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**Lothian Diabetes Handbook**

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Introduction

The Lothian Diabetes Handbook provides the recommended management guidelines for staff caring for all patients in Lothian with diabetes. The handbook contains advice, guidelines and protocols that has been developed and updated according to the Scottish Intercollegiate Guidelines Network (SIGN) 116 Guidelines for the Management of Diabetes. It also contains adapted extracts from Highland and Tayside MCNs’ diabetes handbooks.

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

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

Epidemiology

From the Lothian Diabetes Register as at August 2010 we know that in Lothian at least 4% of the population, 32,395 people, have diabetes. Of these, 86.7% have type 2 diabetes and 12.5% have Type 1 diabetes. 0.6% have another type such as maturity onset diabetes of the young (MODY) or pancreatic. 0.2% of the diabetic population do not have a recorded diagnosis.

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
Mission Statement

To promote optimum health for all people with diabetes in Lothian through the design and delivery of an integrated service.

Aims of Network

The aims of the Lothian Diabetes Managed Clinical Network (MCN) 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 offer all patients with diabetes a high standard of care
- to ensure that all patients with diabetes are seen at least annually
- to ensure appropriate referral of any 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 diabetes in Lothian
- to keep the register of patients updated and to provide a systematic call and recall system for review
The main location for care can generally be identified using the following guide:

**General Practice/Shared Care**
- type 2 diabetes not requiring insulin
- interim follow-up of risk factors for diabetic patients once assessed by hospital diabetes clinic

**Specialist Diabetes Care**
- most patients with type 1 diabetes and those requiring insulin
- women with diabetes considering pregnancy
- pregnant women with diabetes
- children and adolescents with diabetes
- patients developing complications who require specialist care
- patients with a complicated risk factor profile
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<td>Diabetes Handbook Editorial Team: Dr Karen Adamson, Dr Penny Rother, Anne Munro, Mary Scott, Sheena Douglas, Bonnie Crichton</td>
<td>Full review in July 2010</td>
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Diagnosis of Diabetes

Definitions of Diabetes:
The terms Insulin Dependent Diabetes Mellitus (IDDM) and Non-Insulin Dependent Diabetes Mellitus (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 14), 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 plasma glucose (FPG) 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.

Gestational Diabetes Mellitus

Gestational diabetes mellitus (GDM) (pg 68) 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 oral glucose tolerance test (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.

Women with a history of GDM should be screened for the condition in future pregnancies and have a fasting glucose checked annually.
Consider a Diagnosis of Diabetes In a Patient With:

- thirst and polyuria
- unexplained weight loss or tiredness
- pruritus vulvae, balanitis or recurrent ‘UTIs’
- 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 can only be made on venous blood glucose and cannot be based solely on the finding of glycosuria, raised blood glucose (finger prick sample) on a ‘stick’ reading or elevated HbA1c result.

The World Health Organisation published revised guidelines on the diagnosis of diabetes in 2000 and Diabetes UK recommended that all UK health care professionals adopt these new criteria from 1st June 2000. These guidelines have since been updated in November 2005.

Criteria for Diagnosis of Diabetes

1. **Classic symptoms** e.g. polyuria, polydipsia, unexplained weight loss

   *plus one of the following:*
   - Random plasma venous glucose concentration ≥ 11.1 mmol/L
   - Fasting plasma venous glucose concentration ≥ 7.0 mmol/L
   - Plasma venous glucose concentration ≥ 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

Ketonurina

- If ketonuria is present with severe symptoms i.e. vomiting and dehydration, urgent hospital admission is required.

- If ketonuria is present with 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 carbohydrate [CHO] daily).
- Patient should fast overnight (8-14 hours, water allowed) and rest during the test. Patients should remain seated for the duration of the test and should not eat, drink or smoke.
- Samples at times other than 0 and 2 hours are not necessary for diagnosis.
- Diagnostic interpretation of OGTT is different in pregnancy

Algorithm for the Diagnosis of Diabetes

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<tr>
<th>Random plasma glucose</th>
<th>≥ 7.8 mmol/L</th>
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<tr>
<td>Check Fasting Plasma Glucose</td>
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<tr>
<td>&lt; 6.0 mmol/L</td>
<td>No Diabetes</td>
</tr>
<tr>
<td>6.0 – 6.9 mmol/L</td>
<td>Perform OGTT</td>
</tr>
<tr>
<td>≥ 7.0 mmol/L</td>
<td>Diabetes</td>
</tr>
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</table>

OGTT
- Initial fasting plasma glucose
- 75 g of anhydrous glucose or 82.5 g of glucose monohydrate or 410 ml from a bottle of Lucozade containing 70KC/100ml
- Repeat plasma glucose at 2 hours

