, screening of high-risk individuals and groups, and strategies aimed at prevention of obesity are all crucial. At the same time, there is a need to address the huge gaps in the availability of care, as well as the quality of the care itself.[10] We must face up to a situation which involves increasing disease burden, scarce resources, inadequate services, and poor attention to the quality of care. Cost-effective systems are required that are specific to Caribbean needs.

Recent elucidation of the pivotal influence of the in-utero environment in programming future cardiovascular risk offers a strategic leverage point for intervention.[11] Close attention to maternal health, ensuring a healthy fetal environment, could positively influence the next generation!

By predicting the future, we have the power to alter it. It is not too late to stem the tide.

Table 1 Estimated diabetes prevalence in 20–79 age group

	Prevalence (%)
Dominica, Commonwealth of* (65 age group)	15.0
Trinidad and Tobago (35–69 age group)	14.2
Barbados	13.2
Aruba*	12.1
Bermuda*	12.1
British Virgin Islands*	12.1
Cayman Islands*	12.1
Grenada*	12.1
St Kitts and Nevis*	12.1
Netherlands Antilles	10.2
Puerto Rico	9.0
Cuba	8.6
Bahamas	8.4
Jamaica	8.0
Dominican Republic	5.2
Haiti	4.8
Suriname	4.2
Belize	3.7
Guyana	3.0

* = crude value
Source: International Diabetes Federation (2001)

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The diabetic foot: a Caribbean perspective

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Foot ulceration, infection, and Charcot neuropathic osteoarthropathy are three serious complications of diabetes mellitus that can too frequently lead to gangrene and lower limb amputation. Consequently, foot disorders are one of the leading causes of hospitalisation for persons with diabetes, accounting for expenditures of the order of millions of dollars in direct and indirect costs annually in the Caribbean.

Although not all foot complications are preventable, dramatic reductions in frequency could be achieved through the implementation of a multidisciplinary team approach to individual patient management, in conjunction with public health measures aimed at screening for feet at risk.[1]

Scale and scope

The WHO definition of the diabetic foot includes criteria such as infection, ulceration and/or destruction of deep tissues associated with neurological abnormalities, and various degrees of peripheral vascular disease in the lower limb. It is one of the most serious and common complications of diabetes. More than 50% of all non-traumatic amputations are performed on patients with diabetes. Diabetics with foot problems account for a large proportion of the patients seen and those admitted to surgical wards.

A study done in Barbados[2] found that diabetics with foot problems accounted for 80% and 50% respectively of patients in the female and male general surgical wards. Many patients in this study ended up with major amputations for potentially preventable problems. The Barbados study also revealed that many patients presented at a relatively young age and had developed complications after relatively trivial trauma. The implication was that individuals frequently underestimated the seriousness of diabetic foot sepsis. Patients often did not seek primary care before their hospital admission, and hospital admission with foot sepsis was the first point of contact with the healthcare team. Many had never received any form of education on foot care.

In an unpublished study by Naraynsingh et al, the rate of major amputation has been shown to be quite alarming. An analysis of 187 consecutive major amputations observed over a 2-year period at the General Hospital, Port-of-Spain showed 56% were due to pure diabetic foot sepsis, 24% to a mixture of diabetic foot sepsis and peripheral vascular disease, and 13% to pure peripheral vascular disease.

This illustrates that foot sepsis and ischaemia are responsible for the vast majority of major amputations in Trinidad, and possibly in the Caribbean as a whole. This is in contrast to other regions such as North America and Europe, where the major cause is peripheral vascular disease, and Africa, where malignancies and trauma are the leading causes.

Predisposing factors

Diabetes is an important risk factor for atherosclerosis and the diabetic foot is characterised by the association of arteriopathy and neuropathy.

The treatment of serious tissue defects on the diabetic foot is complicated and tedious because of a combination of pathogenic mechanisms that adversely influence healing. Diabetic neuropathies (sensory, motor and autonomic), ischaemia, microangiopathy, and decreased resistance to infection contribute in varying degrees to ulceration and poor wound healing.

