

Clinical Guidelines

A desktop guide to Type 2 diabetes mellitus

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Clinical guidelines have been defined as "systematically developed statements defined to help clinicians and patients make decisions, about appropriate health care for specific circumstances". The advocates of guidelines claim that they make clinical care more consistent, cost effective, and evidence based, and even view them as panacea for all health problems. Critics claim that they infringe upon and curtail clinical freedom, and distort allocation of resources.

In year 2000 the SLMA published the guidelines on management of diabetes mellitus in Sri Lanka, as a desktop guide. It would be reviewed 2-3 yearly or when new evidence is available. This desktop guide is built on currently available evidence from research. Our attempt was to provide guidelines in a more direct, simple, accessible format, that is flexible to stakeholder preferences. The aim of these guidelines is to enable identification of the key decisions, and their consequences as a key component. The guidelines are therefore outcome based and outcome justified. The guideline development group reviewed the benefits, risks, and costs, of alternative decisions.

The greater emphasis on arterial risk factor management rather than just good blood glucose control is given particular prominence.

These guidelines could be adapted for local use depending on the availability of resources, but any such adaptation should be evidence based. This flexibility however leaves no room for complacency in practice. Further this format (desktop guide in didactic style) intended for use by clinicians could also be used for

training of the diabetes care team, and education of patients with diabetes and their families.

Evidence

In order to maintain clarity, accessibility, and usefulness, this desktop guide is didactic in approach. However a source document which would follow this publication will reference the evidence and strength of recommendations given here.

Goals in Diabetes care:

The aim of these guidelines is to enable people with diabetes to have a life of normal length and fulfillment through:

- Promote self-care.
- Relieve the patient's symptoms.
- Improve the quality of the patient's life.
- Prevent and treat acute and long-term complications.
- Treat accompanying disorders.
- Decrease hospitalization for treatment and management of Diabetes.
- Reduce mortality and morbidity associated with Diabetes.

A way forward

In 1998-1999 the National Diabetes Committee worked on the draft guidelines, which were developed by scrutinizing the evidence base available at that time. The multidisciplinary group consisted of board certified consultant physicians and nominees of the relevant professional colleges. The members had a positive attitude towards guidelines in general, were expe-

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rienced in management of patients with diabetes, and had diabetes as their special interest. Many had published locally and internationally.

1. DIAGNOSIS OF DIABETES MELLITUS:

- These symptoms may / may not be present - polydipsia, polyuria, polyphagia, weight loss, unexplained fatigue, blurred vision.
- Random / Fasting glucose concentration, above the cut off levels at least on two occasions.
- Results of finger prick capillary blood samples measured by portable glucose meters should not be used for the diagnosis of Diabetes.

2. INITIAL ASSESSMENT:

The initial assessment may be done over several clinic visits, using APPENDIX 1.

- Detailed medical history
- Complete physical examination.
- Laboratory investigations

3. FOLLOW UP VISITS:

- Frequency of visits to be determined as necessary but regularly. More frequent visits may be required for patients whose diabetic state is not well controlled.
- At the follow up visits the following should be done – check weight, B.P., blood glucose levels, examination of feet.
- Glycated haemoglobin should be done every 3-6 months. It should not be done monthly.
- Screening for long term complications – at least annually, more frequently as required if symptoms develop. This includes cardiovascular diseases, retinopathy, neuropathy, nephropathy, foot examination, funduscopy, lipid profile, renal function, including proteinuria, ECG, chest X-ray if indicated.
- Patients should be referred to a specialist if poor metabolic control despite concerted efforts to control.
- when there is evidence of long term complications like coronary heart disease, retinopathy, neuropathy, nephropathy, foot problems, or refractory hypertension.

- All patients with Type 1 Diabetes should be referred to a specialist for initial control and management.
- Women with pre-gestational diabetes should be referred to a specialist for control of Diabetes before conception and pregnancy counseling.
- Women with gestational Diabetes should be referred to a specialist from the beginning of pregnancy, for early monitoring of the foetus and control of maternal Diabetes.