<table>
<thead>
<tr>
<th>Fasting plasma glucose</th>
<th>&lt; 6.0 and</th>
<th>6.1–6.9 and</th>
<th>&lt; 7.0 and</th>
<th>≥ 7.0 or</th>
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<td>2 hour plasma glucose</td>
<td>&lt; 7.8</td>
<td>&lt; 7.8</td>
<td>7.8–11.0</td>
<td>≥ 11.1</td>
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<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Normal</th>
<th>IFG *</th>
<th>IGT *</th>
<th>Diabetes</th>
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<tr>
<td>Management</td>
<td>No follow up Required</td>
<td>Annual fasting plasma glucose</td>
<td>Annual Oral Glucose Tolerance Test</td>
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* Has increased risk of future diabetes
- Advise on healthy eating, regular exercise and avoidance of obesity (pg 21)
- Check fasting plasma glucose annually
- Treat co-existing coronary risk factors aggressively, as patient is at increased risk of developing cardiovascular disease.
Management of newly diagnosed Type 2 diabetes

Practical management of newly diagnosed type 2 diabetes

Full assessment and diagnosis

Moderate or heavy ketonuria or young age

Refer to hospital urgently for assessment and initial education on Type 1 diabetes

Yes

No

- Refer to type 2 education programme (DESMOND or other)
- Consider dietetic review see dietary advice (p. 97)
- Set glycaemic target: HbA1c<53 mmol/mol (7%) or individualised agreed with patient

Algorithm for glucose lowering in people with type 2 diabetes

1st LINE OPTIONS in addition to lifestyle measures, START ONE OF

Sulphonylurea¹ (SU)

Metformin (MTF)

Intolerant of Metformin

Weight loss/Osmotic symptoms

Review: not reaching target?

Usual approach

Special considerations

¹ Continue medication if:
EITHER individualised target achieved OR
HbA1c falls >0.5% in 3-6 months

2nd LINE OPTIONS in addition to lifestyle measures, adherence to medication and dose optimisation ADD ONE OF

Sulphonylurea

Thiazolidinedione¹

DPP-IV inhibitor

Hypos a concern

No congestive cardiac failure

Hypos a concern and weight gain a concern

Review: not reaching target?

3rd LINE OPTIONS in addition to lifestyle measures and dose optimisation ADD OR SUBSTITUTE WITH ONE OF

ORAL (continue MTF/SU if tolerated)

INJECTABLE (willing to self-inject, continue MTF/SU if tolerated)

Thiazolidinedione¹

DPP-IV inhibitor

NPH insulin¹

GLP-1 analogue¹

Hypos a concern

No congestive cardiac failure

Hypos a concern and weight gain a concern

Osmotic symptoms

Inject before bed

If hypos a concern: BASAL ANALOGUE

Intensify therapy with time if required

BMI>30kg/m²

Desire to lose weight

Usually<10 yrs from diagnosis

Refer to hospital urgently for assessment and initial education on Type 1 diabetes
### Initial Assessment of Patients with Type 2 Diabetes

#### Clinical

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<th>Height &amp; Weight</th>
<th>for calculation of Body Mass Index (BMI) (kg/m²).</th>
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<td>Blood pressure</td>
<td>see <a href="#">measurement of blood pressure</a> (pg 104)</td>
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<td>Foot inspection</td>
<td>check general foot care/hygiene and check for presence of foot deformity and examine shoes for suitability and signs of uneven wear see <a href="#">foot screening checklist</a> (Pg 102)</td>
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<tr>
<td>Peripheral pulses</td>
<td>record presence and absence of dorsalis pedis and posterior tibial pulses in each foot</td>
</tr>
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</table>
| 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 |
| Eyes | Lothian patients will automatically be offered [digital retinopathy screening](#) (pg 47) if they are included on SCI-DC. It is important that they continue to see their optometrist for other eye conditions. |
| Diet and Lifestyle | • Smoking status and alcohol consumption, level of activity, BMI status.  
• Supply initial diet advice sheet. (see [appendix 1](#) pg 97)  
• Refer to dietitian and nurse for education and advice  
• Use education checklist and core education materials.  
• Consider using extra (optional) material such as the ‘Living with Type 2 Diabetes’ booklet published by the Diabetes MCN. |

#### Laboratory

| Glycaemic Control | HbA1c.  
*See [appendix 9](#) for IFCC measurement to be used from June 2011 (pg 109)* |
| Renal function | estimated glomerular filtration rate (eGFR), urea, electrolytes and creatinine |
| Liver function | liver function tests |
| Thyroid function | thyroid function tests. If Thyroid Stimulating Hormone (TSH) >2, check antithyroid antibodies. If TSH> 2 and TPO antibodies positive then require annual thyroid function test |
| Urinalysis | use specific ‘stix’ to check for presence of blood, protein, nitrite (to exclude infection) and ketones. Check lab albumin to creatinine ratio. |
| Lipid Profile | Total cholesterol, HDL-cholesterol, Triglycerides (non fasting) |
| Education | Refer to DESMOND programme or other education session. |

