LOTHIAN DIABETES NETWORK

A MANAGEMENT PROGRAMME FOR PRIMARY AND SECONDARY CARE

This Lothian handbook has been adapted from the Tayside Diabetes Handbook. The Tayside handbook was produced by representatives of Perth and Kinross LHCC, with representatives from the DARTS Steering group and two SIGN/SCPMDE Clinical Guideline Fellows. The Lothian version has been compiled by members of the Lothian Diabetes Services Advisory Group.

The guidelines in this document are advisory and are aimed at healthcare professionals use. They are not intended as rules and regulations for diabetes care. The management of a particular patient should be decided upon by the practitioner responsible in consultation with the patient and should reflect the circumstances and needs of the individual.

CONTENT **Page**

A MANAGEMENT PROGRAMME FOR PRIMARY AND SECONDARY CARE 1
MEMBERS OF LDSAG 6
HANDBOOK EDITORS 10
AIMS OF NETWORK 12
DIAGNOSIS OF DIABETES 14
MANAGEMENT OF NEWLY DIAGNOSED DIABETES 18
FOLLOW-UP OF PATIENTS WITH ESTABLISHED DIABETES 21
TREATMENT WITH ORAL HYPOGLYCAEMIC AGENTS 28
TREATMENT WITH INSULIN 33
MANAGEMENT OF INTERCURRENT ILLNESS 40
HYPOGLYCAEMIA 43
MICROVASCULAR AND MACROVASCULAR COMPLICATIONS OF DIABETES 45
SCREENING AND MANAGEMENT OF EYE COMPLICATIONS 46
SCREENING AND MANAGEMENT OF FOOT COMPLICATIONS 48
SCREENING AND MANAGEMENT OF KIDNEY COMPLICATIONS 53
SCREENING AND MANAGEMENT OF CARDIOVASCULAR RISK IN DIABETES 58
DIABETES AND DRIVING 63
DIABETES AND TRAVEL 66
DIABETES AND ADOLESCENCE .... **Error! Bookmark not defined.**
DIABETES AND MEN 71
EDUCATION AND ADVICE 74
MANAGEMENT OF DIABETIC KETOACIDOSIS 90
MANAGEMENT OF ACUTE HYPOGLYCAEMIA 95
MANAGEMENT OF DIABETIC HYPEROSMOLAR NON-KETOTIC SYNDROME – GUIDELINES 99
Appendix 1: Initial Dietary Advice 104
Appendix 2: Annual Diabetes Foot Assessment 107
Appendix 3: Measurement of Blood Pressure 108
Appendix 4: Sample Letter for Patients Travelling Abroad 109

INTRODUCTION

INTRODUCTION

Following the St Vincent declaration (1989) and the SIGN Guidelines for the care of diabetic patients in Scotland, the Lothian Diabetes Services Advisory Group believe that the health care of people with diabetes should include:

- yearly checks of eyes and vision, kidney function, feet and general well-being
- assessment of risk factors for heart disease such as blood pressure, cholesterol and smoking habits
- assistance with self monitoring and injection techniques
- eating and lifestyle advice.
- regular review of progress and treatment
- continuing education

EPIDEMIOLOGY

From the Lothian Diabetes Survey (2004) , we know that in Lothian at least 3.1% of the population or approximately 24,000 people have diabetes. Of these, 85% have type 2 diabetes and 15% have Type 1 diabetes.

Patients with diabetes display:

- a 2-4 fold risk of developing heart disease
- a 17 fold increase in risk of renal failure
- a 25 fold increase in the risk of blindness
- a 14 fold increase in risk of amputation
- a reduced life expectancy of between 8 and 10 years in those who develop type 2 diabetes between the ages of 40-50

MEMBERS OF LDSAG

TEAM MEMBERS OF THE Lothian Diabetes Services Advisory Group

Chairman

John McKnight, Consultant Physician, LUHT, Diabetes Unit, Western General Hospital
Tel 0131 537 3257 email john.mcknight@luht.scot.nhs.uk

Executive Committee

John McKnight, Consultant Physician, LUHT, Diabetes Unit, Western General Hospital
Tel 0131 537 3257 email john.mcknight@luht.scot.nhs.uk

Harden Carter, Consultant in Public Health Medicine — Deaconess House
Tel 0131 536 9409 email harden.carter@lhb.scot.nhs.uk

Paul Currie, Healthcare Planner, Lothian NHS Board — Deaconess House
Tel 0131 536 9321 email paul.currie@lhb.scot.nhs.uk

Ewan Crawford, Lead Clinician for Diabetes, LPCT — Murrayfield Medical Centre
Tel 0131 337 2166 email ewan.crawford@lothian.scot.nhs.uk

James McCallum — Bathgate PCC
Tel 01506 651 824 email james.mccallum@wlt.scot.nhs.uk

Mary Scott, Diabetes Network Manager — Western General Hospital
Tel 0131 537 3074 email mary.scott@lhb.scot.nhs.uk

Bonnie Crichton, Executive Assistant — Western General Hospital
Tel: 0131 537 3257 email bonnie.crichton@luht.scot.nhs.uk

Patient representatives

Ron Marsh, Chair Patient Representative Group email ron.marsh@btinternet.com

Gerry Shapiro, Vice Chair email c/o bonnie.crichton@luht.scot.nhs.uk

*Two other members of the patient representative group attend quarterly LDSAG meetings on a rotating basis.

Lead GPs

Ewan Crawford, Lead Clinician for Diabetes, LPCT — Murrayfield Medical Centre
Tel 0131 337 2166 email ewan.crawford@lothian.scot.nhs.uk

Penny Rother, Lead GP for diabetes, Midlothian LHCC — Bonnyrigg Health Centre
Tel 0131 536 8989 email penelop.rother@lothian.scot.nhs.uk

Liz Ross, Lead GP for diabetes NW LHCC — Ladywell Medical Centre
Tel 0131 334 5000 email liz.ross@lothian.scot.nhs.uk

John Lang, Lead GP for SW LHCC — Sighthill Health Centre

Tel 537 7160 email john.lang@lothian.scot.nhs.uk

James McCallum, Lead GP for West Lothian Bathgate PCC
Tel 01506 651824 email james.mccallum@wlt.scot.nhs.uk

Stephen Murray, Lead GP for SE LHCC Inchpark Surgery
Tel 0131 666 2121 email sdmurray@bigfoot.com

Ian Dickson, Lead GP for SC LHCC Springwell Medical Centre
Tel 0131 537 7500 email ian.dickson@lothian.scot.nhs.uk

Ninian Hewitt, Lead GP for NE LHCC Long House Surgery
Tel 0131 552 4919 email c/o chrishewitt@compuserve.com

Diana Holton, Lead GP for East Lothian Newton Port Surgery, Haddington
Tel 01620 825051 diana.holton@lothian.scot.nhs.uk

Hospital representatives

Ken Swa, Lead Clinician/Ophthalmologist Princess Alexandra Eye Pavilion
Tel 0131 536 1874 email ken.swa@luht.scot.nhs.uk

Louise Bath, Consultant Royal Hospital for Sick Children
Tel 0131 536 0611 email louise.bath@luht.scot.nhs.uk

Prof Brian Frier, Consultant Physician, LUHT, RIE, Diabetes Unit Royal Infirmary
Tel 0131 536 2070 email brian.frier@luht.scot.nhs.uk

James Walker, Consultant Physician St Johns Hospital
Tel 01506 419666 email james.walker@wlt.scot.nhs.uk

Multidisciplinary representatives

Liz Mackay Western General Hospital
Tel 0131 537 2542 email lizmacka@hotmail.com

Sue Welch, Practice Nurse 73 East Trinity Road
Tel 0131 552 4919 email suzanne.welch@lpct.scot.nhs

Lorna Jarrett, Podiatry Western General Hospital
Tel 0131 537 1297 email lorna.jarrett@hotmail.com

Pat Donald, Podiatry Lothian Primary Care Trust
Tel 0131 537 7463 email patricia.donald@lpct.scot.nhs.uk

Helen Griffiths, Chartered Clinical Psychologist St John's Hospital
Tel 01506 422769 email helen.griffiths@wlt.scot.nhs.uk

Carol Lumsden, Primary Care Pharmacist Edenhall Hospital
Tel 0131 536 8030 email carol.lumsden@lpct.scot.nhs.uk

Ken Galloway, General Manager, Medical Services St Johns Hospital
Tel 01506 419666 email ken.galloway@wlt.scot.nhs.uk

John Steyn, Clinical IM&T Advisor LPCT
IM&T, Royal Edinburgh Hospital
Tel 0131 537 45918
email john.steyn@lpct.scot.nhs.uk

Reita Early, Diabetes Education Facilitator
Murieston Medical Centre
Tel: 01506 464 137
email reita.early@wlt.scot.nhs.uk

Fiona Steven, Lead Dietitian
Royal Infirmary of Edinburgh
Tel: 0131 536 2095
email fiona.steven@luht.scot.nhs.uk

HANDBOOK EDITORS

Handbook Editors

		date last reviewed
Diagnosis of Diabetes	Dr Ewan Crawford, GP	Jan 2005
Management of Newly Diagnosed Diabetes	Dr Rebecca Reynolds, Consultant Physician	Jan 2005
Follow up of Patients with Established Diabetes	Dr Alan Jaap, Consultant Physician	Jan 2005
Treatment with Oral Hypoglycaemic Agents	Dr Alan Jaap, Consultant Physician	Jan 2005
Treatment with Insulin	Prof Brian Frier, Consultant Physician	Jan 2005
Management of Intercurrent Illness	Dr Stuart Gray, Consultant Physician	Jan 2005
Hypoglycaemia	Dr John McKnight, Consultant Physician	Jan 2005
Macrovascular and Microvascular complications of diabetes	Dr John McKnight, Consultant Physician	Jan 2005
Screening and Management of Eye Complications	Dr Ken Swa, Lead Clinician and Associate Specialist Ophthalmologist	Jan 2005
Screening and Management of Foot Complications	Dr Matthew Young, Consultant Physician	Jan 2005
Screening and Management of Kidney Complications	Drs J McKnight and J Walker, Consultant Physicians	Jan 2005
Screening and Management of Cardiovascular Risk	Dr Mark Strachan, Consultant Physician	Jan 2005
Diabetes and Driving	Prof Brian Frier, Consultant Physician	Jan 2005
Diabetes and Travel	Prof Brian Frier, Consultant Physician	Jan 2005
Diabetes and Adolescence	Criona O’Brien, Diabetes Specialist Nurse	pending
Diabetes and Obesity	Sheena Douglas, Dietitian	Jan 2005
Diabetes and Women	Dr Alan Jaap, Consultant Physician	Jan 2005
Diabetes and Men	Dr Alan Jaap, Consultant Physician	Jan 2005
Education and Advice	Liz McKay, Diabetes Specialist Nurse	Jan 2005
Dietary Advice	Sheena Douglas, Dietitian	Jan 2005
Management of Diabetic Hyperosmolar non-ketotic syndrome – guidelines	Dr Mark Strachan, Consultant Physician	Jan 2005
Management of Diabetic Ketoacidosis	Dr Mark Strachan, Consultant Physician	Jan 2005
Management of Acute Hypoglycaemia	Dr Mark Strachan, Consultant Physician	Jan 2005
Appendix: Initial Dietary Advice	Threasa Ferrie, Dietitian	Jan 2005
Appendix: Annual diabetic foot assessment	Pat Donald, Podiatrist	Jan 2005
Measurement of blood pressure	Kathleen Gough, Charge Nurse WGH	Jan 2005
Sample letter for patient travelling abroad	Mary Scott, Diabetes MCN Manager	Jan 2005
Co-ordinators	Diabetes Handbook Editorial Team: Dr Alan Jaap, Dr Penny Rother, Joan Allwinkle, Mary Scott, Reita Early, Sheena Douglas, Bonnie Crichton	
Web editors	Mohini Padayachee and Fred Norwood Lothian Primary Care Trust	

AIMS OF NETWORK

AIMS

The aims of the Lothian Regional Diabetes Network are:

- to minimise premature morbidity and mortality in those with diabetes
- to maximise quality of life by detecting and treating disease and its complications at an early stage
- to provide equal access to high quality diabetes care for all the residents of Lothian.

OBJECTIVES

- To ensure that all patients with Type I are seen at least annually at the hospital diabetes clinic.
- To offer all patients with Type 2 diabetes a high standard of care, including annual review in primary or secondary care clinic
- To consider referral of any Type 2 patient who shows signs of potential complications or instability in blood glucose concentrations or other cardiovascular risk factors, for specialist assessment.
- To agree an individual management plan with the patient.
- To empower patients to manage their own condition
- To audit the care of the patients with diabetes.
- To follow a well-defined and agreed protocol.
- To identify and register all those patients diagnosed with both types of diabetes in Lothian.
- To keep the register updated and initialise a systematic call and recall system at the hospital or in general practice.

THE MAIN LOCATION FOR CARE CAN GENERALLY BE IDENTIFIED USING THE FOLLOWING GUIDE:

General Practice/Shared Care

- Type 2 diabetes.
- Interim follow-up of Type 1 diabetic patients once assessed by hospital diabetic clinic.

Hospital Diabetic Care

- Most patients with Type 1 diabetes.
- Women with diabetes considering pregnancy.
- Pregnant women with diabetes.
- Children and adolescents with diabetes.
- Patients with retinopathy, nephropathy or foot disease who require specialist care
- Patients with a complicated risk factor profile

DIAGNOSIS OF DIABETES

DEFINITIONS OF DIABETES

DEFINITIONS OF DIABETES

The terms IDDM and NIDDM should be avoided as they classify patients on the basis of diabetes treatment rather than the pathogenesis of the disease.

Type 1 Diabetes (previously IDDM)
This results from an absolute deficiency of insulin due to pancreatic beta-cell destruction. It more commonly presents acutely in young people, but can occur at any age. Patients are insulin dependent and prone to ketoacidosis.

Type 2 Diabetes (previously NIDDM)
This results from a relative deficiency of or insensitivity to insulin and is more commonly diagnosed in older people, although can occur in young (especially obese) individuals.

Although the onset of Type 2 diabetes is less dramatic than that of Type 1 diabetes, the long term sequelae are similar and equally devastating, as both Type 1 and Type 2 patients are at risk of developing the microvascular and macrovascular complications of the disease. **For this reason, Type 2 diabetes should never be referred to as 'mild diabetes'.**

Impaired Glucose Tolerance (IGT)
IGT is a state of impaired glucose regulation, diagnosed on glucose tolerance testing (see page 15), which confers an increased risk of future diabetes of 2-5% per year. Patients with IGT tend to have higher blood pressure and plasma triglycerides when compared to non-diabetic individuals.

Impaired Fasting Glycaemia (IFG)
The term IFG has been introduced to classify individuals with fasting glucose values above the normal range but below those diagnostic of diabetes i.e. FPG > 6.0 mmol/L but < 7.0mmol/L. Diabetes UK recommends that all such individuals should have an oral glucose tolerance test to exclude a diagnosis of diabetes.

IGT and IFG are risk categories for future diabetes and/or cardiovascular disease. Patients with either condition should have fasting plasma glucose checked annually (or sooner if symptoms occur) and receive advice on the avoidance of obesity and the benefits of regular exercise. Co-existing cardiovascular risk factors should be treated aggressively.

Gestational Diabetes Mellitus
Gestational diabetes mellitus (GDM) is defined as carbohydrate intolerance of variable severity with onset or first recognition during pregnancy. It does not exclude that the glucose intolerance may have antedated pregnancy; therefore a post-natal OGTT should be performed. Women with a history of GDM have a 60% chance of developing diabetes (usually Type 2) within the subsequent 20 years and this risk is increased by obesity. For this reason they should be advised to control their weight and have an annual fasting glucose measurement performed. For further details, see page 79.

Women with a history of GDM should be screened for the condition in future pregnancies and have a fasting glucose checked annually.

Diagnosis of Diabetes

CONSIDER a diagnosis of diabetes in a patient with:
- thirst and polyuria
- unexplained weight loss or tiredness
- pruritus vulvae, balanitis or recurrent `UTI's'
- recurrent infections
- blurring of vision (usually an osmotic effect and not permanent)
- discoloured or ulcerated feet
- hypertension, ischaemic heart disease or stroke
- obesity, with diagnosis of arterial disease or family history of diabetes.

In such patients, it is useful to perform preliminary screening investigations i.e. random plasma glucose measurement and urinalysis for presence of glucose and ketones.

The diagnosis of diabetes has important medical and legal implications for the patient; therefore a diagnosis of diabetes should NOT be based solely on the finding of:
- glycosuria
- raised blood glucose (finger prick sample) on a 'stick' reading
- elevated haemoglobin A1c (HbA1c) result.

The World Health Organisation has recently published revised guidelines on the diagnosis of diabetes. Diabetes UK recommends that all UK health care professionals adopt these new criteria from 1st June 2000.