4. MANAGEMENT:

1. Targets for control:

1. Blood glucose control assessment levels

	Low risk	Arterial risk	Microvascular risk
HbA1c %	≤ 6.5	> 6.5	>7.5
Venous plasma Glucose (mg/dl)	<110	≤ 110	>125

- Use these assessment levels to indicate the need for further intervention as the basis for short term and long term individualization of targets. Failure to attempt to reach agreed targets would amount to inadequate care.
- Individual targets should be set by taking into account age and quality of life. Glycosylated haemoglobin should be measured at 3-4 month intervals. The levels are categorized according to the risks of developing vascular complications. The risk threshold for arterial disease is lower than that for microvascular disease.
- Urine glucose is not as reliable as blood glucose to assess risk of arterial and microvascular complications. In areas of the county where facilities for blood glucose control is not available the following levels should be used.

	Good	Borderline	Poor
Urine Glucose %	0	≤ 0.5	> 0.5

2. Blood pressure control assessment levels

Low risk	
Blood Pressure	<140/85

3. Blood lipid content assessment levels

	Low risk	At risk	High risk
Total cholesterol (mg/dl)	<185	185 - 230	> 230
LDL - cholesterol (mg/dl)	<115	116 - 155	> 155
HDL - cholesterol (mg/dl)	> 46	39 - 46	< 39
Fasting triglycerides (mg/dl)	<150	151 - 200	> 200

- The lipid profile should be done annually and if the value indicates arterial risk should be done 3-6 monthly. Blood pressure should be checked at each consultation.

4. BMI assessment levels

Good		
Body Mass Index (Kg/m ²)	Males	< 27
	Females	< 25

5. Smoking target

Stop or reduce to as low as possible.

Identify smoking habits

- At diagnosis / referral and Annual review

Emphasize importance:

- At diagnosis and if critical events occur;
- At every appropriate opportunity.

Provide information on:

- Health risks and benefits of stopping / reducing;
- Techniques for reducing tobacco consumption;
- Use of pharmacological substitutes;
- Formal smoking cessation programmes.

2. Reference range for HbA1c varies depending on the laboratory method.

Normal range for HbA1c by HPLC method is 6.5-8.5%.

- For patients with diabetic nephropathy, the optimal B.P. should be 130/80 -135/85 mmHg.
- More liberal guidelines for elderly. Aim for acceptable target for elderly.
- Targets for control have to be defined for each patient. Physicians should involve patients and families when setting optimal targets for metabolic control.

Normal control - difficult
 Good control - should be the goal for the majority
 Acceptable control - may be for elderly

- Patients on insulin should preferably be seen by a DHC team for proper instructions on the use of insulin, meal plans, exercise and SMBG.
- Every patient should have a documented health Care Plan, which includes input regarding diagnosis, presence of complications of diabetes and management strategies from the family physician, all specialists involved in the care of the patient, and the patient himself. This document, preferably of standard format should be retained by the patient.

5. EDUCATION:

- The primary means by which the treatment strategy of diet, physical activity and medication are successfully implemented.
- The aim is to facilitate all the goals of diabetes care that have been identified.
- In educating a patient imparting knowledge, positive attitudes and skills are important for the educational process to be beneficial.
- The educational process should be pitched at a level that the patient understands since educational level of patients differs.
- It is necessary to impart information to other members of the patient's family about the patient's treatment.

6. KNOWLEDGE:

- The patient should know as much as possible about the disease.
- The minimum knowledge should include – what is diabetes, hyperglycaemia should be stressed as opposed to glycosuria as the local terms of diabetes imply glycosuria only. This gives the patients the wrong concepts of diabetes.
- The following should be emphasized –
 - that there is no cure for Diabetes at the moment and the emphasis is on use of registered medications only for the management.
 - a list of registered drugs that could be used is available
 - the importance of combining diet, physical activity and medication to achieve normal blood glucose level.
 - the overriding importance of weight reduction for the overweight, in achieving control with or without medications.
 - reasons for use of medication and its proper administration
 - the acute complications of DLA
 - the long term complications of retinopathy, nephropathy, neuropathy and microangiopathy.
 - the important risk factors like smoking, excessive alcohol consumption, hypertension and hyperlipidaemia.
 - the need to continue medications during sick days since if not done, it is probable that DKA could occur.
 - special situations-travelling overseas:
 - pregnancy :
 - recognition of hypoglycaemia:

7. ATTITUDES:

- Counseling is of utmost importance, in motivating to change unhealthy lifestyles.
- Need to change negative attitudes and reinforce positive ones to change unhealthy lifestyles.
- It is necessary to warn against the dire consequences of poor metabolic control, but it is prudent to emphasize the hope that life can still be

enjoyed despite Diabetes, with some effort put in by the individuals.