#### The Routine Hospital Visit Outline

Frequency of routine visits will vary. 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
Follow-Up of Patients with Established Type 2 Diabetes

The Annual Review Visit

<table>
<thead>
<tr>
<th>Clinical</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Height &amp; Weight</td>
<td>For calculation of BMI (kg/m²)</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Measure more frequently than annually if hypertensive. Target BP for the GMS is <strong>145/85</strong>: SIGN 116 recommends 130/80. Refer to Lothian Joint Formulary (LJF) for drug choice (ACE or A2 in renal disease). Be realistic in trying to reach targets in the elderly or those with multiple pathologies.</td>
</tr>
<tr>
<td>Foot inspection</td>
<td>The annual check should include investigation for neuropathy (monofilament) or vascular disease (pulses). Check general foot hygiene and check for foot deformity and examine shoes for suitability and signs of uneven wear. See <strong>Foot complications</strong> (pg 50) for foot risk assessment and referral pathway.</td>
</tr>
<tr>
<td>Eyes</td>
<td>All patients should have their retina examined annually for retinopathy. There is a national screening programme and patients must be on SCI-DC to be invited for screening. GPs should ensure that 'hard to reach' patients receive screening. Patients must see their optometrist for any other eye investigations.</td>
</tr>
<tr>
<td>Lifestyle assessment</td>
<td>Review alcohol consumption, smoking habits, diet, and coronary heart disease risk factors where relevant.</td>
</tr>
<tr>
<td>Glycaemic Control</td>
<td>HbA1c should be measured 6 monthly once at target. <strong>GMS target 7% (53 mmol/mol).</strong></td>
</tr>
<tr>
<td>Renal function</td>
<td>eGFR, Urea, Electrolytes and Creatinine annually.</td>
</tr>
<tr>
<td>Lipids</td>
<td>Total Cholesterol, HDL-cholesterol and Triglycerides (non-fasting). <strong>Target &lt;5mmol/l.</strong></td>
</tr>
<tr>
<td>Thyroid</td>
<td>Type 2 diabetes: Thyroid function test annually if TSH &gt;2 and Thyroid Peroxidase (TPO) antibodies positive. Type 1 diabetes: Test annually.</td>
</tr>
<tr>
<td>Urinalysis</td>
<td>Use specific 'stix' to test for blood, protein, or nitrite (presence of infection). If no proteinuria, send random (or better, first morning) urine sample (plain universal) to laboratory for albumin:creatinine ratio (ACR).</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Diet and Nutritional Review</td>
<td>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.</td>
</tr>
<tr>
<td>Education Update</td>
<td><strong>See Education Checklists</strong> (pg 81)</td>
</tr>
<tr>
<td>Drug Therapy</td>
<td>Review the need for treatment adjustment</td>
</tr>
<tr>
<td>Contraception</td>
<td>Discuss contraception with women of child bearing age if appropriate. Review medication and glycaemic control. Refer to hospital for pre-pregnancy advice if pregnancy is desired. Refer urgently to diabetes clinic if patient becomes pregnant.</td>
</tr>
</tbody>
</table>
Dietary Advice

Effective management of diabetes cannot be achieved without an appropriate diet. Dietary advice is based on the consensus-based recommendations of the Nutrition Subcommittee of the Diabetes Care Advisory Committee of Diabetes UK and is in line with current guidelines for healthy eating in the UK.

Type 1 Diabetes

For people diagnosed with type 1 diabetes healthy eating guidelines alone are not sufficient. They should be referred to a registered dietitian who will review their diet and tailor dietary advice to individual requirements. The importance of regular meals with consistent carbohydrate content should be emphasized. This will depend on the individual's lifestyle and the type of insulin regimen used. Information about courses such as DAFNE (Dose Adjusting for Normal Eating) and other local courses that provide information about carbohydrate counting and dose adjusting can be provided when appropriate.

Type 2 Diabetes

People newly diagnosed with type 2 diabetes should be given information about dietary education available in their area e.g. group sessions such as DESMOND (Diabetes Education for Self Management of Ongoing and Newly Diagnosed) or Supermarket tours where appropriate food choices will be discussed and appropriate information provided.

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 can contribute up to 10% of total energy and 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 is important to discuss realistic targets for weight loss with patients. 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.

Physical Activity

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.

Physical activity 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 Community Health Index (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**

**Reason for referral/review** e.g. newly diagnosed, poor glycaemic control, weight reduction.

**Relevant patient details** e.g. medication/insulin, social history

**Assessment:**
- Height, weight, BMI (Energy requirements calculated if necessary)
- Current eating habits including
  - Eating pattern
  - Complex carbohydrate and low glycaemic index (GI) sources
  - Fat consumption
  - Fibre consumption
  - Sugar consumption
  - Salt usage
  - Alcohol consumption
  - Diabetic products
- Activity/exercise
- Assess motivation to make necessary changes

**Aim of dietary intervention**
e.g. promote weight reduction, improve glycaemic control

**Treatment Plan**
advice must be tailored to suit individual needs, therefore realistic goals are given.

**Report to referring practitioner**

**Monitor**
Review at clinic or follow-up dietetic appointment or discharge
Diabetes and Obesity

People with diabetes may have a significant problem managing their weight and require specific advice to assist with weight reduction if this is the case. Dietitians are able to offer advice and support.