ALGORITHM for DIAGNOSIS of DIABETES

1. **Classical symptoms** (e.g. polyuria, polydipsia, unexplained weight loss)

plus one of the following
- random plasma venous glucose concentration $\geq$ 11.1 mmol/L

or
- fasting plasma venous glucose concentration $\geq$ 7.0 mmol/L

or
- plasma venous glucose concentration $\geq$ 11.1 mmol/L (2 hour sample in OGTT)

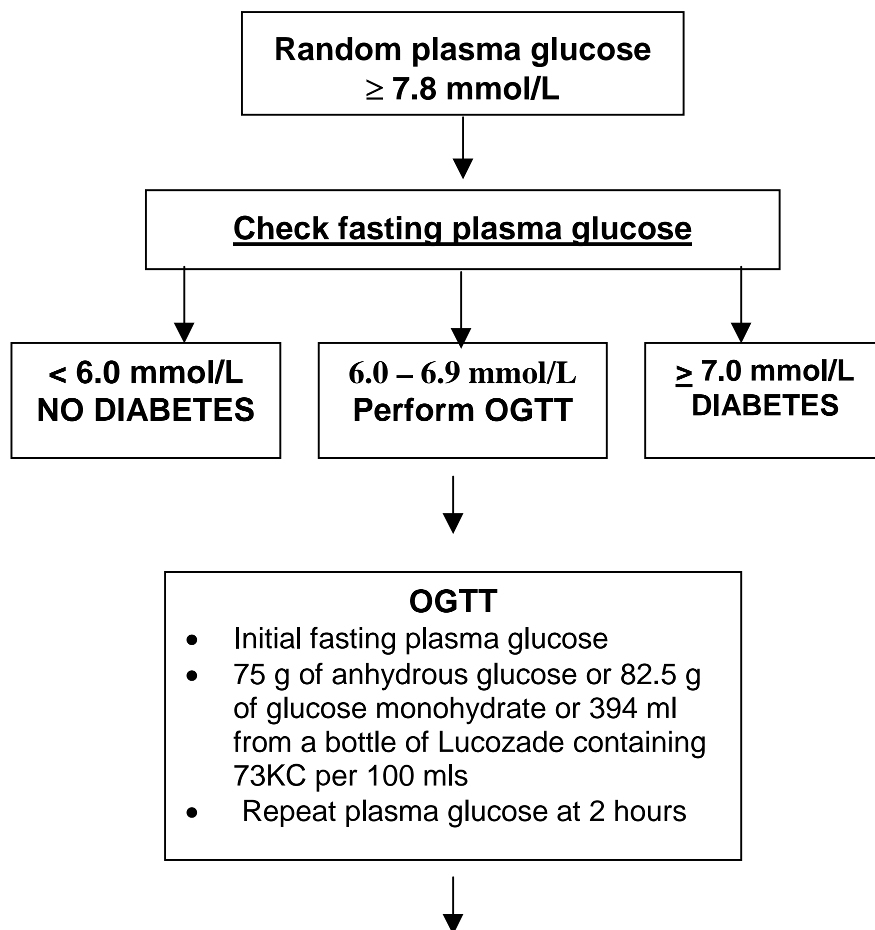
2. **No symptoms i.e. incidental finding of glycosuria or hyperglycaemia**
- Diagnosis should not be based on a single venous plasma glucose measurement
- Additional testing on another day with a value in the diabetic range is essential (using either fasting, random or samples taken 2 hours following glucose load)
- If fasting or random values are not diagnostic, the 2-hour value should be used

If **ketonuria** is present with:
- Severe symptoms i.e. vomiting and dehydration, **urgent hospital admission is required**.
- Milder symptoms and weight loss **discuss patient urgently with the diabetes team** for consideration of insulin therapy.

THE ORAL GLUCOSE TOLERANCE TEST (OGTT)

An OGTT need only be considered to establish a diagnosis of diabetes if blood glucose values fall into an equivocal range (e.g. FPG >6.0 but <7.0 mmol/L). **An OGTT is not necessary if the diagnostic criteria for diabetes are present**

- Perform OGTT after at least 3 days of unrestricted diet (> 150g CHO daily)
- Fast patient overnight (8-14 hours, water allowed) and rest during the test.
- Samples at times other than 0 and 2 hours are not necessary for diagnosis.
- Diagnostic interpretation of OGTT is different in pregnancy (see p83)



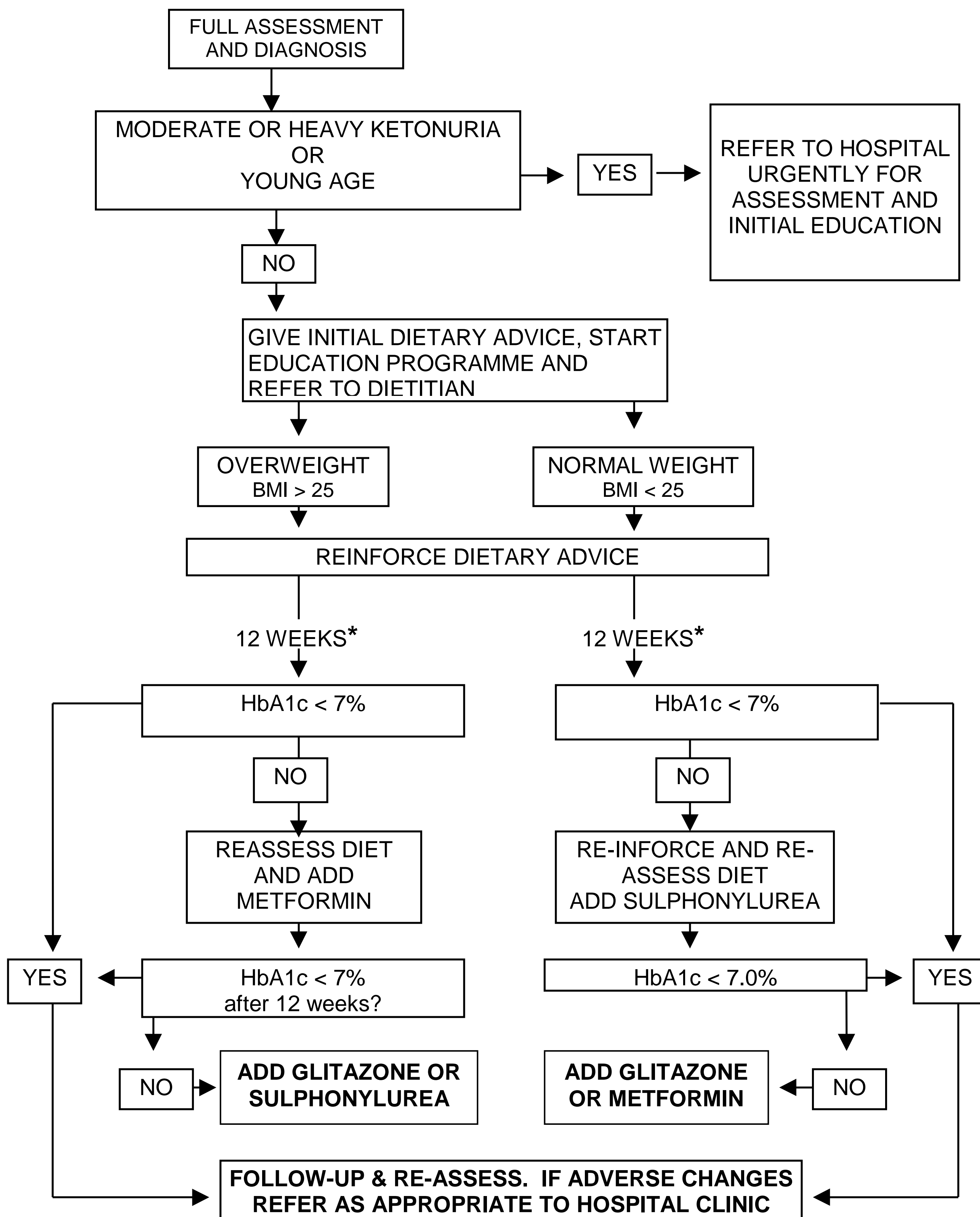
Fasting plasma glucose	< 6.0 and	6.1–6.9 and	< 7.0 and	≥ 7.0 **or**
2 hour plasma glucose	< 7.8	< 7.8	7.8–11.0	≥ 11.1
Diagnosis and Management	**NORMAL** No follow up Required	**IFG** * Annual fasting plasma glucose	**IGT** * Annual Oral Glucose Tolerance Test	**DIABETES**

* **Have increased risk of future diabetes**

- Advise on healthy eating, regular exercise and avoidance of obesity
- Check FPG annually
- Treat co-existing coronary risk factors aggressively, as are at increased risk of developing cardiovascular disease.

MANAGEMENT OF NEWLY DIAGNOSED DIABETES

PRACTICAL MANAGEMENT OF NEWLY DIAGNOSED DIABETES



* Patients with severe symptoms or significant hyperglycaemia despite adherence to adequate diet may require an oral hypoglycaemic agent sooner than 12 weeks (page 32-35) HbA1c targets reflect short time-scale from diagnosis. Long-term treatment targets should be HbA1c <7.0%, to protect against microvascular complications.

INITIAL ASSESSMENT OF PATIENT WITH TYPE 2 DIABETES

Clinical

Height & Weight	-	for calculation of Body Mass Index (kg/m^2).
Blood pressure	-	appendix 3
Foot inspection	-	check general foot care/hygiene and check for presence of foot deformity and examine shoes for suitability and signs of uneven wear.
Peripheral pulses	-	record presence and absence of pulses in each foot
Peripheral nerves	-	ask for history of pain, tingling or numbness
	-	record presence/absence of ankle jerks
	-	use 10g monofilament to test metatarsal heads and big toe (see page 51).
Eyes	-	refer for formal eye screening.

Diet and lifestyle	-	smoking status and alcohol consumption, level of activity, BMI status. Supply initial diet advice sheet (Lothian 'Healthy Eating and Diabetes) refer to dietitian and nurse for education and advice. Use education check list and core education material. Consider using extra (optional) material. (Hyperlink to Type 2 Diabetes Book)

Laboratory

Glycaemic Control	-	HbA1c
Renal function	-	urea, electrolytes and creatinine
Liver function	-	liver function tests.
Thyroid function	-	thyroid function tests.
Urinalysis		use specific 'stix' to check for presence of blood, protein, nitrite (to exclude infection) and ketones. Check lab albumin to creatinine ratio.
Total cholesterol, HDL-cholesterol and Triglycerides (non fasting)	-	best assessed once diabetes has been stabilised

Education

See checklists on page 88

FOLLOW-UP OF PATIENTS WITH ESTABLISHED DIABETES

The Annual Review Visit

Clinical

Height & Weight	-	for calculation of Body Mass Index (kg/m^2).
Blood pressure	-	measure more frequently than annually if hypertensive.
Foot inspection	-	including podiatrist review if considered 'at risk' (see page 49). Check general foot hygiene and check for foot deformity and examine shoes for suitability and signs of uneven wear
Peripheral pulses	-	record presence or absence of pedal pulses in each limb.
Peripheral nerves	-	ask for history of pain, tingling or numbness
	-	check vibration sensation using 128 cycles/sec tuning fork.
	-	record presence/absence of ankle jerks
	-	use 10g monofilament to test metatarsal heads and big toe (see page 51).
Eyes	-	visual acuity and digital retinal photograph
	-	
Risk factor assessment	-	Review alcohol consumption, smoking habits, diet, and coronary heart disease risk factors where relevant.

Laboratory

Glycaemic Control	-	HbA1c
Renal function	-	Urea, Electrolytes and Creatinine.
Lipids	-	Total Cholesterol, HDL-cholesterol and Triglycerides (non-fasting).
Urinalysis	-	use specific 'stix' to test for blood, protein, nitrite (presence of infection). If no proteinuria, send random (or better, first morning) urine sample (plain universal) to laboratory for albumin:creatinine ratio.

Other

Home Monitoring Results

Diet and Nutritional Review: by Practice Nurse or Dietitian if required. Consider referral to dietitian if specific problems/issues e.g. obesity, poor glycaemic control, raised lipids, poor compliance /understanding of diet, change in therapy e.g. oral agents to insulin, or individuals who have not had formal dietary review for 3 or more years.

Education Update: See page 52 for checklist

Drug Therapy: Review need for treatment adjustment

The Routine Outline Visit

Frequency of routine visits will vary. In general every 6-12 months for uncomplicated patients will suffice. More frequent visits may be necessary depending on presence of risk factors, specific diabetes complications or monitoring of treatment changes. Assessment usually involves the following:

- Weight (for Body Mass Index)
- Urinalysis
- HbA1c
- Discussion of home monitoring results
- Diabetes treatment review
- Blood pressure.
- Review previously abnormal results
- Review diet history

DIETARY ADVICE

DIETARY ADVICE FOR PEOPLE WITH DIABETES

Effective management of diabetes cannot be achieved without an appropriate diet. **All patients with newly diagnosed diabetes should be referred to a state registered dietitian who will give individual dietary advice.**

Dietary advice is based on the consensus-based recommendations of the Nutrition Subcommittee of the Diabetes Care Advisor Committee of Diabetes UK.

Nutritional Management Aims

- Help optimise glycaemic control
- Reduce risk factors for cardiovascular disease and nephropathy
- Promote weight loss in overweight or obese individuals

Taking into account

Quality of life, Cultural preferences, patient well-being and safety. The advice should also respect the individual's wishes and willingness to change.

Nutrition and dietary education should

- Meet the needs of the individual
- Include realistic targets and goals
- Allow patients to achieve independence in managing their condition

Dietary Goals

- Ensure an adequate and balanced nutritional intake.
- Encourage regular meals based on complex (preferably high fibre) carbohydrate foods. Foods with a low Glycaemic Index should be encouraged.
- Reduce intake of sweet foods and drinks; sucrose should can contribute up to 10% of total energy. Sucrose need not be excluded from the diet. For this reason there is no need for people with diabetes to use special 'diabetic foods'.
- Reduce fat intake, especially saturated fat intake. Total fat intake should not exceed 35% of total energy with the majority of this from mono and polyunsaturated sources.
- Include at least 5 servings of fruit/vegetables daily
- Limit salt intake to <6g sodium chloride per day.
- Achieve and maintain a healthy weight.

Weight Reduction

Approximately 80% of people with type 2 diabetes are overweight or obese. Weight loss improves insulin sensitivity, glucose uptake and other health outcomes.

Targets for weight loss should be realistic, achievable and agreed by the patient.

It important to discuss realistic targets for weight loss. A good starting point is to lose 10% of body weight over 3 to 6 months with the aim to then maintain weight.

Initial advice should be:

- to reduce energy dense food intake, in particular those high in fat.
- to increase activity levels.

- limit alcohol intake.
- to increase fruit and vegetable intake.

If these measures are not effective then more specific advice to achieve an energy deficit may be necessary.

Some individuals may find attending commercial slimming groups helpful. Those that offer exercise programmes in addition to advice on diet may be of particular benefit.

Exercise

All patients should be encouraged to be more physically active, as this improves general levels of fitness and glycaemic control. It may aid weight loss and improve lipid and blood pressure control.

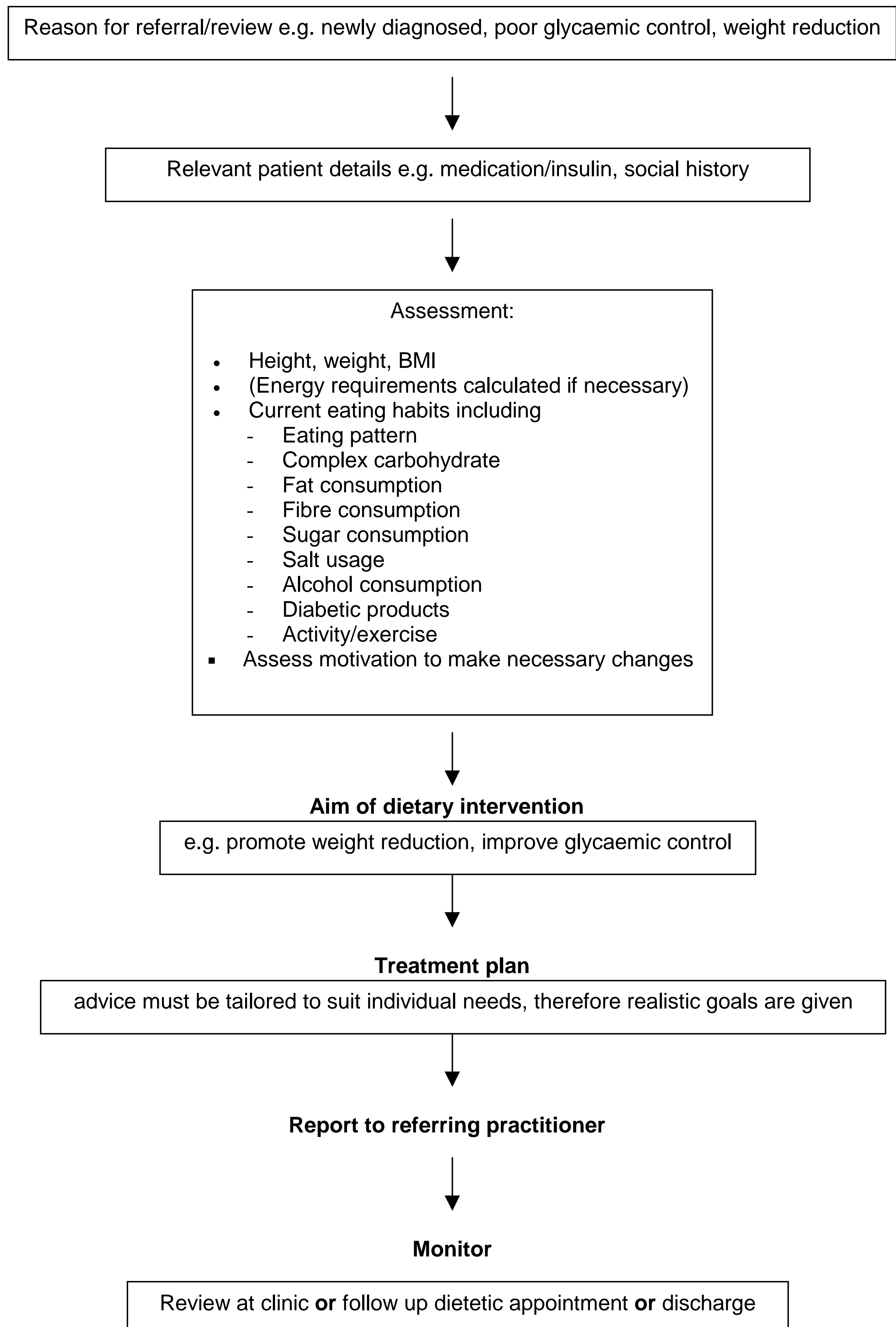
Exercise advice should be realistic and include information on local facilities, e.g. swimming, health clubs, exercise prescription programmes and should also include the costs of such activities.