- If knowledge and skills are imparted in a concerned rather than in a derogatory manner by the health care giver, the chance of success in inculcating a positive attitude of participation and self-help is higher.
- The health care provider must therefore be prepared to spend time with the patient and his family. This is where a Diabetes Education Center can facilitate the education of a patient with Diabetes. Where appropriate, the assistance of the medical social worker should be sought.

8. DIABETES HEALTH CARE TEAM:

- Comprise the doctor, diabetes nurse educator, and the dietitian, with ready access to an endocrinologist, ophthalmologist, cardiologist, obstetrician, podiatrist, pharmacist and a medical social worker.

9. METHODS OF EDUCATION:

- One to one discussion / counseling / demonstration.
- Group discussions / talks / demonstration with emphasis on patient participation.
- Distribution of health education material – reading material (brochures, books, diet sheets). Video clips.
- Settings – diabetes camps support group meetings.

10. MEAL PLANNING:

- Dietary modification for a patient can only be achieved with the participation of the patient and his family.
- Planning for diabetic meals should be individualized.
- The dietary management plan must be realistic and relevant to suit the patient's age physiological state, cultural and ethnic practices and dietary habits.
- In addition to handing out appropriate nutritional education materials, doctors should individualize advice to the patient.

- In case of those with special problems (i.e. grossly obese) the dietitian should be involved in assessment of current eating habits, and development and teaching of an appropriate meal plan.
- Special attention should be paid to the patient's dietary requirements during periods of sickness, travel and exercise.
- The various bodies with the management of diabetes should work together to reach a common understanding on the approach to dietary management. Other members of the DHC team should reinforce dietary strategies with the patient.

11. NUTRITIONAL NEEDS:

- The diet should include a variety of foods, having some food from each of the basic food groups daily.
- Energy intake should be appropriate to achieve and maintain desirable body weight.
- For obese individuals a gradual dietary reduction of 300-500 kcals per day, while increasing physical activity is recommended.
- Carbohydrates should provide 60.0% of calories in diet and should be in the form of non-refined and high-fibre foods.
- Protein should provide 20.0% of energy content. The protein intake may need to be reduced in renal disease.
- Total fat should be restricted to 20.0% of calories.
- Saturated fat 10.0%. Cholesterol <300mg/day.
- Sodium intake should be restricted for individuals prone to or having hypertension.
- Alcohol is not recommended for Diabetics.
- The use of alternative sweeteners is acceptable but not encouraged.
- The total daily food intake should be distributed throughout the day, with at least three regular meals.
- For patients on insulin a bedtime snack and possibly one of more between meal snacks should be included.
- The timing and amount of food should be consistent from day to day.

12. TEACHING OF MEAL PLANS:

- It is recommended that the concept of healthy eating be used in teaching the diabetic diet.
- Instructions should be given on the contribution to the diet of the following types of food:-
 - starchy food (cereals, pulses)
 - meat and meat alternatives
 - milk and milk alternatives
 - fruits
 - vegetables
 - fat
- Exchange lists may be used as a tool by the dietitian in formulating the individual's diet. The extent to which these are taught to the patient will depend on the individual's age and the educational background. List of alternatives annexed.