**Initial weight reduction advice should be:**

- Reduce energy dense food intake, in particular foods high in fat
- Increase fruit and vegetable intake
- Limit alcohol intake
- Increase physical activity levels
- Measure height, weight and BMI
- Set realistic targets for weight loss. 10% of body weight over 3 – 6 months with the aim of maintaining this.

Further information on weight reducing diets can be found on the Diabetes UK website [www.diabetes.org.uk](http://www.diabetes.org.uk), the Food Standards Agency website [www.food.gov.uk](http://www.food.gov.uk) and the British Dietetic Association at [http://www.bda-weightwise.com](http://www.bda-weightwise.com). Slimming groups can also prove helpful particularly if they offer exercise programmes in addition to dietary advice.

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

**Guidelines for the Use of Anti-obesity Drugs:**

In some circumstances anti-obesity drugs can be prescribed. Drug therapy should be undertaken under medical supervision and should be complimentary to calorie restriction and increased physical activity.

- Patients should have consulted a health care professional trained in obesity management and have spent 3 months on a structured weight management programme.
- Patients have failed to lose 10% of their body weight over 3 months. Patients who have lost >7% but <10% of body weight should continue with diet alone for a further 3 months aiming for 10% weight loss.
- BMI ≥30 kg/m² or BMI ≥28 kg/m² with co morbid risk factor(s)

**Orlistat**

- Diet and lifestyle changes are the mainstay for management of obesity.
- Before commencing drug therapy, patients should enter a minimum 3 month structured weight management programme to confirm that they can comply with dietary restriction.
- Drug treatment may be considered in patients as part of an overall treatment plan for managing obesity, who have a BMI ≥30kg/m², or BMI ≥28kg/m² plus associated risk factors.
- Patients should be informed that drug therapy will be discontinued after 3 months if they fail to lose 5% of their initial body weight since starting drug treatment. (Less strict goals may be appropriate for people with type 2 diabetes.) Further courses should only be considered after a suitable period and patients should again demonstrate the ability to lose weight on a suitable diet.
- Continue for longer than 12 months (usually for weight maintenance) only after discussing potential benefits and limitations with the patient.
- Common side-effects with Orlistat may be limited by dietary compliance (decreased fat intake).

**Contra indications to use of Orlistat (Xenical, Alli):**

- Chronic malabsorption
- Cholestasis
- Pregnancy, breast feeding and children

Orlistat (Xenical®) – Common side effects (i.e. occurring in 10-25%) are limited by dietary compliance (i.e. decreased fat intake) and it is therefore essential that these are discussed with the patient beforehand. They include flatus, oily discharge, faecal urgency and incontinence, oily stools and increased defecation.
Discontinuing Treatment with Anti-obesity drugs:

- Anti-obesity drugs are only licensed for continuous use up to two years (Orlistat). Evidence of efficacy and safety is limited beyond this period.
- Treatment must be discontinued after three months in patients who have failed to lose 5% of their starting body weight. They are otherwise at risk of drug side effects in the absence of any therapeutic benefit.
- Patients should be informed prior to treatment that drug therapy will be discontinued if they fail to lose weight or there is significant progressive weight regain (3-5kg) on treatment after an initial weight loss.
- Further courses should only be considered after a suitable time interval and patients should again demonstrate the ability to lose weight on a suitable diet.

Drug Interactions

Orlistat interacts with a significant number of drugs. Prescribers should refer to the British National Formulary (BNF) and Summary of Product Characteristics before commencing.
Lifestyle Advice

General measures to achieve a healthy lifestyle should be reinforced to patients at each visit. Individual targets should be set with patients and progress assessed at regular intervals.

- Provide with weight reduction diet if BMI >25
- Encourage to stop smoking: Contact Health Education Board for Scotland (HEBS) or Smokeline (0800 84 84 84) for further information. **The dangers of smoking and diabetes cannot be stressed too often. The detrimental effects are synergistic and not additive.**
- Advise on low fat/high fibre diet, especially if hyperlipidaemia present.
- Advise regarding a ‘no added salt’ policy, if hypertension present.
- Limit alcohol consumption; Female – 14 units, Male – 21 units per week, or fewer if weight reduction needed. Discourage consumption of ‘diet beers’ especially in patients on insulin, as these are high in alcohol content, or low alcohol beer as this is high in sugar content.
- Encourage regular physical activity.
Psychological Wellbeing and Diabetes

Diagnosis:
At the time of diagnosis many patients will experience a variety of powerful emotions such as denial, shock, confusion, fear, anger, guilt, blame and loss. Some people go through a process very similar to mourning – it is as though they are grieving for lost health. Although it is normal for people to experience these feelings, the diabetes team and/or the primary care team should acknowledge these feelings and provide appropriate support if it is requested.