For those unaccustomed to exercise or those with significant diabetic complications, medical advice should be obtained.

Information required by the Dietitian at referral

- Demographic details including CHI No.
- Weight
- Height
- Waist circumference
- HbA1c or glucose profile
- Lipid profile
- Co-existing medical conditions, e.g. hypertension or thyroid status, where relevant
- Current medication

Key Stages of Diet Therapy



TREATMENT WITH ORAL HYPOGLYCAEMIC AGENTS

Treatment with Oral Hypoglycaemic Agents

Aims of Drug Treatment

- to achieve target HbA1c
- to alleviate hyperglycaemic symptoms
- to avoid hyperglycaemia
- to avoid excessive weight gain
- to reduce long term complications of diabetes
- where possible, to prevent long term complications of diabetes

When to consider tablets

- in type 2 diabetes with inadequate control after at least 12 weeks appropriate diet
- possibly sooner if symptoms troublesome or if not overweight (BMI < 25)
- **avoid in females who are pregnant or planning a pregnancy**

Choice of Drug

- See Table on page 30

Dosage Alteration

- changes in dosage should be gradual; in general, dosage adjustments should be made every few months

Remember prescriptions are free for all patients who receive oral hypoglycaemic agents or insulin

Tablets must be replaced by insulin before and during pregnancy, and during severe illness

Oral Hypoglycaemic Drugs

Class	Action	Generic Name	Daily Dose (max single dose)	Dose Frequency	Comments
Sulphonylurea	Stimulates insulin secretion from the pancreas	Gliclazide	40-320mg (160mg)	1-2 times daily	Take before meals, as absorption reduced by food and hyper-glycaemia **S/E:** Weight gain, Hypoglycaemia **AVOID** as 1st line in obese and in liver disease or significant renal impairment **AVOID** Glibenclamide & Chlorpropramide in elderly (long acting; higher risk of hypos). *No longer 1st line agents; no need to change therapy in patients who are stable
		Glipizide	2.5-20mg (15mg)	1-3 times daily	
		Glimepiride	1-6mg (6mg)	Daily	
		Glibenclamide	2.5-15mg (15mg)	Daily	
		Chlorpropramide *	250-500mg (500mg)	Daily	
		Tolbutamide*	50mg-1.5g (1g)	1-3 times daily	
Biguanide	Decreases gluconeogenesis & increases peripheral glucose utilisation	Metformin	500mg-3g	1-3 times daily	1st choice if obese. Take with or after food. Gradual dose titration. No hypos if used as mono-therapy **S/E:** GI upset, rarely lactic acidosis **AVOID** in critical limb ischaemia or hypoxia
α–**Glucosidase Inhibitor**	Delays digestion of starch & sucrose; reduces post-prandial rise in blood glucose	Acarbose	50-600mg (200mg)	1-3 times daily	Take with food. **S/E:** Flatulence, minimised by gradual dose titration **CAUTION:** Use limited by GI S/E
Thiazolidinedione	Improves insulin sensitivity	Rosiglitazone Pioglitazone	4-8 mg 15-45 mg	Daily Daily	Usually second line agents although now licensed as monotherapy. Useful in combination with Sulphonylurea or Metformin. May be used as monotherapy in obese patients intolerant of Metformin. **S/E:** Weight gain, fluid retention
Prandial Glucose Regulator	Stimulates post-prandial insulin secretion.	Repaglinide Nateglinide	0.5-16mg (4mg) 60-80 mg	With each meal With each meal	Take before food (omit when meals not taken) **S/E:** Weight gain, Hypo-glycaemia

Combination Therapy

The following combinations are considered useful:

Metformin + Sulphonylurea

Metformin + Glitazone

Metformin + Prandial Glucose Regulator

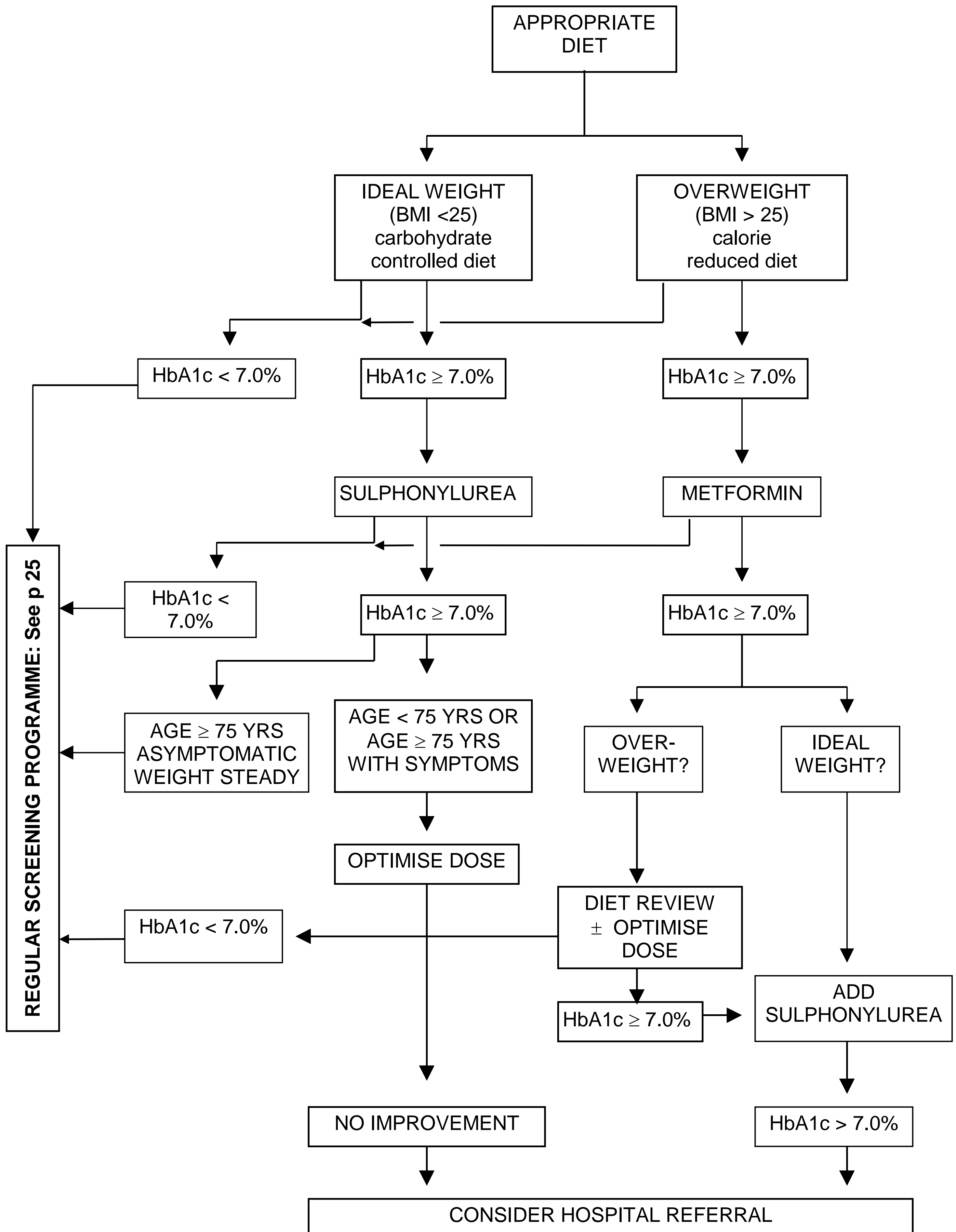
Thiazolidinedione + Sulphonylurea

When insulin is started in obese patients, oral agents may be continued to minimise weight gain.

Triple Therapy

The combination of Metformin + Sulphonylurea + Glitazone is sometimes used where insulin treatment is considered an unacceptable option e.g. morbidly obese patients, or those not wishing to lose a vocational driving licence

Treatment with Oral Hypoglycaemic Drugs



TREATMENT WITH INSULIN

TREATMENT WITH INSULIN

Principles of Treatment

- Insulin by injection is given as replacement therapy in people with absolute or relative deficiencies in insulin secretion.
- A balance must be maintained between carbohydrate consumed, insulin administered and exercise taken - all of which can affect blood glucose concentration. The aim of treatment is to maintain near normoglycaemia.
- Self-monitoring of blood glucose and HbA1c measurements are necessary to ensure that treatment is effective and targets are being met.
- Remember, all prescriptions are free for all patients on oral antidiabetic drugs and insulin therapy.

A trial of insulin is justified in any patient with Type 2 diabetes who is symptomatic and in whom better glucose control is likely to be associated with health gain

Generally

- Soluble (regular), short-acting insulin should be injected **subcutaneously** 15-30 minutes before meals
- Insulin analogues (e.g. Humalog or NovoRapid) are fast acting and can be injected immediately before eating or during or after meals.
- Insulins should be stored in the `fridge', but not in the freezer compartment. Insulin pens in current use may be kept at room temperature.
- Diet should be reviewed for all patients starting insulin to emphasise regular meals with a consistent carbohydrate content, although this will depend on individual lifestyle and the type of insulin regimen
- Appropriate education on hypoglycaemia and diabetic ketoacidosis (DKA) is essential to allow effective self-management.
- Treatment needs to be individualised and must take account of things such as shift work, lifestyle, holidays, exercise etc.
- Referral to a dietitian is required to allow diet to be tailored to the individual taking into account age, lifestyle, occupation, shift patterns, exercise etc.

In general, insulin should never be stopped without prior consultation with a consultant diabetologist

Aims of Insulin Treatment

- Abolition of symptoms of hyperglycaemia
- Maintenance of ideal body weight
- Avoidance of hypoglycaemia
- Maintaining as near normal a blood glucose as is practical and safe for the individual.

Insulin Injection Sites and Injection Technique

Injection Sites

- The use of several different injection areas is recommended to avoid the development of lipohypertrophy
- Insulin is absorbed more rapidly from the abdomen than from the thighs or arms, except long acting analogues, which appear to have more uniform absorption. This should be

taken into account when prescribing different insulins. Exercise accelerates the rate of insulin absorption from the injection sites on the legs.

Injection Technique

The technique of insulin administration should be taught by a nurse with specialist skills in diabetes.

- Check insulin dose
- Pinch up fold of skin
- Inject needle at 90 degrees into this fold Avoid lumpy and hypertrophied areas
- Dispose of syringe and/or needle carefully.

There is no need to swab the skin before or after insulin injection

Commonly Used Insulin Preparations

There are three main types of insulin preparations.

Those of **short** duration which have relatively rapid onset of action are called *Soluble* insulins. The traditional soluble insulins include Actrapid, Velosulin and Humulin S. For those patients who require animal insulin there is a pork insulin preparation called Hypurin Porcine Neutral and a beef insulin preparation called Hypurin Bovine Neutral Fast acting insulin *analogues* (Humalog and NovoRapid) are available which have a more rapid onset and shorter duration of action than the soluble insulins.

Insulins with an intermediate time-action are called *Isophane* insulins and include Insulatard and Humulin I. For those patients who prefer animal insulins there is Porcine and Bovine Hypurin Isophane and Pork Insulatard. A *lente* insulin is available called Monotard which has a similar time-action profile.

There are some insulins whose onset is **slower** and whose action is **longer.** These have been traditionally called *insulin zinc suspension* insulins and include Ultratard and Humulin Zn although these insulins are now rarely used.

Longer-acting analog insulins are available called insulin Glargine (Lantus) and insulin Detemir (Levemir), which have a duration of action of up to 24 hours.

Fixed mixtures of insulin are available which contain Soluble and Isophane insulins in varying proportions, e.g. Mixtard 30 (30% soluble, 70% Isophane) – Mixtard 50, Humulin M3, Hypurin Porcine 30/70 Mix and, Pork Mixtard 30. In addition there are mixtures of analogues such as Humalog Mix 25, Humalog Mix 50 and NovoMix 30.

Insulin Administration Devices and Blood Glucose Monitoring Equipment

1. Syringes

Plastic syringes may still be the preferred method of delivery for some patients e.g. those using two different insulin preparations simultaneously which require free mixing of insulin, or those patients using large volumes of insulin which cannot be administered with a pen device. Syringes with attached needles are obtained on prescription, and are available in a 50 unit and 100 unit size.

Syringes are available for use with standard length needles (12.7mm) and short length needles (8mm).

2. Pen Injection Devices

Many patients use a pen injector device for insulin administration. This is available in two forms, either a reusable form for use with a cartridge or a pre-filled (disposable) type. The principal advantage of pen injection devices is the convenience of carrying and administering the insulin.

Disposable (Pre-filled) pens are particularly useful for patients with limited dexterity and visual impairment. Pre-filled pens are available on prescription.

Some Re-usable Pens are available from Diabetes Clinics or can be provided on prescription and are free to patients. Cartridges containing insulin are mostly 3ml in volume and are obtained on prescription. Most 1.5ml pens have been withdrawn from production.

Pen needles are available on prescription. 6mm, 6mm and 5mm lengths are used most commonly.

Re-use of Needles is not recommended.

3. Glucose Monitoring Equipment

A wide variety of blood glucose meters are available but electrodes (test strips) are not interchangeable for use between the various brands. Contact any of the Diabetes Specialist Nurses for further details and advice.

Disposal of Sharps

Syringes

Needles should be clipped off using the “BD Safe Clip” which is available on prescription. This device shears off and secures up to 200 needles, which can then be disposed of safely with the household refuse. The syringe minus the needle can then be dropped into an old ring pull can or lidded container. When it is full the lid should be secured or the opening taped over, put into a plastic bag and disposed with the refuse.

Lancets

Lancets should be treated with the same respect making sure the lancet is pushed firmly into the lancet cover before putting into containers or cans. Similarly pen devices should be disposed of with the same care.

Insulin Regimens and Dosage Adjustment

Principles of Dosage Adjustment

No one set of advice can cope with all situations.

Never change insulin on the basis of single blood glucose readings
Check monitoring technique/injection technique

- Identify the periods of day in which problems are occurring with glycaemic control and look for a pattern in blood glucose readings
- Be alert to fictitious blood glucose values being recorded by some individuals. This may be suggested by major discrepancy with the HbA1c concentration.
- Review insulin dose distribution.
- Review eating patterns including alcohol consumption.
- Review whether poor control in one part of the day is not a consequence of a previous period.
- Agree an adjustment of dose by 2 units initially.
- Most patients are capable of becoming skilled at self-adjustment of their insulin dose and regimen.

Twice Daily Regimen

Insulin is administered as two injections before meals, usually before breakfast and before evening meal. This is most commonly distributed as a one third:two thirds mixture of soluble and isophane insulin or given as a fixed biphasic insulin mixture e.g. Human Mixtard 30 or Humulin M3. Pre-mixed formulations of rapid-acting and intermediate-acting insulin analogues (Humalog Mix 25, Humalog Mix 50, NovoMix 30) are also suitable for twice daily administration.

To adjust insulin doses on a ‘free-mixing’ regimen

- If glucose high/low **before breakfast**, increase/decrease **EVENING long-acting** insulin.
- If glucose high/low **before lunch**, increase/decrease **MORNING short-acting** insulin.
- If glucose high/low **before evening meal**, increase/decrease **MORNING long-acting** insulin.
- If glucose high/low **before bed**, increase/decrease **EVENING short-acting** insulin.

To adjust insulin doses for a fixed (biphasic) insulin mixture

- If glucose high/low **before breakfast**, increase/decrease **EVENING** insulin dose
- If glucose high/low **before evening meal**, increase/decrease **MORNING** insulin dose
- Other adjustments may necessitate a change of the mixture. For further advice, contact your local Diabetes Specialist Nurse.

Basal-Bolus Regimen

This consists of an injection of a soluble insulin or rapid-acting insulin analogue before each of three main meals (bolus), and a basal insulin supply, either in the form of isophane, given as late in the evening as possible (before bedtime) or a long-acting insulin analogue (Lantus or Levemir) which can be given either in the evening or in the morning. Approximately 30% of the total daily insulin is provided as the basal insulin and the remainder is divided and given as bolus doses before each meal. Although this regimen consists of multiple injections, it does not necessarily give better blood glucose control, on average, than twice daily regimens. The main advantage of this regimen is improved flexibility, especially in coordinating insulin doses with meal size and physical exercise. It is therefore particularly useful for younger patients and those on shift work.

For dosage adjustment with a basal-bolus regimen:

- If glucose high/low **before breakfast**, increase/decrease **EVENING long-acting** insulin
- If glucose high/low **before lunch**, increase/decrease **MORNING short-acting** insulin
- If glucose high/low **before evening meal**, increase/decrease **LUNCHTIME short-acting** insulin
- If glucose high/low **before bed**, increase/decrease **EVENING short-acting** insulin

Rapid-Acting Insulin Analogues

- Rapid-acting analogues of insulin (e.g. Humalog, NovoRapid) may be used both in twice daily and basal bolus regimens
- **For some patients on rapid-acting insulin analogues, monitoring of post-prandial (2 hours) glucose may be required to assist with dosage adjustment.**

Over Insulinisation

The following symptoms are suggestive of over insulinisation:

- Recurrent Hypoglycaemia
- Wide excursions of blood glucose values
- Weight gain
- Subtle features of chronic hypoglycaemia
  - headache
  - craving to eat
  - personality change in elderly

Too Little Insulin

The following symptoms are suggestive of too little insulin:

- Chronic hyperglycaemia/osmotic symptoms
- Weight loss
- Feeling non-specifically unwell
- Nocturia, nocturnal thirst
- Chronic Fatigue (“hyperglycaemic malaise”)

Insulin in the Elderly

Age itself is not a contraindication to insulin therapy

- Targets for glycaemic control in the elderly need not be as stringent as in the younger patient
- The aims of treatment are to control hyperglycaemia with particular avoidance of hypoglycaemia.
- It may be necessary to avoid short-acting insulin in the very elderly. Regimens using twice daily isophane or once daily long-acting insulin analogue are often effective in this age group, and reduce the risk of hypoglycaemia.