14. EXERCISE:

- Exercise is essential for achieving metabolic control in patients with diabetes.
- An exercise programme should be drawn up for each individual patient to suit his age, aptitude, fitness and exercise.
- Excessive exercise carried out without the necessary precautions can have potential adverse effects to the cardiovascular and musculo skeletal system.
- Exercise could exacerbate existing complications of diabetes such as microvascular disease, such as retinal hemorrhage and increased proteinuria.
- It is thus essential that a pre-exercise be recommended to the patient with Diabetes. This would include a full medical history and examination to exclude macrovascular, microvascular and neurological complications. Advice from relevant specialists may be necessary.
- For those over 40 years of age and / or with high risk of coronary disease intending to do more than mild, low-intending exercises such as walking (i.e. activities which result in heart rates exceeding 60-70.0% maximum heart rate), exercise stress ECGs may be indicated.

- The "FITT" formula guidelines for exercise –
F – Frequency: 3-5 days / week. (even daily if low intensity)

I – Intensity: till the patient feels warm or sweats and breathes deeply. (60-85% of maximum heart rate)

T – Time: 20-60 minutes each time, fairly constantly.

T – Type: Aerobic exercises like walking, jogging, swimming, cycling, and ball and racket games, combined with calisthenic exercises.

- For those who are unfit or who have not been active for sometime, low intensity activities like walking should be started first for at least 4-6 weeks, initially for 10-15 minutes, gradually building up the duration up to 60 minutes.
- Precautions to be taken by all patients with diabetes when they exercise are tabled in appendix.

15. SELF-MONITORING OF BLOOD GLUCOSE (SMBG):

- Blood glucose monitoring is the recommended method for monitoring diabetes control.
- SMBG is an important integral part of self-care.
- Clinicians should encourage the practice of SMBG by their patients.
- Information of SMBG forms the basis and determines the efficacy of the treatment.
- SMBG is indicated in –
 - patients on intensive insulin treatment
 - patients with unstable diabetes – patients with tendency towards recurrent hypoglycaemia or hyperglycaemia, acute illness or other emergency situations.
 - pregnancies complicated by diabetes
 - patients with altered renal threshold for glucose
 - patients with colour blindness
 - children, disabled or elderly persons in whom urine samples may be difficult to obtain
 - In patients with type 2 diabetes not on insulin treatment, SMBG may be useful in optimizing control.
- Frequency of SMBG –
 - for insulin treated patients: 1-2 days / week, before each meal and at bedtime and occasionally a test at 3 a.m.

– for non insulin treated patients: weekly or fortnightly, before each meal and at bedtime.

Frequency of monitoring will depend on the types of treatment, stability of control, patient's preference and financial constraints. Frequency of tests need to be increased during changes in daily routine, alterations of insulin regimens, inter current illness, and patient on intensive treatment.

16. METHODS OF SMBG:

- SMBG can be performed using a glucose meter or by the visual method.
- The visual method is more economical, compared to glucose meters, it is at best semi-quantitative and operator dependant. It is not suitable for persons with defective visual acuity or colour vision.
- The accuracy of SMBG devices is highly operator-dependant.
- Strict and meticulous adherence to manufacturer's instructions is mandatory.
- Other sources of error include defective or deteriorated test strips, and instrument failure.
- SMBG may be unreliable in hypoglycaemia (<2 mmol/l or 36 mg/dl) and severe hyperglycaemia ranges (>20 mmol/l or 360 mg/dl). Caution should be exercised in interpreting values in these ranges.
- Quality assurance is ensured by
 - Training of users
 - verification of users' performance
- Initial training should be done by qualified staff. Self-education by reading the manufacture's instructions is inadequate.
- The effect of training has to be verified by checking patient's technique not only during the training session, but at periodic reviews, as performance can deteriorate with time.
- Ideally patients' performance using their own SMBG systems should be compared with simultaneous laboratory estimations. Calibration checks of meters should also be conducted with standard solutions.
- Health care professionals should be familiar with current systems available and should also assess the patient's ability to use a particular SMBG system in order to assist them in making the best choice.

- Even though SMBG devices can be purchased directly by patients they should be bought with the advice and guidance of the attending physician or a member of the Diabetes Health Care team.
- Whenever the result of SMBG is of concern facilities should be available for DHC team to be contacted for advice.

17. SELF-MONITORING OF URINE GLUCOSE:

- Urine glucose testing is a useful method for self-monitoring in the patient with stable Type 2 Diabetes who is not on insulin treatment.
- Accuracy of urine glucose tests are influenced by high patient intra- and inter- variability of renal threshold for glucose.
- Urine glucose tests do not detect hypoglycaemia.