Psychological Problems:
There is, however, a need to be vigilant to the possibility that patients with diabetes may experience psychological disorders. Research has found that people with diabetes are more likely to experience anxiety and depression than people in the general population.

It is estimated that one in three patients with diabetes will experience clinical depression.

Depression is associated with poor glycaemic control whilst remission of depression is associated with improved control. Patients with complications associated with diabetes have a higher prevalence of depression.

Screening procedure:
All people with diabetes should be screened for depression and anxiety. The Scottish Diabetes Group (SDG) Psychology Working Group has recommended the use of the Hospital Anxiety and Depression Scale (HADS) for this purpose. Other common tools include the PHQ-9 for depression and the GAD-7 for anxiety.
A screening system using the HADS has been developed in the diabetes clinic at St John’s Hospital, and if this pilot is successful it may be possible to roll this out to other secondary sites.
In primary care, patients with diabetes should be screened for depression according to local mental health protocols.

Recognition of Depression

Diagnosis of depression may be made when a patient describes
- Low or sad mood
- Loss of interest or pleasure
and FOUR of the following associated symptoms:
- Disturbed sleep (insomnia/hypersomnia)
- Worthlessness or guilt
- Poor concentration
- Loss of energy or fatigue
- Disturbed appetite (loss or increase of appetite/weight)
- Suicidal thoughts or acts
- Retardation or agitation
- Symptoms of anxiety or nervousness

These symptoms must persist for at least two weeks

How does mood affect diabetes?
The exact pathways are not yet known for certain. However, many people with low mood feel unmotivated and can’t be bothered. This may affect how often they check their blood sugar or insulin levels, or they may not take prescribed medications. Feeling low can also affect appetite, and make it less likely that someone will engage in regular exercise. Feeling stressed or anxious can also increase
blood sugar levels. This may lead to feeling unwell, which increases feelings of low mood, stress and anxiety, setting up a vicious cycle.

**Interventions:**

There is evidence that providing treatment and support for depression and other emotional health problems can bring a range of physical and psychological benefits for this patient group.

Where the local diabetes team has direct access to clinical psychology sessions, local referral criteria should be developed, not only for the treatment of psychological disorders but also to assist with behaviour change and lifestyle modification relating directly to their diabetes.

For the majority of cases, the normal protocol operating for the General Practice at which the patient is registered should be followed i.e. social prescribing, exercise programmes, prescription of an appropriate antidepressant or referral on to local mental health services or psychological therapy services.

**Children and Young People:**

The psychological and social changes that occur during the course of normal child development have important implications for the child's or young person's ability to manage his/her diabetes.

In addition, any chronic disease can place children at increased risk for the development of psychological problems and can also place numerous demands on the family's ability to cope. Risk factors to be aware of might include: using maladaptive coping strategies such as avoidance to cope with diabetes; too much responsibility being placed on the child for his/her diabetes care; family conflict; poor communication within the child's family and between the family and the diabetes team; poor parental mental health; psychological problems that existed pre-diabetes.

As with adults, referral should be as normal. At the time of publication Lothian has received funding from the Scottish Diabetes Group for a 3 year project to address paediatric psychological needs in diabetes.

**Living Better**

Living Better is a new initiative which aims to improve the mental health and wellbeing of people with diabetes and chronic heart disease. Five primary care pilot sites are exploring different treatment models for these populations. The project will run from January 2008 to March 2011.

Living Better is led by Royal College of General Practitioners Scotland, in partnership with the Scottish Development Centre for Mental Health and the University of Stirling. Other partners in the project include Diabetes UK Scotland, British Heart Foundation (Scotland), Chest Heart and Stroke Scotland, and Depression Alliance Scotland. The project is funded by the Scottish Government.

Further information is available on the Living Better website.
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. The DVLA need not be informed if treatment is with diet alone or with oral antidiabetic drugs (unless they have other complications). The DVLA must be informed when treatment is changed to insulin therapy, either alone or in combination with antidiabetic drugs.

- Patients treated with insulin will be sent a Diabetic 1 (DIAB1) 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 this is required, a Diabetic 3 (DIAB3) form is sent to the doctor for completion. A history of recurrent severe hypoglycaemia or impaired awareness of hypoglycaemia may lead to revocation of the licence.

- If insulin-treated, the licence is “period-restricted” and will be issued for 1, 2 or 3 years.

- 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 a LGV or PCV licence will have their vocational driving licence revoked when they commence treatment with insulin.