Insulin therapy in Type 2 diabetes

The most common indication for insulin in these patients is deteriorating glycaemic control on oral antidiabetic agents. The decision to introduce insulin can be difficult and the following factors should be taken into account:

- Age
- Other health problems, e.g. diabetic complications such as visual impairment
- Social circumstances, e.g. patients holding a vocational driving licence
- Patient’s attitude to insulin injections
- Compliance with diet
- Patients weight

Starting insulin is best managed as an outpatient under the supervision of the Consultant Diabetologist and a Diabetes Specialist Nurse.

A frequent problem encountered in treating those with Type 2 diabetes, is an inevitable gain in weight after starting insulin. On average, this is around 4 kg after 6 months of treatment. Patients should be warned that this might occur particularly if they do not limit their energy intake. As part of the education process for starting insulin, patients should receive a dietetic review and advice.

Patients should be offered a dietetic referral to discuss potential weight problems and dietary changes to prevent/minimise weight gain.

In some circumstances, a combination of insulin and oral antidiabetic agents may be indicated in people with Type 2 diabetes, but this is most often reserved for obese, insulin resistant patients.

As Type 2 diabetes is an insulin resistant state, high doses of insulin may be needed to obtain adequate glycaemic control.

The decision to use combined insulin and oral antidiabetic therapy should be taken by a Consultant Diabetologist.

MANAGEMENT OF INTERCURRENT ILLNESS

Management of Intercurrent Illness in Insulin Dependent Diabetes

THE GOLDEN RULE: Insulin should NEVER be omitted
EXTRA DOSES of soluble insulin are often required during illness.

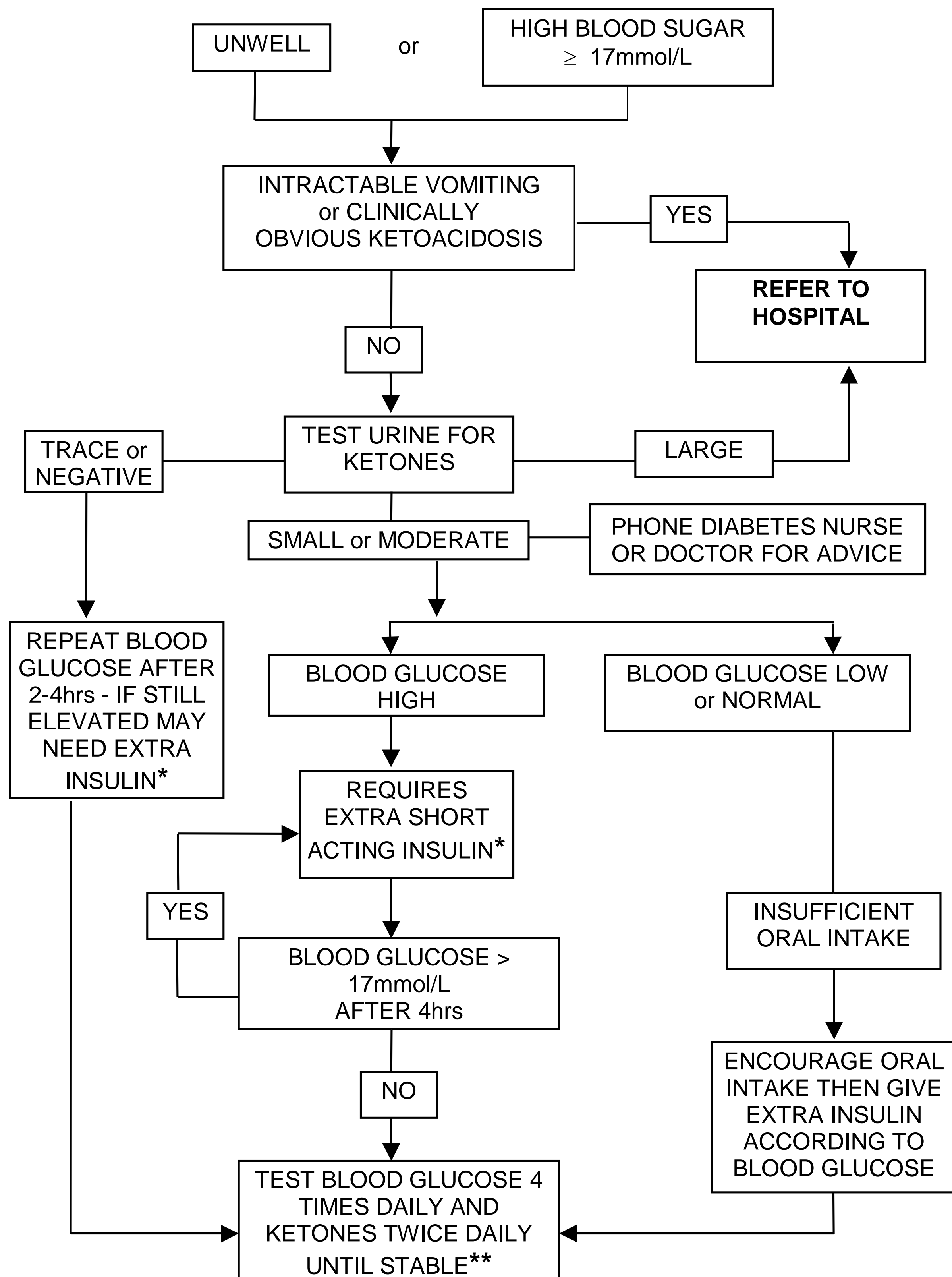
- Maintain an adequate fluid intake (sugar free) of 100-200mL (approximately 1 glass) every hour
- Maintain a regular intake of carbohydrate, regardless of blood glucose. It may be difficult to persuade some patients or relatives of this!
- At mealtimes, if unable to eat, but tolerating fluids, take carbohydrate in the form of 200mL of one of the following;
  - -Ribena and water
  - -Fruit juice
  - -Milk with Drinking Chocolate or Ovaltine
  - -Flat Coca Cola or Lemonade (sugary)
- Increase blood glucose monitoring to at least 4 hourly and test for ketones twice daily
- Do not be afraid to increase insulin; in general, 4 units of soluble insulin every 2 hours until blood glucose is below 10 mmol/L is advisable. Ensure that glucose monitoring technique and equipment is accurate and arrange to review patient
- Ketonuria is an early sign of decompensation and if acted upon promptly, it will often prove possible to avert hospital admission (see page 42).
- If vomiting, hospital admission may be necessary: your GP may consider administering an anti-emetic injection, "Dioralyte/Rehidrat" with instruction to reconstitute as directed and to take an egg-cupful every 10 minutes.
- **This advice applies to adults; for children, contact the Paediatric Diabetes team**

INDICATIONS FOR HOSPITAL ADMISSION

- **Inability to swallow or keep fluids down**
- **Vomiting**
- **Persistent diarrhoea**
- **Persistently raised glucose (>28 mmol/L) despite increasing insulin**
- **Strongly positive ketonuria**
- **When ketoacidosis is clinically obvious (dehydration, abdominal pain, intractable vomiting, rapid or laboured respirations)**

The hospital diabetes team is there to advise.
When in doubt – please phone!

Management of intercurrent illness in Type 1 Diabetes Mellitus



*** The diabetes team will advise patients individually on how much extra insulin should be taken in the event of ketonuria or sustained hyperglycaemia**

**** Refer to hospital if clinical deterioration**

HYPOGLYCAEMIA

Hypoglycaemia

In a person with diabetes all documented blood glucose values below 4.0 mmol/L can be considered to represent hypoglycaemia and should not be tolerated if they occur often.

REMEMBER: 'FOUR IS THE FLOOR'

- Hypoglycaemia is a serious side effect of therapy which can (rarely) be fatal.
- Hypoglycaemia is less common in people treated with sulphonylureas than in those taking insulin, but may be more prolonged and more severe, particularly when associated with substantial alcohol consumption.
- Glibenclamide is particularly prone to causing hypoglycaemia and should not be used in elderly people.
- All patients started on sulphonylurea drugs should be warned about the possibility of hypoglycaemia and told to discontinue the tablets and seek medical advice should it occur.
- **The symptoms and signs of hypoglycaemia can be variable. A high index of suspicion is often required.**

Confirmation by blood glucose measurement is desirable, but glucose strips may be inaccurate at low blood glucose concentrations.

Treatment of Mild Hypoglycaemia

- Rapid acting carbohydrate i.e. glucose drink (fresh orange juice, ordinary Coke or lemonade, milk with 2 teaspoons sugar) 3 glucose tablets, 'fun-size' chocolate bar,
- Follow with slower acting carbohydrate i.e. sandwich, roll, toast, banana, apple, 2-3 biscuits or next meal if due.

Treatment of Moderate to Severe Hypoglycaemia

- HYPOSTOP is a thick glucose gel, which is easily absorbed through the buccal mucosa. It is indicated in confused or drowsy patients; **to avoid risk of choking this should not be used when consciousness is impaired.**
- Intravenous dextrose is the emergency treatment of choice in the unconscious patient (Min-I-Jet is a convenient formulation containing 50 mL of 50% dextrose in a preloaded disposable syringe).
- GLUCAGON (iv, im or sc) is also useful, in people taking insulin. It may take 10-15 minutes to act as it relies on breaking down hepatic stores of glycogen to glucose. Glucagon may be less effective in some people with depleted glycogen stores (e.g. in prolonged starvation or in alcoholics).
- Patients may experience abdominal pain/discomfort, nausea or vomiting following Glucagon administration.
- Once the person is able to swallow, additional carbohydrate should be given by mouth (see above).

If consciousness is not restored despite correction of hypoglycaemia, urgent referral to Accident and Emergency is indicated.

- Patients may occasionally have a high glucose for several hours after a "hypo" if it is treated overenthusiastically.
- Insomnia, vivid dreams, night sweats and/or morning headache may be symptoms of nocturnal hypoglycaemia.
- Hypoglycaemia may present as confusion in the elderly, or be misdiagnosed as cerebrovascular disease e.g. TIAs
- Insulin-induced hypoglycaemia has been implicated in causing convulsions in the young and in some unexplained deaths.

MICROVASCULAR AND MACROVASCULAR COMPLICATIONS OF DIABETES

New guidelines pending. These will be posted once they are finalised.

Jan 05

SCREENING AND MANAGEMENT OF EYE COMPLICATIONS

Complications: Retinopathy

- Diabetic retinopathy is the commonest cause of blindness in the 30-65 age group in the UK at the present time.
- Development or progression of retinopathy can be prevented by good glycaemic control, management of hypertension and avoidance of smoking.
- It is reasonable to aim for a target HbA1c of ≤ 7.0% to limit development and progression of microvascular complications, including retinopathy.
- Laser treatment is indicated for proliferative diabetic retinopathy and maculopathy. It is more likely to be asymptomatic; therefore screening for retinopathy is vital.
- Laser therapy is not always effective in all patients.
- Retinopathy may be present in up to a third of newly diagnosed type 2 diabetic patients.
- Some degree of retinopathy will also be present in the majority of patients who have had diabetes for more than 20 years, and a significant number, particularly if poorly controlled, will develop retinopathy at an earlier stage.
- In Lothian, all patients should have annual screening by fundoscopy performed by
  - Accredited Optometrists if they are primarily looked after by GPs
  - Patients attending hospital diabetes clinics will have their retinal photography taken by the retinal screeners and a quality assured grading from Lothian & Borders Regional Diabetic Retinopathy Grading Centre will be provided from January 2005.
  - The results of the grading will be communicated to the patients, GPs and diabetologists.
  - Those patients who attend the diabetic eye clinics under the supervision of Dr Ken Swa at PAEP, do not need to be screen either by the optometrists or at diabetes clinics.
- All patients who need to be referred to the ophthalmology clinics are to be initiated by
  - The Lothian Diabetic Retinopathy Screening Service.
  - The Accredited Optometrist according the referral criteria directly or via their GPs.
- All Patients should still attend the optometrists annually for their refraction i.e. to have their prescription check for the glasses. The examination is free for people with diabetes.
- All other ocular emergencies should be referred to Acute Referral Clinic at PAEP and St John's hospital by the usual way.
- It is envisaged that Optometry based retinopathy screening will cease by March 2006.

All patients should have their eyes examined at least annually for detection of diabetic retinopathy.

(Hyperlink added here to retinopathy screening flow chart)

SCREENING AND MANAGEMENT OF FOOT COMPLICATIONS

THE DIABETIC FOOT

Aims of Diabetic Footcare Advice

- Education of patients and/or carers on the importance of self-care
- Prevention of trauma and subsequent development of foot lesions
- To aid healing of established lesions and prevention of recurrence
- To maintain patient mobility and avoid hospital admission
- Adherence to national guidelines, to reduce the morbidity associated with diabetic foot disease

Objectives of Diabetic Footcare

- To provide all diabetic patients with education on foot care
- To ensure that all patients receive annual foot examination
- To provide a service whereby patients are referred appropriately to members of a specialist team, according to level of risk

State Registered Podiatrists play an important role in the education, monitoring and treatment of patients presenting with lower limb complications of the diabetes. Podiatrists do not routinely need to see low risk patients unless they have a foot pathology.

General Principles

- All diabetic patients should receive education in foot care, to reduce the incidence of chronic ulceration, gangrene and amputation.
- Foot examination should be performed at the annual review visit in all patients (see p22)
- Use of a 10g Monofilament is recommended.
- Ongoing management depends upon **risk stratification** (see p50). For summary, see Appendix 2

Testing Pressure Sensation with a Monofilament

- **Monofilaments are designed to deliver a standard stimulus usually 10g force**
- **Test a total of 10 sites: 1st, 2nd 3rd & 5th plantar metatarsal heads and plantar aspect of great toe, in both feet**
- **If the patient is able to feel ≤ 8/10 touches with a monofilament, then the risk of foot ulceration is increased 5-10 fold.**

RISK STRATIFICATION FOR DIABETIC FOOT DISEASE

1. **Low Risk Patients**
- No clinical signs of peripheral vascular disease or neuropathy
- Display none of the features listed below

Provide with leaflets & education
Refer to podiatry only for podiatric problems

2. **Moderate Risk Patients**
- Clinical evidence of neuropathy [10g monofilament]
- Absence of foot pulses
- Presence of foot deformity
- Visual impairment
- Physical disability

Provide with leaflets & education
Refer for regular podiatry

3. **High Risk Patients**
- Clinical evidence of neuropathy [10g monofilament] with callus
- Presence of foot deformity with callus
- Present or previous history of ulceration
- Peripheral vascular disease - absent pedal pulses with history of intermittent Claudication or rest pain or in combination with neuropathy
- Previous amputation
- Previous Charcot Neuroarthropathy

Provide with leaflets & education
Refer to specialist diabetes podiatry service
[Foot Clinic, Diabetes Clinic, Community Podiatry]

All ulcers should be referred

FOR PATIENTS WITH ANY OF THE FOLLOWING

- **Foot ulceration**
- **Active Charcot Neuroarthropathy**

Arrange for URGENT REVIEW by a Specialist Podiatrist who is a member of a Hospital Diabetes Team

- **Diabetes Specialist Foot Clinic, Royal Infirmary of Edinburgh, 5 days a week**
- **St John's Hospital, Livingston, Wednesday, Thursday, Friday**
- **Roodlands Hospital, Tuesday, Thursday**
- **Western General Hospital, 5 days a week**
- **Eastern General Hospital, Friday morning**

(hyperlink) Contact details

Basic Footcare Advice for Patients

Do	Do Not
Examine feet daily, including between toes and around heels	Wear ill-fitting shoes
Check footwear for small objects or rough seams	Burst blisters
Wash feet daily and dry thoroughly	Sit too near heaters or fires or use hot water bottles to heat feet up quickly
Check water temperature with elbow before bathing feet	Poke down edges of nails with scissors to cure ingrown toenails
Switch off electric blankets and remove hot water bottles before going to bed.	Use razor blades, pumice stones or corn remedies
Ask for feet to be measured when buying shoes	Wear sandals if there is any loss of sensation in the feet
Follow this advice and have feet checked regularly	Go barefoot.

MANAGEMENT of DIABETIC FOOT COMPLICATIONS

1. General Measures

Education
- Outline the do's and don'ts of footcare
- Provide with advice leaflets about footcare and suitable footwear

Regular Podiatry
- General footcare and routine podiatry treatments
- Debridement of ulcers
- Continuing education.

Orthotics
For patients with established neuropathy, pressure relief is a mainstay in the prevention and treatment of ulceration. This may be achieved using:
- Seamless shoes or insoles
- Plaster casts or Scotch casts

2. Ulceration: Simple Dressings

A wide range of dressings, with different indications for use is available
- **Alginates** (e.g. Kaltostat, Sorbsan): Suitable for moist exuding wounds
- **Hydrogels** (e.g. Intrasite): Tend to keep wound moist, but may help to absorb a little exudate
- **Hydrocolloids** (e.g. Granuflex, Aquacel, Combiderm): Absorbent dressings which are NOT suitable for infected wounds or very exudative ulcers. They are therefore **probably not very useful in the treatment of diabetic foot ulceration**. If they are used, then they should be changed at least every 3 days.
- **Foam Dressings** (e.g. Allevyn, Lyofoam): Suitable for use as a covering dressing and to absorb exudate.

3. Treatment of Ulceration

- **Grade 1A-2B ulcers on the Texas classification chart (create hyperlink)**
- Long term antibiotic (at least 3 weeks treatment) may improve healing even in the

absence of proven infection
- Co-amoxiclav or Erythromycin are both suitable choices
- Swabs of ulcers are often reported as showing growth consistent with colonisation
- It is probably wise to eradicate colonising pathogens with an appropriate antibiotic.