18. SELF-MONITORING OF URINE KETONES:

- Should be performed in patients with Type 1 Diabetes during acute illness to alert them about possible deterioration of control and development of DKA.
- Tests for urine ketones is recommended when blood glucose consistently exceeds 20 mmol/l (360 mg/dl).

19. BEDSIDE BLOOD GLUCOSE MONITORING IN HOSPITALS:

- There could be potential dangers in use of blood glucose meters for rapid bedside glucose determinations. This is because quality control is less well assured with decentralization, as it would involve a large number of users and machines.
- If it is to be used, should ensure that staff are properly trained and quality control schedules for maintenance of the equipment should be available.
- Values obtained by the meter exceeding 20 mmol/l (360 mg/dl) or lower than 4 mmol/l (70 mg/dl) in acutely ill patients or those with unstable blood glucose control should be validated by sending samples for simultaneous laboratory determination.

20. DRUG THERAPY: TYPE 2 DIABETES

- Diet, exercise and weight control are the mainstays of treatment for patients with Type 2 Diabetes.
- When these measures alone fail to control blood glucose, then Oral Hypoglycaemic Agents (OHA) may be added.
- OHA (e.g. sulphonylureas and biguanides) are usually used in a symptomatic patient after a trial of diet for 8-12 weeks has failed.
- Special care must be taken in the elderly not to precipitate hypoglycaemia.
- Treatment should be started with small doses and increased fortnightly until control is achieved.
- The choice of OHA depends on the individual patient.
- Sulphonylureas are effective in reducing blood sugar levels for NIDDM (Type 2) Diabetes with onset of disease after 40 years of age and duration of disease less than 5 years.
- Biguanides can control hyperglycaemia without causing weight gain and thus is an advantage for persons with diabetes who are overweight.
- OHA should be used with caution in patients with renal, liver and cardiac disease.
- Biguanides and sulphonylureas can be used in combination in a patient whose metabolic control is not acceptable with one medication. The two classes of drugs act through different cellular mechanisms and enhance the overall glucose lowering effect of each other. This combination therapy is used to delay or avoid insulin therapy when treatment with one OHA is deemed to have failed.
- Insulin should be used for patients with Type 2 Diabetes when blood glucose cannot be controlled with diet, exercise, weight control and OHA. This can occur early in the disease when treatment is being instituted (i.e. primary drug failure) or after some years when the patient can become refractory to sulphonylureas (secondary failure). It is also used in times of increased insulin requirements e.g. during episodes of infections, surgery, hyperglycaemic hyperosmolar non-ketotic state and during pregnancy. The choice of insulin type would depend on the patient and his diabetes status.

21. Retinopathy

21.1 Detection and surveillance

Patients with type 2 diabetes should be examined at first diagnosis of diabetes.

Patients with type 1 diabetes should have their ocular fundi examined not later than 5 years after diagnosis of diabetes.

Measure or assess yearly:

- Visual acuity
- Pupils must be dilated and the examination done in a darkened room
- Retinal photography is an acceptable alternative method

Reassess at shorter intervals of 3-6 months:

- Pregnant women with diabetes
- Nephropathy
- Long standing poorly controlled diabetes

21.2 Eye disease management

- If no retinopathy is detected subsequent review in 1 year

Refer to ophthalmologist if

- Retinopathy is detected

21.3 Treatment

- pan-retinal photocoagulation for proliferative diabetic retinopathy
- Focal laser photocoagulation in maculopathy
- Vitreo-retinal surgery for vitreous haemorrhage/traction or retinal detachment.
- All patients with diabetic retinopathy should be informed of their retinopathy. All persons with visual impairment should be registered with the Visually Handicapped.

Attend to the psychological and social aspects of visual impairment where it develops.

The primary management of diabetic eye disease is by careful attention to blood glucose control targets from the time of diagnosis.