- The only exceptions to this are drivers who had type 1 diabetes and were issued with such a licence before the law was changed in April 1991. They can retain their vocational driving licence under “Grandfather’s Rights” These cases are dealt with on an individual basis and licences are reissued annually subject to a satisfactory medical review. Few such drivers now remain.

- People treated with diet or oral antidiabetic drugs can hold LGV or PCV licences, providing they have no visual, or other relevant medical problems.

- The new class of incretin mimetic drugs, which includes Exenatide, Liraglutide and DPP-4 inhibitors, sitagliptin, vildagliptin and saxagliptin, are not associated with hypoglycaemia except when used in combination with sulphonylureas. There is no increased risk of hypoglycaemia when combined with metformin, which is the preferred drug to be used with incretin mimetics. With respect to medical fitness to drive, because of the potential risk of hypoglycaemia when incretin mimetics are combined with sulphonylureas, drivers on this treatment regimen should be advised to test their blood glucose and exert caution when driving. Because of the perceived risk of hypoglycaemia when used in combination with sulphonylureas, the DVLA now required an individual assessment of drivers who are taking an incretin mimetic with a sulphonylurea when they apply for a Group 2 driving licence (LGV and PCV).
Lighter Goods/Smaller Passenger Vehicles

Since January 1998, drivers treated with insulin have been barred from driving vehicles in D1 category (small passenger carrying vehicles for 8 or more passengers). Regulation changes in April 2001 were made to allow ‘exceptional case’ insulin-treated drivers to apply for, or retain their entitlement to drive, class C1 (3.5 – 7.5 tonnes) vehicles, subject to annual review of medical fitness to drive. This has to be carried out by a consultant physician specialising in diabetes.

It should be noted that taxi licensing is not under the jurisdiction of the DVLA, but is under the control of local authorities, many of which may seek the advice of an occupational health physician regarding diabetes and medical fitness to drive.

Hypoglycaemia While Driving

To avoid hypoglycaemia drivers should be advised to:

- Abstain completely from alcohol when driving
- Always carry a fast-acting form of carbohydrate that is easily accessible in the car e.g. a glucose drink, or confectionery
- 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 a glucose drink or glucose tablets
- Remove the ignition key and move into a passenger seat to avoid any suggestion that the person is in charge of the vehicle, even though it is stationary
- Do not recommence driving until 45 minutes after blood glucose has been restored to normal (because of delayed cognitive recovery)

Drivers with diabetes 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. 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 standards 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 load the premiums for motor insurance policies for people with diabetes, and differences in approach are common. No single insurance scheme can be recommended in terms of cost or cover, and each case has to be negotiated individually. Diabetes UK will give advice to drivers about policies and motor insurers.
Diabetes and Travel

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

Insulin

- Patients should check what types and strengths of insulin are available in the countries in which they will be travelling (refer to Diabetes UK or Pharmaceutical Company).
- Insulins used in the UK and most English-speaking countries are of the strength U-100 (100 units/ml). In some countries insulin may come in 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, particularly during airline flights. In small aircraft the luggage hold is unlikely to be heated, and insulin could be exposed to very low temperatures.**
- Insulin is often absorbed faster in warmer climates, so regular blood glucose monitoring is important, and insulin doses may need to be reduced.
- 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. It may be advisable for a travelling companion to carry some of the spare supplies.
- Glucose as drinks, tablets or confectionery, to treat hypoglycaemia
- A diabetes identity card, which can be provided in different languages by Diabetes UK, or wear an identification bracelet or necklace.
- A supply of carbohydrate food carried in hand luggage, to cover any travel delays or inedible airline food.
- A letter, from either GP or Hospital 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.

Coping with Illness*

- If sickness or diarrhoea develops, insulin should **never** be stopped even if solid foods cannot be tolerated, and tablets should be continued if possible.
- Carbohydrate intake should be maintained in the form of frequent sugary drinks.
- Blood glucose should be measured frequently.
- Urine should be tested for ketonuria as an early sign of metabolic decompensation.
- If sickness or diarrhoea persists **medical advice should be sought.**

*see [Management of Intercurrent Illness](#) (pg 76)
Insurance

- Free or reduced cost emergency treatment is available in other European Union (EU) countries. The appropriate form is available from Post Offices.
- **Travel insurance is vital.** At the time of application, patients should inform the insurance company that they have diabetes and ensure that the insurance policy provides adequate cover. (Many insurance companies exclude diabetes for travel cover).