4. Treatment of Deep Ulceration/ Osteomyelitis

Approximately 20% of patients with neuropathic ulceration and 11% of patients with neuro-ischaemic ulceration go on to develop osteomyelitis, despite appropriate antibiotic therapy
- Suspect clinically if “Sausage Toe” deformity
- Refer to Specialist Podiatry Service if suspected
- May be diagnosed by X-ray, but radiological changes take up to 3 weeks to develop
- Triple phase bone scan and MRI scans are more useful.
- High dose Clindamycin (150mg-300mg qds) or Ciprofloxacin (500mg bd) are optimum choices; use for at least one month.

5. Treatment of Non-Healing Ulcers/ Recurrent Ulceration

- Refer to Specialist Podiatry Service if suspected
- Consider vascular investigations for patients with non-healing ulcers and reduced or absent peripheral pulses/signs of ischaemia.
- Ankle Brachial Pressure Index (ABPI), using Doppler, may be difficult to interpret in patients with diabetes, due to vessel calcification
- Absolute pressures of 50mmHg at the ankle may be indicative of significant arterial disease
- If clinical appearance or pressure measurements are suggestive of arterial disease, then duplex scanning, standard angiography or MRI angiography should be requested, with a view to revascularisation for suitable lesions

6. Charcot Neuroarthropathy

Up to 10% of patients with neuropathy have x-ray changes suggestive of Charcot Neuroarthropathy
- Diagnose clinically by finding swelling, pain and a temperature difference between the feet, even in the absence of X-ray changes
- A foot with dense neuropathy and no previous ulcer presenting in this way is more likely to be a Charcot foot than osteomyelitis
- Refer to specialist foot clinic at RIE
- Immobilisation is the mainstay of treatment.
- Intravenous pamidronate or oral bisphosphonates may help to settle the process earlier.

SCREENING AND MANAGEMENT OF KIDNEY COMPLICATIONS

Complications: Nephropathy

- Diabetic nephropathy is detected clinically by the presence of persistent microalbuminuria or proteinuria.
- The peak incidence of nephropathy is usually 15-25 years following onset of diabetes in type 1 but may be present at diagnosis in type 2.
- Development of renal disease occurs with poor glycaemic control, hypertension and smoking
- The presence of nephropathy is an independent and powerful predictor of macrovascular disease.
- Screening is vital as early detection and effective treatment can slow progression of nephropathy therefore significantly delaying end stage renal failure.
- The possibility of non-diabetic renal disease should be considered if atypical features, including haematuria and absence of retinopathy, are present

The natural course of diabetic renal disease may be summarised as follows:

Stages	Laboratory Features
Stage 1:	Normal urinary albumin excretion rate Normal serum creatinine
Stage 2:	Increased urinary albumin excretion rate (microalbuminuria) Dipstick negative for proteinuria Normal serum creatinine
Stage 3:	Dipstick positive proteinuria Serum creatinine normal or minimally elevated
Stage 4:	Progressive decline in renal function Rising serum creatinine
Stage 5:	End stage renal failure

MICROALBUMINURIA & PROTEINURIA

- **Microalbuminuria** refers to urine albumin concentrations that are below the limit of detection of routine urine dipsticks **(i.e. dipstick negative proteinuria).**

- **Proteinuria** refers to urine albumin concentrations that are detectable by routine dipsticks **(i.e. dipstick positive).**

- In Type I diabetic patients, persistent microalbuminuria, is a marker of early nephropathy.

- In Type 2 diabetic patients, microalbuminuria correlates with macrovascular disease and underlying hypertension and is a marker for nephropathy.

- Microalbuminuria in Type 2 diabetes should be viewed as an additional and independent cardiovascular risk factor. Co-existing CHD risk factors should be treated aggressively in Type 2 diabetic patients who are microalbumin positive.

- In both types of diabetes, improved diabetic control **(Target HbA1c ≤ 7.0%)** and particularly aggressive anti-hypertensive therapy may retard the progression of nephropathy.
- All patients with nephropathy should be treated with a statin and strongly advised to stop smoking.

Who should be tested?
Test ANNUALLY for microalbuminuria in patients who are dipstick negative as follows:
- Type 1 diabetic patients, aged >12 years, with duration of diabetes of more than 5 years
- Type 2 patients

Which sample should be sent?
- First voided morning urine sample in a clean universal container.

This is for measurement of urinary albumin:creatinine ratio (ACR). An ACR > 2.5 mg/mmol in men or >3.5 mg/mmol in women equates to microalbuminuria on 2 out of 3 occasions. An ACR > 30 mg/mmol indicates diabetic nephropathy.
(Samples should **NOT** be sent from patients who have evidence of UTI (nitrite positive).For those who display dipstick positive proteinuria (more than ++) or haematuria a spot urine should be sent)
- Random urine sample may be used but has a higher false +ve rate.

Interpretation of Results

DIAGNOSIS		ACR (mg/mmol)	ACTION
Negative		**<2.5 men <3.5 women**	**Repeat annually.**
Microalbuminuria		**2.5 – 30 men 3.5 – 30 women**	**Repeat to confirm persistently abnormal result.**
Proteinuria		**>30**	**Repeat to confirm persistently abnormal result.**

Management of Diabetic Renal Disease

Prevention:

- Good blood glucose control (HbA1c <7.5%), good blood pressure control (BP 140/80mmHg)

Treatment:

- Apply aggressive targets for control of hypertension
  - Type 1 diabetes <120/70mmHg
  - Type 2 diabetes<130/80 mmHg

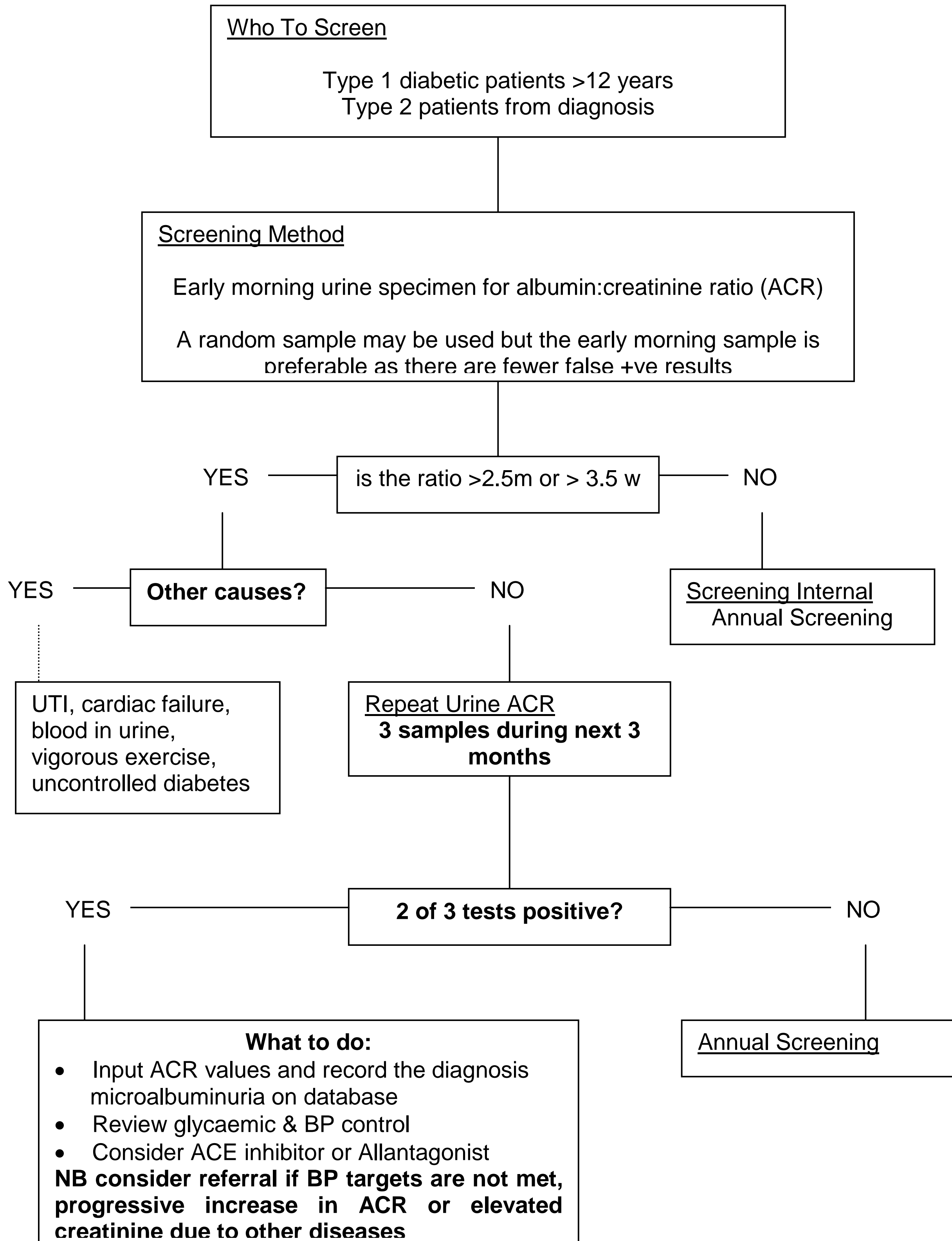
- Encourage smoking cessation
- Improve glycaemic control
- Introduce an ACE Inhibitor in patients with Type 1 diabetes with microalbuminuria or overt proteinuria, regardless of BP. Remember the possibility of teratogenesis in females of childbearing age.
- Introduce an ACE Inhibitor or ARB in patients with Type 2 diabetes, as 1st-line therapy. Remember the possibility of co-existing renovascular disease
- In all patients, co-existing cardiovascular risk factors should be managed aggressively.
- Refer to dietitian for dietary assessment and advice in relation to protein and sodium intake

Criteria for Referral to Hospital Diabetic Clinic

Patients with any of the following:

- Persistent microalbuminuria
- Overt proteinuria
- Elevated serum creatinine (>150μmol/L)

Microalbuminuria Screening in People with Diabetes



SCREENING AND MANAGEMENT OF CARDIOVASCULAR RISK IN DIABETES

Lipids

Hypercholesterolaemia is an important reversible risk factor for cardiovascular disease and should be tackled aggressively in all diabetic patients.

- In Type 1 patients, normal or high HDL-cholesterol concentrations are often seen. However an elevated HDL-cholesterol is not associated with the same cardio-protective effect as in non-diabetic individuals.
- The characteristic hypertriglyceridaemia of Type 2 diabetes is mild hypercholesterolaemia, low HDL-cholesterol and hypertriglyceraemia.
- Triglyceride concentrations are elevated by poor glycaemic control. Triglycerides may normalise with good glycaemic control, attention to diet and increasing exercise. Excess alcohol consumption is also associated with elevated triglyceride concentrations.

Screening for dyslipidaemia

- Lipids should be checked at diagnosis and annually thereafter.
- Assess more frequently if lipid-lowering therapy is prescribed.
- Total cholesterol, HDL-cholesterol and triglycerides should be requested. For ease, non-fasting estimation is usually adequate. Lipids should not be screened in people whose life expectancy is estimated to be less than five years.

MANAGEMENT

1. Lifestyle Advice

Reinforce dietary advice and optimise glycaemic control.
Provide weight reduction diet for those with BMI > 25.
If BMI > 30, set target of 5-10 kg weight loss.
Increase fruit and vegetable consumption (5 portions per day).
Increase oily fish consumption (2 portions per week).
Reduce saturated fat intake.
Encourage regular exercise

2. Exclude (and Treat) Secondary Causes of Hypercholesterolaemia

Alcohol excess
Hypothyroidism
Nephrotic Syndrome
Cholestasis
Drugs (e.g. diuretics, corticosteroids)

3. Drug Treatment: Patients with existing cardiovascular disease (Secondary Prevention)

Includes diabetic patients with angina, myocardial infarction, cerebrovascular disease and peripheral vascular disease

- Treat with a Statin if **Total cholesterol ≥5 mmol/L**
- All patients should receive Aspirin. If aspirin is contraindicated, alternative anti-platelet therapy, such as clopidogrel, should be considered.

4. Drug Treatment: Patients without cardiovascular disease (Primary Prevention)

- Type 1 and Type 2 patients with evidence of nephropathy (microalbuminuria or proteinuria present) should be regarded as candidates for secondary prevention and treated with a statin.
- Consider this approach also in Type 1 patients with a family history of premature ischaemic heart disease

- In all other patients, the absolute risk of developing CHD over 10 years may be calculated using the Joint British Coronary Prevention Chart (see Website for electronic version).
- Treatment with a statin is recommended when the 10 year risk of the event is $\geq$ 30%
- Consider treatment at a lower risk threshold (e.g. 15-30% risk) in people with diabetes as true CHD risk may be under-estimated by the chart
- The Joint British Chart does not take into account a family history of premature CHD. Where this is relevant (i.e. 1St degree male relative affected before age 55 or female before age 65), multiply the risk of an event by a factor of 1.5 to obtain a more accurate assessment.
- Consider adding Aspirin in patients whose 10 year risk of an event is $\geq$ 15%.

Assessment of absolute CHD risk may be performed using the Joint British Coronary Prevention Chart. Intervention with a statin is recommended if 10 year risk of an event is $\geq$ 30%
RISK ESTIMATION SHOULD NOT BE PERFORMED IN
- **Patients with existing cardiovascular disease**
- **Type 1 & Type 2 patients with nephropathy.**

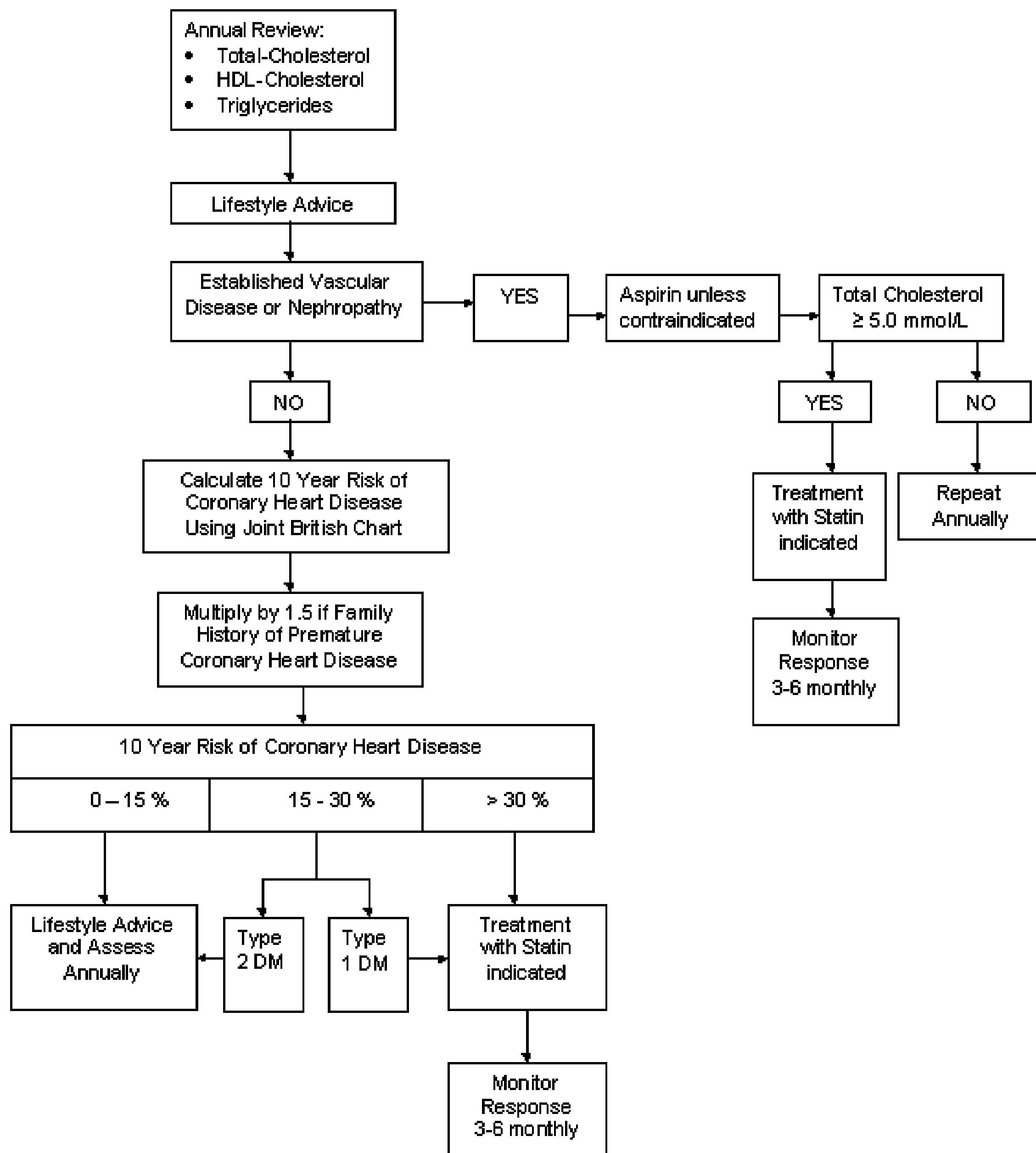
Age Limits
- There should be no ‘upper age limit’ for prescribing lipid-lowering therapy. Each individual should be considered on his/her own merits and, if life expectancy is estimated to be greater than five years, lipid-lowering therapy should be prescribed if standard criteria are met
- Once treatment is established, it should not be discontinued at any particular age, unless clinically indicated due to other conditions.

In patients with persistently raised Triglyceride concentrations

Check fasting sample (Total-cholesterol, HDL-cholesterol & Triglycerides)
Optimise glycaemic control
Exclude co-existing pathology e.g. alcohol excess.