22. Nephropathy

22.1 Detection and surveillance

- Family history of diabetic nephropathy, essential hypertension, history of poor metabolic control, history of prior renal disease and / or hypertension and history of retinopathy.
- Physical examination: blood pressure, assessment of peripheral vascular system, detailed examination of ocular fundi.
- Check for proteinuria at first visit and yearly.
- For patients with type 1 diabetes of over 5 years standing and for patients with type 2 diabetes at first diagnosis and who test negative for proteinuria, testing for microalbuminuria is recommended.
- Positive tests should be confirmed and quantitated by 24 hour excretion studies.
- Tests for microalbuminuria should be delayed until glycaemic control has been established for 3-4 weeks and is invalid in patients urinary tract infection or overt cardiac failure.

Estimation of endogenous creatinine clearance performed on an accurately obtained 24 hour urine collection should be done in:

- Patients with identified high risk of diabetic nephropathy
- Patients with persistent microalbuminuria
- Patients with proteinuria

For patients who initially test negative for proteinuria, urinalysis should be repeated annually.

For patients identified to be at high risk of nephropathy and who test negative for proteinuria, detection of persistent microalbuminuria indicates the likely presence of incipient nephropathy.

22.2 Management

- Every patient diagnosed as having diabetic renal disease of whatever grade of severity should be informed of the diagnosis and of the implications to the future management and outcome.

- For patients with evidence of early and intermediate stage diabetic nephropathy, benefit may be expected from excellent metabolic control. For younger patients, "tight" glycaemic control is appropriate.
- Moderate reduction in dietary protein intake may also have a moderating effect on progression of the disease.
- Patients detected to have diabetic nephropathy at any stage and who have not had the benefit of recent ophthalmic examination should be examined for the presence of retinopathy and referred for specialist review if necessary.
- Those with diabetic nephropathy should be screened for retinopathy.

22.3 Indications for referral to a nephrologist

Not all patients with evidence of diabetic renal disease need immediate referral to the nephrology clinic. The following will require a prompt referral :

- Heavy proteinuria (>3g/day) and the nephrotic state or proteinuria associated with moderate to severe hypertension that is resistant to therapy. Where proteinuria is associated with haematuria or other abnormal sediment on microscopy, a specialist referral is indicated for exclusion or confirmation of a non-diabetic glomerulopathy.
- Hypertension of moderate or greater severity that proves resistant to general and pharmacological measures
- Impaired renal function of greater than moderate severity (serum creatinine level greater than 2.5 mg/ dL; 200 umol/L or creatinine clearance less than 30 ml per minute)
- Sudden deterioration in renal function
- The NDC recognizes that diabetes patients should have access to renal replacement therapy. The decision whether or not to provide renal replacement therapy for diabetic end stage kidney failure should be individualized for each patient. Where non-renal disease (e.g. macrovascular peripheral or cerebrovascular disease) is present which precludes any benefit to the patient from renal replacement therapy, the latter (renal replacement therapy) may not be indicated.

22.4 Management of hypertension

Diabetic nephropathy is commonly associated with hypertension. Control of hypertension is the single most important therapeutic strategy that has been shown to slow down or arrest the progression of nephropathy to end stage renal disease.

- The management of hypertension should first include the achievement of ideal weight, cessation of tobacco use, moderation of alcohol intake and the implementation of a program of regular aerobic exercise.
- In addition, the majority of patients with diabetic nephropathy and hypertension will require drug treatment. Care should be taken in the choice of antihypertensive agent to avoid drugs that may adversely affect metabolic control (thiazide diuretics; beta blocking agents) or that may exacerbate postural hypotension (methyldopa). Angiotensin converting enzyme (ACE) inhibitors have shown particular promise in hypertension in diabetic nephropathy.
- For younger patients; the target blood pressure should be set at the lowest readings which the patient can tolerate;
- for older patients more liberal criteria of control are appropriate.
- Calcium channel blockers though they reverse nephropathy have recently been shown to increase cardiovascular mortality.

23. Cardiovascular disease

Diabetes mellitus is a major risk factor for morbidity and mortality due to cardiovascular disease, in particular coronary, cerebrovascular, peripheral vascular and hypertensive disease. At least one-third of patients with cardiovascular disease have diabetes. Their cardiovascular mortality is higher than in those who do not have diabetes. About 55% of hospital admissions of diabetic patients are related to cardiovascular problems.