Diabetes mellitus is the major medical cause of amputation. The risk of amputation is 15-fold higher in diabetic subjects; five out of six amputees are diabetic. There are three types of clinical presentations of the diabetic foot – neurological, infectious and ischaemic. In clinical practice, these three forms are often intertwined but the most frequent clinical sequence of events is: neuropathy → unsuspected trauma and ulceration → infection and Ischaemia → amputation. The ischaemic component of the diabetic foot is only recognised when ankle pulses are missing, and when non-invasive vascular assessment confirms stenosis or occlusion of the main arterial trunks of the legs. Many also fail to recognise the possibility of distal diabetic arteritis. This is present in about 15% of all diabetic patients without trophic changes, and in 35% of those with trophic changes. This foot arteritis is closely related to neuropathy.[3]

In a recent study from Jamaica,[4] clinical neurological studies, blood pressure measurements, and haematological investigations were performed on a random sample of 44 patients, at the diabetes out-patient clinic of the University Hospital of the West Indies, to examine some of the proximate factors that predispose to the development of the diabetic foot.

The study revealed that 86% of the patients had elevated glycosylated haemoglobin (Hb>9.0%), 82% had clinical signs of peripheral sensory neuropathy, and 29% had signs of autonomic neuropathy in addition to peripheral sensory neuropathy. Sixty-one per cent (61%) of the patients had ankle/brachial systolic blood pressure ratio less than 1.0 and were diagnosed as having peripheral vascular disease (PVD). [4]

General recommendations

According to international consensus, the diabetic foot syndrome should be organised at the management of level of general practitioners, as well as at the level of special diabetological centres. The basic organisational unit of multidisciplinary team care of patients with the diabetic foot syndrome is the 'foot clinic'.[5]

Comprehensive prevention and therapy of the diabetic foot provided by a podiatric team may reduce the number of amputations significantly and may substantially decrease the cost of long-lasting therapy. Foot-care management should be organised with the general practitioner and podiatric nurse as the first contact. Specialised foot centres – comprising a diabetologist, podiatric nurse, radiologist, general, orthopaedic and vascular surgeons, an orthopaedic technician, and a physiotherapist – could serve as secondary and tertiary supra-regional centres. Such a model has proven value but would require political initiative and national economic support.

The podiatric team should have the following responsibilities:

- to inform the public
- to identify patients at high risk
- to monitor and treat patients.

In this way, a vertically integrated, continuous line of management would be achieved.

Specific treatment

The first principles of treatment are to establish and maintain control of blood glucose, hypercholesterolaemia and hypertension; the ultimate causes of the problem. Pain relief and infection are simultaneously treated with the restoration of pulsatile blood flow. In the case of ischaemia, angiography must be undertaken in order to plan the revascularisation. The treatment options of angioplasty, with or without stenting and by-pass surgery, add costly but demonstrable value. Distal reconstructions with anastomosis to the leg or pedal arteries provide satisfactory limb-salvage rates. This aggressive and systematic approach to the diabetic foot is economically sound, allows hope for limb salvage, and improves the quality of life.

Continuous learning and local research

The Caribbean region is gaining the dubious image of being the amputation Mecca of the world with Barbados the 'capital'.[2] Confronted with a unique problem, there is an opportunity to develop new solutions. We have, for example, discovered that slippers – a common and popular choice of footwear in the Caribbean – may reveal strong clues of a foot at risk. We have found that when a diabetic complains of, or admits to, the event of slippers having slipped off their feet, then this is a strong indicator of feet at risk. We hypothesise that such a 'slipping-slipper' syndrome may be serving as a marker of severe diabetic peripheral neuropathy. In unpublished data, we have made the observation that such feet are at high risk of sepsis.

Conclusion

Despite such tremendous advances in our understanding of the pathological processes in diabetes, and despite the major advances in therapeutic strategies, the diabetic foot remains a relatively ignored and poorly managed entity in the Caribbean.

Foot ulcers and sepsis in diabetic patients are common and frequently lead to lower limb amputation. A systems approach, involving a vertically integrated process of primary care at the community level in liaison with supraregional foot care centres, seems a necessary step in Caribbean medicine.

Please contact the Editor of *Caribbean Health* for the references to this article.