LIPID LOWERING DRUGS
Drug choice should be made on the balance of trial evidence, safety and cost-effectiveness

Flowchart for Management of Dyslipidaemia in Diabetes



Statins

- First-line choice for isolated hypercholesterolaemia or combined hyperlipidaemia, providing (random) triglycerides are < 5 mmol/l. See Lothian Joint Formulary for preparations.
- Monitoring of liver function and creatinine kinase is recommended

Fibrates

- Suitable if combined hyperlipidaemia present (random triglycerides >5 mmol/L)
- Not advisable in the presence of renal impairment (serum creatinine > 150 µmol/l)
- Combination therapy with a Statin is possible, but close monitoring of liver function and creatinine kinase is essential (increased risk of hepatic damage and myositis)

DIABETES AND DRIVING

DIABETES AND DRIVING

Ordinary Driving Licences: informing the Driver and Vehicle Licensing Agency

- It is a statutory requirement for the patient to inform the Driver and Vehicle Licensing Agency (DVLA) when receiving treatment with insulin or oral antidiabetic drugs. The DVLA need not be informed if treatment is with diet alone but must be informed when treatment is started with oral medication or if changed to insulin therapy, either alone or in combination with antidiabetic drugs.

- Patients treated with insulin will be sent a Diabetic 1 form which will ask for further details including the name of the patient's GP or hospital physician and for consent to approach that doctor directly if necessary for relevant information to assess medical fitness to drive.

- If insulin-treated, the licence will be issued for 1, 2 or 3 years. If treated with oral medication, the usual "till 70" licence will be retained providing there are no other medical conditions which may prevent this.

- The DVLA must be informed if any other medical problems or diabetic complications develop which could affect the safety of driving, irrespective of the method of treatment required for diabetes.

- Contact address and telephone number:
  Medical Adviser
  Drivers Medical Unit
  DVLA
  Longview Road
  Swansea SA99 1TU

  Telephone 0870 600 0301
  Web address: www.dvla.gov.uk

Vocational Driving Licences for Large Goods Vehicles and Passenger Carrying Vehicles

- Since April 1991 the issue of a Large Goods Vehicle (LGV) or Passenger Carrying Vehicle (PCV) licence is not permitted by statute to people treated with insulin. A person holding an LGV or PCV licence will have their vocational driving licence revoked when they commence to treatment with insulin.

- The only exception is drivers who had type 1 diabetes and were issued with such a licence before April 1991 when the law was changed. will retain a vocational driving licence under "Grandfather's Rights" These cases are dealt with individually and licences can be reissued annually subject to a satisfactory medical review.

- LGV or PCV licences can be held by people treated with diet or Oral antidiabetic drugs providing there are no visual or medical problems.

Lighter Goods/Smaller Passenger Vehicles

Since January 1998, drivers on insulin have been barred from driving vehicles in D1 category (small passenger carrying vehicles for 8 or more passengers). Regulation changes in April 2001 allow 'exceptional case' insulin-treated drivers to apply for or retain their entitlement to drive class C1 (3500-7500kgs lorries) subject to annual medical examination.

Hypoglycaemia

The main problem is the possibility of hypoglycaemia occurring while driving.

To avoid hypoglycaemia drivers should be advised to:

- abstain completely from alcohol when driving
- Always carry fast acting carbohydrate food which is easily accessible in the car e.g. a glucose drink, or confectionary
- Drive for no more than 2 hours without eating a snack
- Check blood glucose before and at 2 hour intervals during journeys
- Carry identification indicating that they have diabetes

If symptoms of hypoglycaemia do occur while driving, drivers should be advised to:

- Stop the vehicle in a suitable location as soon as it is safe to do so
- Immediately take s glucose drink or tablets
- Remove the ignition key and move into a passenger seat to avoid any suggestion that the person remain in charge of the car
- Do not recommence driving until 45 minutes after blood glucose has been restored to normal (because of delayed cognitive recovery)

Diabetic drivers should know that if they have an accident attributable to hypoglycaemia they render themselves liable to the charge of driving under the influence of drugs.

Visual Standards

Visual standards relating to driving are identical to those applied generally. The driver should be able to read a number plate (7.9cm) at a distance of 20.5 metres and have a visual field of at least 120° in the horizontal axis and at least 20° in the vertical axis. This approximates to an equivalent Snellen Chart corrected acuity of 6/12. If in doubt, refer specifically to the Ophthalmology Clinic for formal assessment. People who have had laser therapy for diabetic eye disease may require formal testing of their visual fields with perimetry to ensure that they meet the required standard for driving.

Motor Insurance

Diabetes must be disclosed either when arranging a new policy or at the time of diagnosis. Change in treatment or the development of new complications should be disclosed when they occur and should not await renewal of the policy.

Failure to notify the insurer can invalidate cover in the event of a claim.

Not all insurance companies will load their policies for diabetes in the same way and there is no single insurance scheme which will be the cheapest in every case. Contact Diabetes UK for further advice.

DIABETES AND TRAVEL

DIABETES AND TRAVEL

Travelling and holidays should be planned in advance and advice sought from the diabetes team when necessary.

Insulin

- Patients should check what types and strengths of insulin are available in the area in which they will be travelling (refer to Diabetes UK or Pharmaceutical Company).
- Insulins used in the UK and most other English-speaking countries are of the strength U-100 (100 units/ml). In some countries insulin may come as U-40 or U-80 strengths. **If these insulins are to be used, the appropriate syringes are required.**
- Insulin should not be left in direct sunlight and should be kept in a cool place.
- **Insulin should always be carried in hand luggage to avoid the risk of losing suitcases.**
- Insulin may be absorbed faster in warmer climes, so regular blood glucose monitoring is important.
- Advice on dose or regimen adjustment maybe required for long distance travel. (e.g. crossing time zones)

What to Take

- An adequate supply of insulin, syringes or pens, needles, tablets and testing equipment as necessary, including a spare glucose meter.
- Glucose as drinks, tablets or confectionary, to treat hypoglycaemia
- A diabetes identity card which Diabetes UK can provide in different languages, or wear an identification bracelet or necklace.
- A supply of carbohydrate carried in hand luggage, to cover any travel delays or inedible airline food.
- A letter, from either GP or Diabetes Centre, with a contact telephone number and address confirming the individual has diabetes and routinely needs to carry needles, syringes, lancets and blood glucose monitoring equipment for their treatment (see Appendix 4)

Vaccinations

Patients should be advised to find out whether vaccinations are required for the proposed destination. Occasionally these can cause sickness or 'flu-like symptoms and it is prudent to have them administered well in advance of travel.

Advice: Coping with Illness

- If sickness or diarrhoea develops insulin or tablets should <u>never</u> be stopped even if solid foods cannot be tolerated.
- Carbohydrate intake should be maintained in the form of regular sugary drinks.
- Monitor blood glucose levels frequently.
- Urine should be tested for ketonuria as an early sign of decompensation.
- If sickness or diarrhoea persists <u>medical advice should be sought.</u>

Insurance

- Free or reduced cost emergency treatment is available in other EU countries. The appropriate form is available from Post Offices.
- <u>Travel insurance is vital</u>. Patients should inform the insurance company of the presence of diabetes and ensure that the insurance package provides adequate cover.

Long Haul

- If crossing time zones or travelling for many hours, specific advice regarding adjustments to insulin regimes can be obtained from the hospital team.
- Patients should bring along a flight schedule and information on time zone changes to help plan the timing of injections.

Website http://www.scottish-internet.co.uk/clients/diabetestravel/

DIABETES AND ADOLESCENCE

Adolescence is defined as those young people between the ages of 14 and 18 years for the purpose of this document.

Aim of Diabetes Care

To offer support and guidance to promote physical and psychological well being during this difficult period and into adulthood in order to:

- Avoid hospitalisation.
- Achieve optimum glycaemic control to prevent both short and long term complications.
- To provide adequate screening for the detection of early signs of complications.
- Integration of the young person into school, social and working life of their peers.
- Provision of support /education with regard to alcohol use, contraceptive advice, and drug use, particularly with regard to the possible effect on their diabetes.

Adolescent/ Young Person's Clinic

Diabetes clinics for this group are held at the Royal Infirmary, Western General, St John's and Roodlands Hospital. Doctors, diabetes specialist nurses, and dietitians from the paediatric and adult services staff the clinics. The transfer from paediatric to adult services can be unsettling. The decision as to the exact time will be based on the physical and emotional maturity of the individual and will be made in conjunction with the young person and their parent. Generally this is around the age of 14 years.

Blood Glucose Monitoring/Urine testing

- Home blood glucose monitors are provided for all young people with diabetes. Regularity of testing should be sufficient to ensure confidence in appropriate insulin management to obtain optimum blood glucose control within their lifestyle. Recording of blood glucose results to aid management is encouraged.
- Urine testing is not used to check for glucose, but is used to check for ketones during illness and episodes of high blood glucose.

Insulin Regimens

- Many teenagers opt for multiple injection regimens (4 or more per day) as this gives increased flexibility in eating times/amounts and can be an aid to exercise management. This consists of a long acting insulin with boluses of short acting insulin and may be used in conjunction with carbohydrate counting
- Three times daily insulin regimens may be used. These usually consist of mixed insulin in the morning, fast acting insulin before the evening meal, and moderate acting insulin before bed.
- Twice daily mixed insulins are occasionally used.

Provision of Written Information

Written information is provided in the form of:

- Clinic attendance, diabetes nurse support, emergency contact
- "Hypo" guidelines
- Sick Day Management
- Insulin regimens

This information is given in conjunction with teaching from a member of the diabetes team.

School/ College

Young people with diabetes should not have a lot of absences from school, college, or work. Visits to the clinic are necessary. Provided that glycaemic control is satisfactory academic and sporting achievements should not be adversely affected.

Teachers should be aware of the diagnosis. The diabetes nurse specialist will visit the school of all young people newly diagnosed with diabetes. Written guidelines on diabetes are provided and discussed. In addition education sessions are provided, for school staff, at the Royal Hospital for Sick Children and St John's Hospital from June to September annually.

Diabetes nurse specialists also provide support for staff taking children on trips.

Activity Holidays

Many teenagers respond well to the opportunity to meet socially with other young people with diabetes and this can help them to develop their own support structures. The Youth Diabetes (YD) Project started in 1983 and it provides a nationwide network of young people who meet for activities and to share their experiences.

Further information can be obtained from the Youth Diabetes Group of Diabetes UK.
www.diabetes.org.uk

DIABETES AND MEN

ERECTILE DYSFUNCTION

Erectile failure occurs in 30% of all diabetic men and affects 55% of those aged over 60 years. The cause is often multi-factorial. Vascular and neuropathic causes are common, but psychological factors may be partly or wholly responsible in some cases. Drugs, especially anti-hypertensive agents and statins, as well as alcohol may also be involved. Testosterone deficiency and hyper-prolactinaemia cause loss of libido and where present, the possibility of an underlying pituitary tumour should be excluded.

All diabetic men who complain of erectile dysfunction (ED) require a detailed history and examination.

History

1. Define the precise problem i.e. distinguish between the following
   - Loss of libido, which points to psychological factors or the presence of hyperprolactinaemia or hypogonadism.
   - Failure of erection (impotence)
   - Premature ejaculation
   - Failure of ejaculation
   - Painful or other conditions of the penis e.g. balanitis, phimosis or Peyronie's disease

2. What is the likely cause?
   - Differentiate between predominantly psychological and organic causes (see table)

3. How important is the problem and what are the patient's expectations of treatment?
   - A vital issue. The impact on the partner as well as on the patient should be assessed.

Table: Differential Diagnosis of Psychogenic and Organic Erectile Dysfunction

Psychogenic	Organic
• Was the onset rapid?	• Was the onset gradual?
• Is there an inconsistent response varying with time/partner?	• Is there a consistent lack of erections?
• Does the patient still get nocturnal or early morning erections?	• Have the patient's nocturnal or early morning erections stopped?
• Does the patient still respond to self-stimulation?	• Does the patient find no response to self-stimulation?
• Has the patient had an important life event that might contribute to erectile dysfunction?	• Does the patient have underlying disease which might be a contributing factor?
*A **YES** response to most questions suggests an underlying PSYCHOLOGICAL cause*	*A **YES** response to most questions suggests primarily ORGANIC cause and further investigations may be necessary*

Examination

1. General Assessment
   - Body habitus, presence of secondary sex characteristics, gynaecomastia

2. Cardiovascular Disease
   - Hypertension and evidence of peripheral vascular disease

3. Neurological
   - Peripheral Neuropathy

4. Appearance of external genitalia

Investigations

The presence of underlying endocrinopathy is usually rare in clinical practice and in most cases minimal laboratory tests are required.

- If hypogonadism is suspected, testosterone. If low, repeat test at least twice on early morning samples (diurnal variation). If low concentration confirmed, refer to Endocrine Clinic for advice.
- Measure prolactin if both libido and potency reduced, especially in younger patients. If abnormal, refer for endocrine assessment.

MANAGEMENT OF ERECTILE DYSFUNCTION

1. General Measures

- Improve diabetic control
- Reduce alcohol intake
- Withdraw causative drugs where possible
- Correct associated endocrine disease where present
- Involve partner as appropriate

2. Pharmacological Treatments

- Oral preparations - first choice sildenafil; second choice tadalafil and vardenafil. n.b. all contra-indicated in patients using oral, sublingual or transdermal nitrate.
- Intra-cavernosal injection of vasoactive drugs
- Intra-urethral agents

See Lothian Joint Formulary and BNF for details of preparations

3. Vacuum Devices

These work by sucking air out of a tube into which the penis has been placed and placing a constricting ring around the base of the penis to restrict blood within the penis thus maintaining an erection. They can be useful for some men particularly in a stable relationship who are not able to take medication or have problems with needles.

4. Surgical Treatment

Implants both semirigid and inflatable via a reservoir are available if all else fails.

EDUCATION AND ADVICE CHECKLISTS

New Patient with Type 2 Diabetes Checklist

NHS Lothian ________________ Diabetes Clinic

Patient Details

Contact Tel. No.

Date

WHAT IS DIABETES?	COMMENTS
• What is diabetes explained • Video – action of insulin • Symptoms of diabetes • Type 1 and Type 2 diabetes defined	
DIET Referral to dietitian – see dietary education checklist	
TREATMENT • Diet • Tablets – action, timing, side-effects • Prescriptions • Insulin • hypos	
MONITORING • Urinary glucose monitoring • Blood glucose monitoring • Meter type – strips • Finger pricker – lancets • Timing of tests • Frequency of tests • Target levels • Documentation – diary/download • Sharps disposal	

<table>
<tr><td><u>COMPLICATIONS</u>
• Eyes
• Feet
• Kidneys
• Heart/circulation
• Cholesterol/lipids
• Blood pressure
• Impotence</td><td></td></tr>
<tr><td><u>ANNUAL CHECK-UP EXPLAINED</u>
• Blood tests/urine tests
• HbA1c
• Weight
• Blood pressure
• Visual acuity and fundoscopy
• Foot examination</td><td></td></tr>
<tr><td><u>LIFESTYLE AND LIFE EVENTS</u>
• Smoking
• Exercise
• Driving and insurance
• Illness – sick day rules
• Foot care
• Diabetes UK info given – application form
• Contraception/pregnancy
• Contact telephone numbers given</td><td></td></tr>
<tr><td><u>FOLLOW-UP</u>
• Hospital appointment
• Shared care</td><td></td></tr>
</table>

Patient Dietary Education Checklist

NHS Lothian ____________________ Diabetes Clinic

Patient Details

Contact Tel. No.

Date

	Date discussed
What is diabetes?	
Effect of food on blood sugar levels	
Diabetic medications – type, when taken, and how they work	
Healthy eating – regular meal pattern meals based on complex carbohydrate decreased simple sugars decreased fat intake increased fibre intake 5 portions fruit and vegetables/day decreased salt intake glycaemic index	
Alcohol – volume, frequency and effects	
Benefits of achieving/maintaining ideal weight, and advice for healthy weight loss	
Portion sizes	
Hypoglycaemia – prevention and treatment (where appropriate)	
Exercise	
Diabetic products	
Artificial Sweeteners	
Non-alcoholic drinks	
Snacks	

Comments:

Diabetes Re-education

NHS Lothian ________________ Diabetes Clinic

Patient Details

Contact Tel. No.

Date

Duration of Diabetes

Last HbA1c Date

	CURRENT	CHANGE TO
Insulin regime and technique		
Monitoring and equipments		
Dose adjusting		
Hypos		
Exercise		
Employment/shifts		
Alcohol		
Smoking		
Diet		
Stress		
Driving		
Complications		

USUAL DAILY PATTERN

	Current		Change to	
	Weekdays	Weekends	Weekdays	Weekends
GET UP				
B'FAST INJECTION				
B'FAST				
A.M. SNACK				
LUNCH INJECTION				
LUNCH				
P.M. SNACK				
EVENING INJECTION				
EVENING MEALS				
BED INJECTION				
SUPPER				

Plan

Next clinic appointment

Date

Signature

Starting Insulin in Patients with Type 1 and Type 2 Diabetes

NHS Lothian ____________________ Diabetes Clinic

Patient Details

Contact Tel. No.

Date

WHAT IS DIABETES?	COMMENTS
• Symptoms – why?	
PRACTICAL SKILLS • Dialing dose / ?Drawing up • Injection technique Sites – rotation Disposal Storage of insulin Needle length Pen type / syringe size INFORMATION ABOUT INSULIN • Insulin type • Action / duration • Timing of injections	
BLOOD GLUCOSE MONITORING • Meter type – strips • Finger pricker – lancets • Timing of tests / frequency • Target levels • Adjusting of insulin dose • Downloading – clinic • Downloading – home • Documenting • Relation to HbA1c – target	
DIETETICS • Carbohydrate counting	
HYPOGLYCAEMIA • Signs and symptoms • Causes • Treatment • Glucagon • ID • Honeymooning	
HYPERGLYCAEMIA • Signs and symptoms • Causes • Treatment • Ketostix / blood ketones / optium • Sick day rules	

LIVING WITH DIABETES • Exercise • Alcohol • Work • Foot care • Effects of stress • Impotence • Contraception / pregnancy • Holidays • Smoking • Recreational drugs	
COMPLICATIONS • Eyes • Feet • Kidneys • Heart • Impotence • DCCT / UKPDS	
CLINIC APPOINTMENTS • Annual Review – what care to expect • Routine – what care to expect • Free prescription • Free eye test with optician • Inform DVLA and Insurance • DUK application form	
CONVERSIONS • OHA – what to continue	

Next Clinic Appointment:

Next DSN Appointment:

Patient literature given:

Patient Dietary Education Checklist for Starting Insulin

NHS Lothian ____________________ Diabetes Clinic

Patient Details

Contact Tel. No.