23.1 Screening and Early Detection

Multiple cardiovascular risk factors frequently cluster in individuals with diabetes. The risk of cardiovascular disease increases with the presence of the number of

these factors, and is further amplified by cigarette smoking. The benefits of risk factor screening and management in reducing the risk of cardiovascular disease are universally accepted. It is probably cost-effective and cost beneficial.

The recommendations for cardiovascular risk screening are as follows.

- Detailed documentation of the major risk factors both non-modifiable and modifiable and a history of cardiovascular disease
- Thorough physical examination including blood pressure recording. The criteria for normotension is to be taken as a systolic pressure < 120 and diastolic < 80 mmHg.

23.2 Management

- Risk factor management especially advice to stop smoking must be reinforced at every visit.
- Blood pressure to be monitored at every visit. Non pharmacological management should be advised prior to commencement of drug therapy.
- Regular basic laboratory and radiological investigations should be more frequently performed. (Section 2.3)
- Total cholesterol should be less than 4.8 mmol/L (< 185 mg/dL) and LDL cholesterol less than 3.0 mmol/L (< 115 mg/dL). (Refer targets for control). If dyslipidaemia exists, intervention in terms of dietary modification, weight reduction and exercise as well as frequent lipid profile estimation till normalization is reached. Drug therapy is used when indicated.
- Optimum weight is taken to be a Body Mass Index (BMI) 18-25 kg/m². Monthly weight monitoring should be done
- Referral to the appropriate specialist if the patient does not respond to treatment.

The NDC emphasizes the importance of patient and community education in the prevention, early detection and treatment of cardiovascular complications of diabetes.

24. Neuropathy

Neuropathy is common in all patients with diabe-

tes and may be detected soon after the onset of the disease. Neuropathy can affect the sensory, motor and autonomic nervous systems and can be disabling. At the initial visit, questions should be asked regarding symptoms related to the sensory (numbness, anaesthesia, incoordination. etc), motor (nocturnal muscle cramps, weakness etc) and autonomic (gastrointestinal and bladder symptoms, sexual dysfunction, postural lightheadedness) nervous systems. Signs related to the sensory (touch, pain and vibration sense impairment), motor (muscle weakness and wasting) and autonomic (postural hypotension) systems should be documented.

- The above history and physical examination should be done at least annually during follow-up visits. If the patient has neuropathy at the initial visit, its progress should be monitored.
- Referral to the specialist is indicated for patient with the following:
 - (1) Autonomic neuropathy which results in erectile impotence, gastroparesis, diarrhoea and neurogenic bladder.
 - (2) Neuropathic ulcers and joint destruction.

25. Foot problems

Loss of limb is a major contributor to morbidity in diabetes mellitus. On an average, between 20-30 "diabetic" limbs are amputated each day in Sri Lanka. This results from infection, neuropathy and peripheral vascular disease, made worse by poorly controlled diabetes and poor foot hygiene. Up to 50% of patients with diabetes and almost all those with diabetes for more than 20 years duration have neuropathy. The neuropathy leads to an insensitive foot which is prone to injury from trivial trauma. This in turn leads to ulceration, infection and gangrene; especially in the presence of vascular disease. The solution to this grave complication lies in prevention, as well as prompt and effective treatment of established complications.

25.1 Screening and Early Detection

Prevention of complications lies in an effective screening programme, to identify at-risk patients, and constant monitoring. To do this, a systematic screening programme has to be instituted with a proper protocol. Screening for the diabetic foot at risk should include a thorough medical history and physical examination.

25.2 Management

Education and foot hygiene for all diabetic patients is essential to ensure success of screening programme. Physicians dealing with diabetes mellitus must be well-versed in such a screening programme. Effective and prompt treatment of early complications can significantly salvage limbs. This demands a team approach to the problem involving medical and ancillary personnel.

The NDC recommends that more emphasis be placed on foot care and the suitability of footwear, the prevention of loss of limbs and the training of health care professionals in the prevention and management of foot problems.

Contributors:

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