Long Haul Flights

- If crossing time zones or travelling for many hours by aeroplane, specific advice regarding adjustments to insulin regimens, or the use of alternative insulin therapy can be obtained from the hospital team.
- Patients should produce their proposed flight schedule and information on time zone changes to help plan the timing of insulin injections and meals, during travel and after arrival at the destination.
Blood Glucose Monitoring

Self-monitoring of blood glucose levels is an integral part of routine diabetes care for people with Type 1 diabetes and Type 2 diabetes treated with insulin and/or oral hypoglycaemic medications. As part of the day-to-day routine it can inform of necessary lifestyle and treatment choices as well as help to monitor for symptoms of hypoglycaemia or hyperglycaemia. Self-monitoring supported by education is therefore one of the key tools available to people with diabetes to enable them to self-manage effectively. Essential to this is the person being able to discuss the purpose of self-monitoring, how to interpret and act upon results. Monitoring can be considered short term at diagnosis along with educational support. Correct meter care and quality control are essential when meters are used.

It is important that the blood glucose levels being aimed for are as near normal as possible (that is in the range of those of a person who does not have diabetes). There are many different opinions about the ideal range to aim for. As this is so individual to each person, the target levels must be agreed between the person and their diabetes team.

Adults with Type 1 diabetes (National Institute for Health and Clinical Excellence [NICE] 2004)

- Before meals: 4-7mmols/L
- 2 hours after meals: less than 9mmols/L

Type 2 diabetes treated with insulin (NICE 2008)

- Before meals: 4-7mmol/L
- Two hours after meals: less than 8.5mmols/L

The Lothian Diabetes Service Advisory Group advises that home blood glucose monitoring in non-insulin treated Type 2 diabetes should routinely be undertaken only:

- where treatment change is indicated
- to monitor a treatment change
- where hypoglycaemia is suspected
- where control is poor
- at a patient’s request

Home blood glucose monitoring need not be performed by:

- Those treated effectively by diet alone
- Those whose control is stable and appropriate for that patient as indicated by HbA1c
- Those treated with metformin or glitazones where hypoglycaemia is unlikely and control is appropriate.

In these cases, a six-monthly estimate of HbA1c is adequate to monitor glycaemic control.

At diabetes review, professionals should routinely ask patients if they are monitoring and review how their results are being used to influence their management.

See also [www.ljf.scot.nhs.uk](http://www.ljf.scot.nhs.uk)
Management of Type 2 Diabetes

Aims of Drug Treatment

- to alleviate hyperglycaemic symptoms
- to avoid hyperglycaemia
- to avoid excessive weight gain
- to achieve target HbA1c
- to reduce and where possible 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 all Oral Hypoglycaemic Agents (OHA) except Metformin in pregnancy (pg 69).

Choice of Drug

- See table on following page

Dosage Alteration

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

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

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

Triple Therapy

See algorithm for glucose lowering in people with type 2 diabetes (page 34).
## Oral Hypoglycaemic Drugs