Date

	Date discussed
What is diabetes?	
Effect of food on blood sugar levels	
Diabetic medications – type, when taken, and how they work	
Healthy eating – regular meal pattern meals based on complex carbohydrate decreased simple sugars decreased fat intake increased fibre intake 5 portions fruit and vegetables/day decreased salt intake glycaemic index carbohydrate counting	
Alcohol – volume, frequency and effects	
Benefits of achieving/maintaining ideal weight, and advice for healthy weight loss	
Portion sizes	
Hypoglycaemia – prevention and treatment (where appropriate)	
Exercise	
Diabetic products	
Artificial Sweeteners	
Non-alcoholic drinks	
Snacks	
Diet and Illness	

Comments:

Pre-pregnancy checklist for women with diabetes

NHS Lothian ________________ Diabetes Clinic

Patient Details

Contact Tel. No.

Date

PRESENT HbA1c Discuss reason for good control. Advise to prevent pregnancy until conditions are right (HbA1c 7 – 7.5)	COMMENTS Less than 7% ideally
CONTRACEPTION Current method used Keep diary of menstrual periods	
FOLIC ACID	Date started; Dose; 5mg
SMOKING Amount per day Advice given to stop/leaflet given	
BLOODS HbA1c, rubella, thyroid and renal function, FBC, red cell folate, vitamin B12	
BP	
FUNDOSCOPY	
BLOOD GLUCOSE MONITORING Meter, diary, frequency. Prior to conception at least 2-3 days per week Once pregnant 4 time a day	Aiming for blood glucose levels between 4 – 6 pre-meals
CURRENT INSULIN REGIME Type, pen syringe, needle size, injection sites/technique	
HYPOGLYCAEMIA Discuss risk of moderate – severe hypo increased a) in women who have many hypos b) in women who have had diabetes for a long time c) if history of severe hypos in previous pregnancies	
COMMON HYPO PATTERN IN	

PREGNANCY a) in early pregnancy – conception to 16 weeks b) in last few weeks usually at night c) round the time of delivery, during labour and immediately after	
HYPERGLYCAEMIA Test for ketones if blood sugar is high i.e. more than 9.0 or if ill or vomiting Give oral and written instructions on how to obtain advice at any time of day or night	
DISCUSS Glucagon, info leaflet – hypo, ID card, dextrosol, there is no evidence that hypos can cause abnormalities in human pregnancies	
DIETITIAN Assessment of diet in relation to diabetic control and general health (folate, iron, calcium) and food hygiene and safety.	
COMPLICATIONS OF DIABETES	
OTHERS	
FOLLOW-UP ARRANGEMENTS	

Travelling across time zones

NHS Lothian ___________________ Diabetes Clinic

Patient Details

Contact Tel. No.

Date

Name:

Insulin type:
Insulin dose:

Destination:

Flight details – outward journey

	Our time	Their time
Departure		
Arrive		
Departure		
Arrive		

INSULIN INJECTIONS

Flight details – return journey

	Their time	Our time
Departure		
Arrive		
Departure		
Arrive		

INSULIN INJECTIONS

Signature:

Date:

COMMENTS:

Travel checklist

NHS Lothian ___________________ Diabetes Clinic

Patient Details

Contact Tel. No.

Date

Signed

Details of trip

Companion:

Destination:

Departure/return dates:

Insulin type:

Usual doses:

Last HbA1c:

	Comments	Completed
Health checks • Diabetic annual review • Podiatrist • GP • Vaccinations • Dentist • Optician	Date: Prescription Antibiotics	
Bureaucracy • Medical Insurance • Customs letter • Identification • Driving licence	Given Y / N	
Diabetes drugs • Insulin type • Pen device and needles • Disposal • Availability • Transporting	Give spare Y / N Contact company	

Diabetes equipment • Blood glucose meter • Test strip availability • Finger pricker • BM sticks • Ketostix / Multistix	Give spare/battery Y /N Temperature effect Give spare Y / N Give Give	
Getting there • Meals • Time zones	Give time zone sheet	
Info for travel companion • General diabetes • Hypoglycaemia	Show glucagen kit Give hypo literature Dextrosol - humidity	
Food and alcohol • Specific CHO foods • Dose adjusting - food - alcohol	Give translations e.g. sugar-free	
Illness • Blood glucose monitoring • Dose adjusting • Ketostix • Diet	Give	
Website details		
e-mail address		
DUK translations		
Follow up on return	DSN appt. Diabetic clinic appt.	

one more checklist to be added.

MANAGEMENT OF DIABETIC KETOACIDOSIS

MANAGEMENT OF DIABETIC KETOACIDOSIS

Diagnosis

- elevated plasma and/or urinary ketones
- metabolic acidosis (raised H^+/low serum bicarbonate)

Remember that hyperglycaemia, although usually marked, is not a reliable guide to the severity of acidosis, and in children, pregnant women, malnourished or alcoholic patients, blood glucose may not be very raised.

The degree of hyperglycaemia is not a reliable guide to the severity of the metabolic disturbance in DKA.

The presence of the following features should alert you to the possibility of DKA:

- intra and extra-vascular volume depletion with reduced skin turgor, tachycardia and hypotension (late features)
- rapid and deep sighing respirations, smell of ketones
- ketonuria
- vomiting/abdominal pain
- drowsiness/reduced conscious level

Consider DKA in any unconscious or hyperventilating patient.

Remember:

- Consider DKA in any unconscious or hyperventilating patient.
- Patients with adverse clinical signs (on the SEWS chart) or signs of cerebral oedema (see below) should be discussed immediately with senior medical staff.
- These guidelines refer to adult patients. All patients under the age of 16 should be discussed with the paediatric diabetes team at the Sick Children's hospital and arrangements made for transfer when clinically appropriate.

Immediate management – Within the First Hour

Initial Assessment

- Airway and breathing - correct hypoxaemia.
- IV access.
- monitor ECG, O_2 saturations, pulse, BP, respiratory rate, conscious level and fluid balance.
- Laboratory blood glucose, bedside BM, urea and electrolytes, serum bicarbonate, arterial blood gases.

Fluid Replacement

- Commence rehydration with 0.9% saline 1000 ml over one hour.

Intravenous Insulin

- Prepare intravenous insulin infusion (see below) and commence at 3 units/hr

Other Interventions/Actions

- NG tube if impaired consciousness or protracted vomiting.
- Catheter if oliguric.
- Consider central line if clinically indicated.
- Admits patient to a high dependency area.
- **Call the metabolic/diabetes registrar.**

Ongoing management – Hours 2 - 4

Reassess patient regularly and monitor vital signs

Intravenous fluids

- Aim to rapidly restore circulating volume and then gradually correct interstitial and intracellular fluid deficits.
- Use isotonic saline (see example below) – infusion rates will vary between patients, remember risk of cardiac failure in elderly patients.
- If hypotension (SBP < 100 mmHg) or signs of poor organ perfusion are present, use colloid to restore circulating volume.
-

1000mls 0.9% saline over 2nd hour

500mls 0.9% saline over 3rd hour

500mls 0.9% saline over 4th hour

- Add in 10% dextrose once blood glucose $\leq$14 mmol/l. Infuse at 100mls/hr. **Do not alternate saline and dextrose.** Measure U&Es and *venous* bicarbonate at the end of hour 2 and hour 4.

Electrolyte replacement

- Despite a considerable total body potassium deficit (300 – 1000 mmol/l), plasma potassium levels are usually normal or high at presentation, because of acidosis, insulin deficiency and renal impairment.
- Potassium concentration **will** fall following commencement of treatment; expect to give plenty of potassium.
- Target potassium concentration is 4.0-5.0 mmol/l.

Severe hypokalaemia complicating treatment of DKA is potentially fatal and is usually avoidable.

Blood Glucose and Insulin

- Hourly *laboratory* glucose
- Aim to ensure a gradual reduction in blood glucose over the first 12-24 hours. There is no specific evidence to avoid rapid rates of fall (e.g. >5mmol/hr), but there are some observational data to suggest that excessive rates of fall may be associated with cerebral oedema.
- The target blood glucose concentration for the end of the first day is 10-20mmol/l.
- Make up an infusion of 50 units of soluble insulin (e.g. Humulin S or Actrapid) in 50 mls 0.9% saline (1 unit/ml) and infuse using a syringe driver.

Aim for a gradual reduction in blood glucose over 12 hours

- 6 units/hr initially
- 3 - 4 units/hr when blood glucose < 14 mmol/l

If plasma glucose does not fall in the first hour, the rate of infusion needs increased - **phone the metabolic registrar and/or senior medical staff for advice**

- If blood glucose falls below target (i.e. <9mmol/l) on 3 units/hr, reduce insulin infusion to 2 units/hr. **Do not reduce the insulin rate below this.** If glucose continues to fall, increase the infusion rate of dextrose or the concentration. Discuss with the diabetes registrar and/or senior medical staff.
- Remember that intravenous insulin has a half-life of 2.5 minutes. It is important that the insulin infusion is not interrupted.

Consider Precipitating Factors

If indicated check:

- FBC
- CXR
- ECG
- Urine gram stain and culture
- Blood cultures and other infection screen

Correction of acidosis

- Volume resuscitation and insulin infusion will correct metabolic acidosis in the majority.
- Ketonaemia typically takes longer to clear than hyperglycaemia.
- Intravenous sodium bicarbonate should not be used routinely and certainly not without discussing with a senior doctor (there is evidence it may cause harm if there is evidence of cardiogenic shock or other lactate-generating conditions).

Other measures

- Urinary catheter: if cardiac failure, persistent hypotension, renal failure or no urine passed after 2 hours.
- CVP line: consider if elderly with concomitant illness, cardiac failure or renal failure.
- Give standard venous thromboembolism prophylaxis.
- Antibiotics: only if infection is proven or strongly suspected. Remember that raised WBC and fever occur with metabolic acidosis.
- Screen for myocardial infarction if > 40 years old

Subsequent Management – 4 hours+

Fluids and Electrolytes

- Allow oral intake if swallowing safe and bowel sounds present.

- Measure U&Es and venous bicarbonate twice daily, until bicarbonate within the normal reference range.
- Continue with 0.9% saline ≤250ml/hour until bicarbonate is in the reference range and the patient is eating.
- Continue potassium infusion until target is maintained.

Insulin and Dextrose

- A blood glucose meter can be used to monitor blood glucose concentration if the previous laboratory blood glucose is <20mmol/l.
- Pre-meal subcutaneous insulin should be administered to patients who are eating, even when on intravenous insulin. Discuss the doses with the diabetes registrar.
- Maintain IV insulin (minimum rate 2 units/her) and 10% dextrose infusion (100ml/hr) until biochemically stable and patient has eaten at least two meals. In such circumstances, stop IV insulin 30 minutes after subcutaneous insulin.

Continuing Care

- Ensure patient is reviewed by the diabetes team on the day following admission (at the very latest), so that the cause of the DKA can be elucidated, appropriate education can be given and follow up arranged.
- Patient should not be discharged until biochemically normal, eating normally and established on subcutaneous insulin.
- Ensure that a copy of the discharge summary is sent to the diabetes team.

Acute complications

- Hypokalaemia: due to inadequate potassium replacement and predictable due to insulin and fluid administration and resolution of acidosis. Avoid by regular monitoring of electrolytes and appropriate potassium replacement.
- Hypoglycaemia: due to overzealous treatment with insulin.
- Hyperglycaemia: due to interruption or discontinuance of intravenous insulin after recovery without subsequent coverage by subcutaneous insulin – **always ask advice of metabolic registrar.**
- Cerebral oedema: rare but potentially fatal. More common in children, but is seen in young adults. Characteristically, the patient has initially responded well to treatment prior to the development of severe headache and neurological deterioration. **Get urgent senior help.** Treatment is with mannitol 0.5 – 2-g/kg body weight.
- ARDS: suspect if dyspnoea, tachypnoea, central cyanosis and non-specific chest signs. Manage on ITU.
- Thromboembolism – presentation and management as standard.

Potassium replacement

No potassium in the first litre unless known to be < 3.0 mmol/l

Thereafter, replace potassium as below:

plasma potassium (mmol/l)	potassium added (mmol/hr)
< 3.5	40*
3.5 – 5.0	20
>5.0, or anuric	No supplements

* must be given in one litre of fluid; avoid infusion rates of KCL >10 mmol/hr

Protocol prepared by Vincent McAulay 10/2002
Updated by Mark Strachan 5/2004

MANAGEMENT OF ACUTE HYPOGLYCAEMIA

MANAGEMENT OF ACUTE HYPOGLYCAEMIA

Recognition and Diagnosis

- defined arbitrarily as laboratory blood glucose < 3.5 mmol/l
- always confirm hypoglycaemia with a laboratory measurement, but treat on basis of BM while awaiting lab result
- symptoms of hypoglycaemia are age specific, with behavioural change being common in children and neurological symptoms prominent in the elderly – always check blood glucose in patients with suspected stroke
- most patients presenting with hypoglycaemia will be on insulin or sulphonylurea drugs, e.g. gliclazide

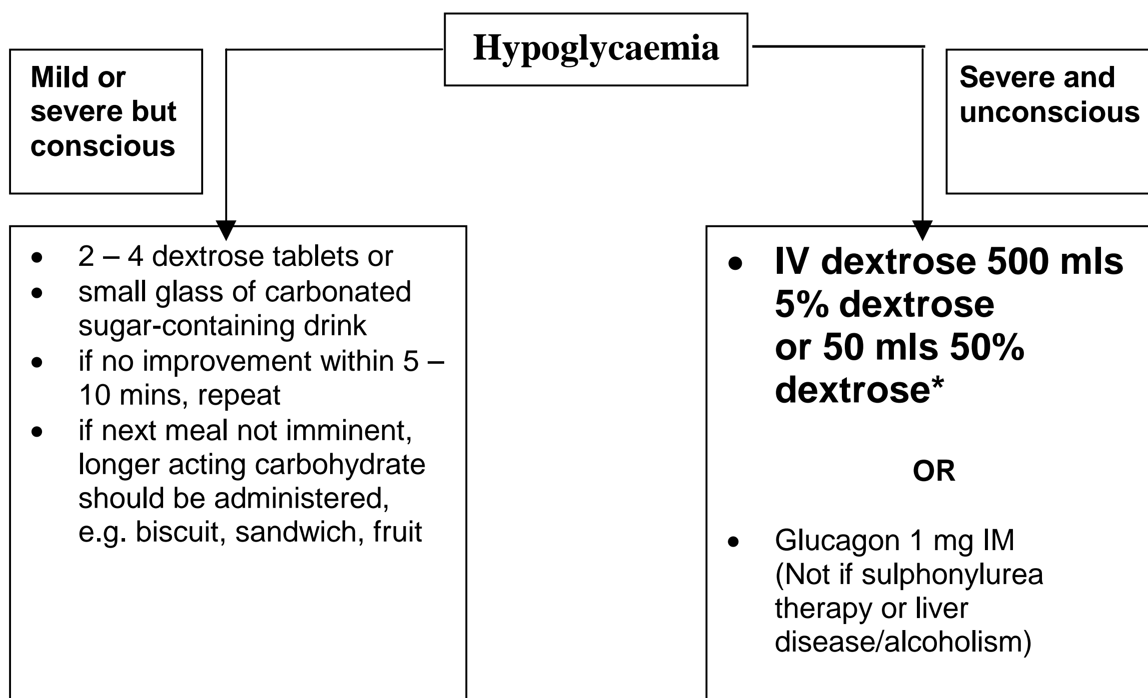
COMMON SYMPTOMS OF HYPOGLYCAEMIA

Autonomic	Neuroglycopenic	Non-specific
Sweating Trembling Pounding heart Anxiety Hunger	Weakness Visual disturbance Difficulty speaking Tingling Dizziness Difficulty concentrating Tiredness Drowsiness Confusion	Headache Nausea

UNUSUAL ASSOCIATIONS AND PRESENTATION OF HYPOGLYCAEMIA

Cardiovascular	*Neuropsychological*	*Miscellaneous*
Prolongation of QT-Interval Atrial Fibrillation Non-Sustained Ventricular Tachycardia Silent Myocardial Ischaemia Angina Myocardial Infarction Sudden Death	Focal/Generalised Convulsions Coma **Hemiparesis; TIA's** Ataxia, Choreoathetosis Focal, Neurological Deficits Decortication Cognitive Impairment Behavioural/Personality Change **Automatism/Aggressive behaviour** Psychosis	Fracture of Long Bones/Vertebrae Joint Dislocation Soft Tissue Injury Head Injury Burns Hypothermia Road traffic accidents

Management



*50% dextrose must be administered into a large vein to avoid extravasation

Recovery from hypoglycaemia may be delayed if:

- hypoglycaemia has been prolonged or severe.
- an alternative cause for impairment of consciousness co-exists, e.g. stroke or drug overdose.
- patient is post-ictal (convulsion caused by hypoglycaemia).

Sulphonylurea-induced hypoglycaemia (SIH)

- mild SIH is treated in a similar way to insulin-induced hypoglycaemia (see above).
- sulphonylurea-induced hypoglycaemic coma requires intravenous dextrose and treatment in hospital because relapse after initial resuscitation is well recognised. An intravenous bolus of glucose stimulates insulin secretion, especially in individuals who have retained pancreatic beta-cell function, and many people will require an ongoing intravenous infusion of 10% dextrose to sustain the blood glucose concentration above 5.0 mmol/l. **Inform metabolic registrar.**
- **avoid glucagon – may cause paradoxical worsening of hypoglycaemia.**

Follow up

Most patients can be discharged following treatment (note exception of severe SIH), providing they have a safe means of getting home and a responsible adult to care for them. **Always discuss each case with the metabolic registrar. The metabolic registrar should advise on further management and arrange follow up of patients admitted with hypoglycaemia.** It is important to try and elucidate the reason for hypoglycaemia. The most common cause for hypoglycaemia is patient error, i.e. too much insulin or not enough carbohydrate. Others include:

- excessive exercise (hypoglycaemia can be early or occur the following day).
- excess alcohol (inhibits hepatic gluconeogenesis).
- renal failure (insulin and sulphonylureas undergo renal clearance).
- development of coincidental endocrine disease, e.g. Addison's disease (weight loss, anorexia, skin pigmentation, postural hypotension, hyponatraemia, hyperkalaemia etc), hypopituitarism, hypothyroidism.
- malabsorption and gastroparesis, e.g. coeliac disease (weight loss, abdominal pain, bloating, loose stools, glossitis, apthous ulceration, anaemia, hypoalbuminaemia etc).

Risk factors for severe hypoglycaemia

Intensive insulin therapy
Low HbA1c
Previous history of severe hypoglycaemia
Long duration of diabetes
Impaired awareness of hypoglycaemia
Irregular life style
Alcoholism or binge drinking

Risk factors for sulphonylurea-induced hypoglycaemia

Age (not dose of drug)
Impaired renal function
Previous history of cardiovascular disease or stroke
Reduced food intake; diarrhoea
Alcohol
Adverse drug interactions
Use of long-acting sulphonylureas
Recent hospital admission

Protocol prepared by Vincent McAulay 10/2002

MANAGEMENT OF DIABETIC HYPEROSMOLAR NON-KETOTIC SYNDROME – GUIDELINES

MANAGEMENT OF DIABETIC HYPEROSMOLAR NON-KETOTIC SYNDROME –GUIDELINES

- common in frail elderly
- high mortality (30%)
- may be previously undiagnosed diabetes, but can also develop in people with known type 2 diabetes
- significant hyperketonaemia, ketonuria and acidosis are usually absent
- acute intercurrent illness is common

Diagnosis

Typical features include:
- severe hyperglycaemia (> 50 mmol/l)
- hyperosmolarity (> 320 mosmol/kg) with profound dehydration and prerenal uraemia
- depression of the level of consciousness; coma is well recognised

Plasma osmolality

2 x (Na + K) + urea + glucose (all mmol/l)
Normal range is 280 – 300 mosmol/kg

Immediate management

Initial Assessment
- Airway and breathing - correct hypoxaemia.
- IV access.
- monitor ECG, O_2 saturations, pulse, BP, respiratory rate, conscious level and fluid balance.
- Laboratory blood glucose, bedside BM, urea and electrolytes, serum bicarbonate, arterial blood gases.

Fluid Replacement
- Commence rehydration with 0.9% saline 1000 ml over one hour.

Intravenous Insulin
- Prepare intravenous insulin infusion (see below) and commence at 3 units/hr

Other Interventions/Actions
- NG tube if impaired consciousness or protracted vomiting.
- Catheter if oliguric.
- Consider central line if clinically indicated.
- Admits patient to a high dependency area.
- **Call the metabolic/diabetes registrar.**

Ongoing Management – Hours 2-4

Reassess patient regularly and monitor vital signs

Intravenous fluids

- Aim to rapidly restore circulating volume and then *gradually* correct interstitial and intracellular fluid deficits.
- Use isotonic saline (see example below) – infusion rates will vary between patients, remember risk of cardiac failure in elderly patients.
- If serum sodium exceeds 155 mmol/l, use 0.45% saline instead of isotonic.
  Discuss with metabolic/diabetes registrar

500 mls saline over 2nd hour
500 mls saline over 3rd hour
500 mls saline over 4th hour

- If hypotension (SBP < 100 mmHg) or signs of poor organ perfusion are present, use colloid to restore circulating volume.
- Add in 10% dextrose once blood glucose ≤15 mmol/l. Infuse at 125-250 mls/hr. **Do not alternate saline and dextrose.**
- Measure U & Es and serum osmolality at the end of hour 2 and 4.

Electrolyte replacement

- Target potassium concentration is 4.0-5.0 mmol/l.

Potassium replacement

No potassium in the first litre unless known to be < 3.0 mmol/l

Thereafter, replace potassium as below:

plasma potassium (mmol/l)	potassium added (mmol/hr)
< 3.5	40*
3.5 – 5.0	20
>5.0, or anuric	No supplements

* must be given in one litre of fluid; avoid infusion rates of KCL >10 mmol/hr

Blood Glucose and Insulin

- Hourly *laboratory* glucose
- Aim to ensure a gradual reduction in blood glucose over the first 12-24 hours. There is no specific evidence to avoid rapid rates of fall (e.g. >5mmol/hr), but there are some observational data to suggest that excessive rates of fall may be associated with cerebral oedema.
- The target blood glucose concentration for the end of the first day is 10-20mmol/l.
- Make up an infusion of 50 units of soluble insulin (e.g. Humulin S or Actrapid) in 50 mls 0.9% saline (1 unit/ml) and infuse using a syringe driver.

- If blood glucose falls below target (i.e. <10mmol/l) on 3 units/hr, the insulin infusion can be reduced to a minimum of 1 unit/hr. **Do not reduce the insulin infusion rate below this.** If glucose continues to fall, increase the infusion rate of dextrose or the concentration. **Discuss with the metabolic registrar.**

> - 3 units/hr initially
>
> If plasma glucose does not fall in the first hour, the rate of infusion needs increased - **phone the metabolic registrar for advice**

- Remember that intravenous insulin has a half-life of 2.5 minutes. It is important that the insulin infusion is not interrupted.

Consider Precipitating Factors:

- FBC
- CXR
- ECG/MI Screen
- Urine gram stain and culture
- Blood cultures and other infection screen

Other measures

- Urinary catheter: if cardiac failure, persistent hypotension, renal failure, no urine passed after 4 hours or impaired consciousness.
- CVP line: consider if elderly with concomitant illness, cardiac failure or renal failure.
- Thromboembolic complications are common, however full anti coagulation has been associated with a high risk of GI bleeding. Patients should receive DVT prophylaxis with LMWH, rather than unfractionated heparin and should have TED stockings (unless contraindicated).
- Nasogastric tube: if consciousness is impaired to avoid aspiration of gastric contents.
- Antibiotics: low threshold for use.

Subsequent Management – 4hours+

Fluids and Electrolytes

- Allow oral intake if swallowing safe and bowl sounds present.
- Measure U&Es twice daily, until within the normal reference range (or back to usual baseline for that patient).
- Continue with normal saline U<U250ml/hr until U&Es back to baseline and the patient is eating.
- Continue potassium infusion until target is maintained.

Insulin and Dextrose

- A blood glucose meter can be used to monitor blood glucose concentration if the previous laboratory blood glucose is <20mmol/l.
- Maintain IV insulin (minimum rate 2 unites/her) and 10% dextrose infusion (250ml/hr) until biochemically stable and patient has eaten at least two meals. It is not necessarily the case that the patient will require subcutaneous insulin; the need for sc insulin or oral hypoglycaemic therapy should be discussed with the diabetes/metabolic registrar.

Continuing Care

- Ensure patient is reviewed by the diabetes team prior to discharge, so that the cause of the HONK can be elucidated, appropriate education to be given and follow up arranged.
- Patient should not be discharged until biochemically normal, eating normally and established on appropriate therapy.
- Ensure that a copy of the discharge summary is sent to the diabetes team.

Protocol prepared by Vincent McAulay 10/2002
Updated by Mark Strachan 4/2004

Appendix 1: Initial Dietary Advice

Healthy Eating and Diabetes

When you have diabetes your body is unable to control the amount of sugar in your bloodstream. You can help control your blood sugar by being careful about the food you eat. Diet is an important part of your treatment whether you are controlled by diet, tablets or insulin. There is no need to follow a 'special' diet; a sensible eating plan is best. This leaflet is a simple guide. Your Doctor or Nurse will refer you to a State Registered Dietitian to discuss your diet in more detail.

Do Have Regular Meals

Try to have three meals per day. Missing meals, especially breakfast can lead to snacking later. If you feel you need something to eat between meals, choose low fat snacks such as fruit, vegetables or yoghurt. Have small amounts of meat, fish or pulses/lentils daily.

Eat Starchy Foods at Each Meal

Include plenty of starchy foods e.g. bread, potatoes, pasta, rice, breakfast cereals etc. Try to choose those that are higher in fibre, if possible. Some fibre rich foods can slow down the rise in blood sugar, which could improve your diabetic control. Eat regular amounts of starchy foods at breakfast, lunch, tea and supper. They help to fill you up and should form the main part of all your meals. These foods include:

- Cereals e.g. Porridge, Weetabix, Shredded Wheat, All Bran, Muesli, Oat-based Cereals, Cornflakes and Rice Krispies
- Bread and rolls – preferably wholegrain
- Potatoes – boiled or baked rather than roast or chips
- Pasta, rice, noodles and yam
- Chappati/naan bread

Fruit and Vegetables

As well as being a good source of fibre, fruit and vegetables are low in fat and calories. They contain many vitamins and minerals vital for good health. Aim for at least five portions of fruit and vegetables per day. These can be fresh, frozen, tinned or dried e.g. one apple, orange, banana, 2 plums, cup of grapes or berries, bowl of salad, 2 tablespoons raw, cooked, frozen or canned vegetables. Use tinned fruit in natural juice.

Eat Less Sugary Foods & Drinks

Foods that contain large amounts of sugar can raise your blood sugar very quickly. These foods include sweet drinks, sweets, chocolate, cakes, biscuits and puddings. Try to use low sugar or sugar free alternatives instead. Remember to take tea, coffee and cereals without sugar. If you eat regular meals, you can include foods high in sugar in your diet occasionally but keep portions small. Try:

- Artificial sweeteners where possible, available in tablet or granulated form e.g. Hermasetas, Candarel, Natreena, Sweetex
- Diet or low calorie drinks and squashes
- Low sugar jams and marmalades, or small quantities of ordinary
- Plain, low sugar cereals e.g. porridge Weetabix, Cornflakes or Bran flakes
- Plain biscuits e.g. oatcakes, rice cakes, corn cakes, Garibaldi, crackers, Rich Tea, scones or pancakes
- Low sugar puddings and yoghurts - labelled no added sugar, diet or lite

Eat Less Fatty Foods and Snacks

Eating less fat is important to staying healthy. Too much fat in your diet increases everyone's risk of heart disease. When you have diabetes the risk is increased. Fat contains a lot of calories; therefore too much will lead to weight gain. Carrying extra weight can make your diabetes harder to control and increases your risk of developing complications.
You can reduce your fat intake by:

- Baking, grilling microwaving or steaming instead of frying
- Choosing lean meats, fish or chicken (remove fat and skin)
- Using low fat dairy produce e.g. semi-skimmed milk, low fat spread and yoghurts
- Use a smaller amount of strong favoured cheese or use reduced fat cheeses e.g. reduced fat cheddar, Edam, Gouda or cottage
- Have boiled, baked or mashed potatoes instead of chips
- Avoid fatty foods such as crisps, pies, pastry, cakes, biscuits, chocolate, cream, cream sauces and salad dressings

Diabetic Products

These foods (e.g. 'special' biscuits, cakes and sweets) are very expensive and can be high in fat and calories. They also contain sorbitol, which can have an unwanted laxative effect. Therefore these products are generally not recommended.

Weight Control

Carrying too much weight can make your diabetes more difficult to control. Being overweight can also increase your risks of developing other health problems. Strict dieting is not recommended. Long-term results are best achieved by following a sensible, healthy eating plan as described in this leaflet. Your Doctor, Nurse or Dietitian will be able to discuss the most effective way for you to lose weight if necessary.

Having read the information in this leaflet, write down any changes you could make.

Alcohol

Check with your doctor whether you can have alcohol. Drinking alcohol in moderation is usually safe. Alcohol taken in excess can upset your diabetic control and lead to weight gain.
Recommended maximums
Men – no more than 3 units daily
Women – no more than 2 units daily
Aim to have 2 – 3 alcohol free days per week.
[1 unit = 1 pub measure of wine/sherry/spirit - vodka, whisky, etc or half pint of beer/lager/cider]

Salt

Cutting down on salt can help lower blood pressure. People with diabetes can be at a greater risk of developing high blood pressure. Try not to add salt at the table and avoid too many salty foods e.g. crisps, bacon, tinned and packet soups, processed meats.

Making Changes

Record your usual daily food intake here. Please include drinks.

Breakfast:

Snack:

Lunch:

Snack:

Evening Meal:

Supper:

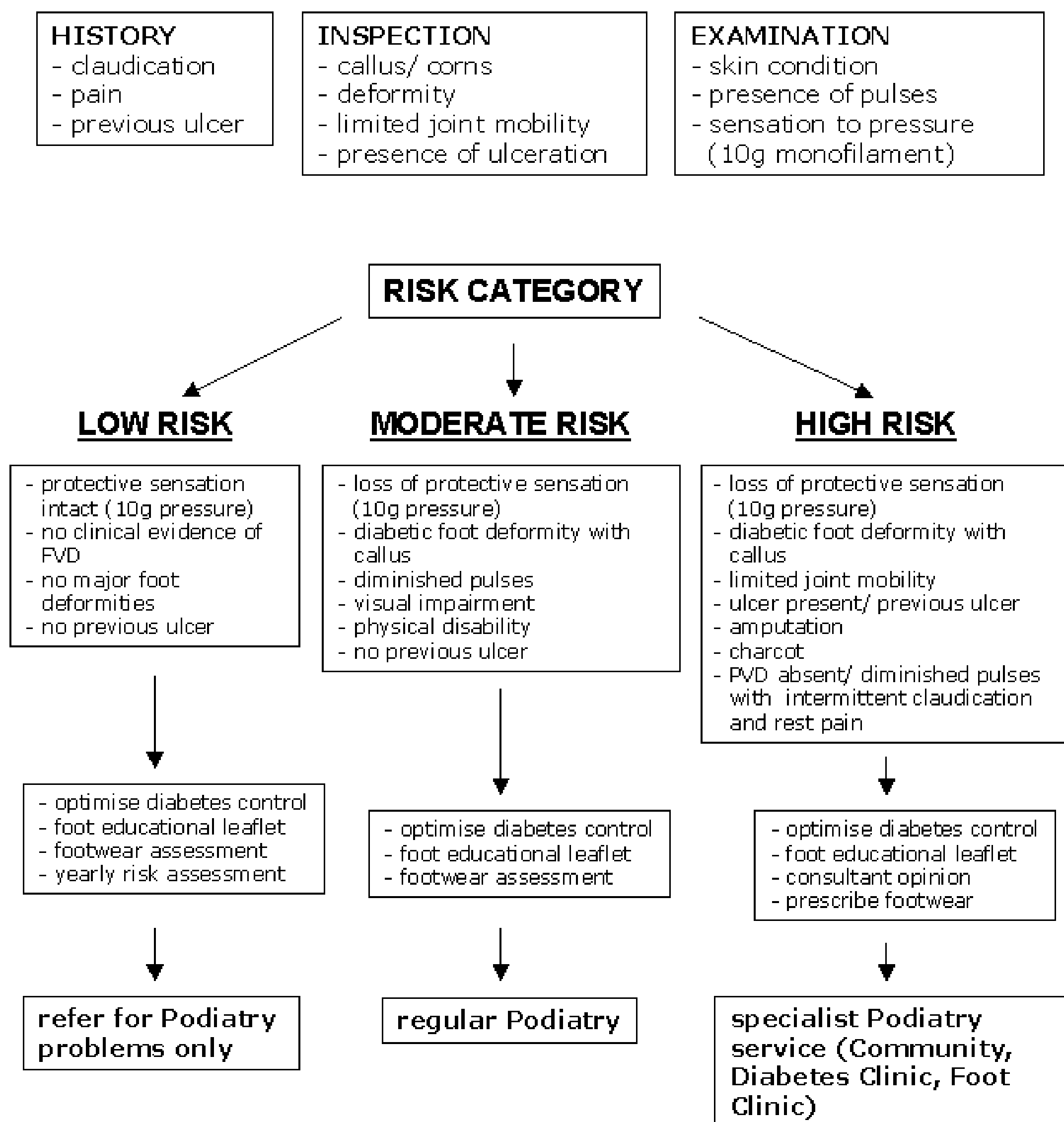
Alcohol/Extras:

Having read the information in this leaflet, write down any changes you could make.

For further dietary advice, your Doctor or Nurse will refer to you a State Registered Dietitian to discuss your diet in more detail.

Produced by NHS Lothian Nutrition Liaison Team with thanks to West Lothian NHS Trust
June 2002

Appendix 2: Annual Diabetes Foot Assessment



Appendix 3: Measurement of Blood Pressure

- Use a properly maintained and calibrated mercury sphygmomanometer.
- If an alternative device is used, ensure that it meets standards recommended by the British Hypertension Society.
- Sitting BP in left arm is recommended.
- Measure standing BP, especially in elderly and those who are pregnant, to exclude postural hypotension (a fall in SBP > 20mmHg on standing).
- Seat the patient for a minimum of 3 minutes before recording BP.
- Patient should avoid tea and coffee for 30 minutes before measurement.
- Remove tight clothing above the cuff, support arm at heart level and ensure hand is relaxed.
- Use cuff of appropriate size. Bladder should engage at least two thirds of the arm circumference.
- Lower mercury slowly by 2 mmHg per second.
- Read BP to the nearest 2 mmHg.
- In the elderly and pregnant measure DBP at Phase 4 and note in records.
- Take two measurements at each visit.

Appendix 4: Sample Letter for Patients Travelling Abroad

To Whom It May Concern:

Re: Patient's Name

The above person has a medical condition that requires treatment with regular injections. This person therefore is required to carry a supply of needles, syringes/insulin pen, insulin and other equipment for medical reasons.

If further information is required, please contact your hospital or GP surgery