<table>
<thead>
<tr>
<th>Class</th>
<th>Action</th>
<th>Generic Name</th>
<th>Daily Dose (max single dose)</th>
<th>Dose Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biguanide</td>
<td>Decreases gluconeogenesis &amp; increases peripheral glucose utilisation</td>
<td>Metformin</td>
<td>500mg-3g</td>
<td>1-3 times daily</td>
<td>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 patients predisposed to lactic acidosis e.g. renal failure</td>
</tr>
<tr>
<td>Sulphonylurea</td>
<td>Stimulates insulin secretion from the pancreas</td>
<td>Gliclazide</td>
<td>40-320mg (160mg)</td>
<td>1-2 times daily</td>
<td>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 in elderly (long acting; higher risk of hypos).</td>
</tr>
<tr>
<td>Sulphonylurea</td>
<td></td>
<td>Glipizide</td>
<td>2.5-20mg (15mg)</td>
<td>1-3 times daily</td>
<td></td>
</tr>
<tr>
<td>Sulphonylurea</td>
<td></td>
<td>Glimepiride</td>
<td>1-6mg (6mg)</td>
<td>Daily</td>
<td></td>
</tr>
<tr>
<td>Sulphonylurea</td>
<td></td>
<td>Glibenclamide</td>
<td>2.5-15mg (15mg)</td>
<td>Daily</td>
<td></td>
</tr>
<tr>
<td>Thiazolidinedione</td>
<td>Improves insulin sensitivity</td>
<td>Pioglitazone</td>
<td>15-45 mg</td>
<td>Daily</td>
<td>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</td>
</tr>
<tr>
<td>Thiazolidinedione</td>
<td></td>
<td>Rosiglitazone</td>
<td>4-8 mg</td>
<td>Daily</td>
<td></td>
</tr>
<tr>
<td>Thiazolidinedione</td>
<td></td>
<td>*Rosiglitazone is Contraindicated in patients who have had an Acute Coronary Syndrome and not recommended in patients with Ischaemic Heart Disease.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gliptins</td>
<td>• Glucose dependent insulin secretion</td>
<td>Sitagliptin</td>
<td>100 mg</td>
<td>Daily</td>
<td>2nd line add in to metformin. Weight neutral</td>
</tr>
<tr>
<td>Gliptins</td>
<td>• Decrease in glucagon levels</td>
<td>Vildagliptin</td>
<td>50 mg</td>
<td>2 times daily</td>
<td></td>
</tr>
<tr>
<td>Gliptins</td>
<td>• Delayed gastric emptying</td>
<td>Saxagliptin</td>
<td>5mg</td>
<td>Daily</td>
<td></td>
</tr>
<tr>
<td>Gliptins</td>
<td>• Increase satiety</td>
<td>Vildagliptin/Metformin</td>
<td>50/850 mg, 50/1000 mg</td>
<td>2 times daily</td>
<td></td>
</tr>
<tr>
<td>Class</td>
<td>Action</td>
<td>Generic Name</td>
<td>Daily Dose (max single dose)</td>
<td>Dose Frequency</td>
<td>Comments</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------------------------------------------------------</td>
<td>----------------</td>
<td>-----------------------------</td>
<td>----------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>incretin mimetic</td>
<td>• Glucose dependent insulin secretion</td>
<td>Exenatide</td>
<td></td>
<td></td>
<td>An injectable therapy that should be considered in patients on maximal OHAs who would usually go onto insulin. Exenatide/Liraglutide is weight reducing. Side effects include nausea and vomiting.</td>
</tr>
<tr>
<td></td>
<td>• Decrease in glucagon levels</td>
<td>Liraglutide</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Delayed gastric emptying</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increased satiety</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prandial Glucose Regulator</td>
<td>Stimulates post-prandial insulin secretion.</td>
<td>Repaglinide</td>
<td>0.5-16mg (4mg)</td>
<td>With each meal</td>
<td>Take before food (omit when meals not taken)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nateglinide</td>
<td>60-80 mg</td>
<td>With each meal</td>
<td>S/E: Weight gain, Hypo-glycaemia</td>
</tr>
<tr>
<td>Glucosidase Inhibitor</td>
<td>Delays digestion of starch &amp; sucrose; reduces post-prandial rise in blood glucose</td>
<td></td>
<td>50-600mg (200mg)</td>
<td>1-3 times daily</td>
<td>S/E: Flatulence, minimised by gradual dose titration</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>CAUTION:</strong> Use limited by GI S/E</td>
</tr>
</tbody>
</table>
Algorithm for Glucose Lowering in People with Type 2 Diabetes

Review and set glycaemic target: HbA1c <7% or individualised agreed with patient

1st LINE OPTIONS in addition to lifestyle measures, START ONE OF

- **Metformin (MTF)**
  - Intolerant of Metformin
  - Weight Loss / Osmotic symptoms

Review: not reaching target?

2nd LINE OPTIONS in addition to lifestyle measures, adherence to medication and dose optimisation ADD ONE OF

- **Sulphonylurea¹**
  - **Thiazolidinedione¹**
  - **DPP-IV inhibitor¹**
  - Hypos a concern
  - No Congestive Heart Failure
  - Hypos a concern and weight gain a concern

Review: not reaching target?

3rd LINE OPTIONS in addition to lifestyle measures, adherence to medication and dose optimisation ADD OR SUBSTITUTE WITH ONE OF

**ORAL** (continue MTF/SU if tolerated)

- **Thiazolidinedione¹**
  - **DPP-IV inhibitor¹**
  - Hypos a concern
  - No Congestive Heart Failure
  - Hypos a concern and weight gain a concern

**INJECTABLE** (willing to self-inject, continue MTF/SU if tolerated)

- **NPH insulin¹**
  - Osmotic symptoms
  - Inject before bed
  - If hypos a concern: BASAL ANALOGUE
  - Intensify therapy with time if required

- **GLP-1 analogue¹**
  - BMI>30kg/m²
  - Desire to lose weight
  - Usually <10 years from diagnosis

1 Continue medication if: EITHER individualised target achieved OR HbA1c falls >0.5% in 3-6 months
# Management of Type 2 Diabetes in Primary Care

Care for the patient with type 2 diabetes involves optimising lifestyle, treating raised blood pressure, cholesterol and blood sugar while screening for eye, foot and kidney problems.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Frequency</th>
<th>Target</th>
<th>Action</th>
<th>Advice</th>
</tr>
</thead>
</table>
| Lifestyle     | ALL patients should be encouraged to stop smoking (NRT advice, quitline number), do more physical activity and stick to a healthy low fat and salt diet. All patients should be offered structured education within 3 months of diagnosis e.g. DESMOND. | 145/85                                      | Treat to target (Generally the lower the better)  
Practice nurse to measure, treatment in discussion with GP. | **GMS target:** 145/85  
**SIGN 116: 130/80**  
**Evidence of Kidney Disease:** as low as possible  
Refer to LIF for drug choice (ACE or A2 in renal disease). Be realistic in trying to reach targets in the elderly or those with multiple pathologies. |
| Pregnancy     | Consider pregnancy issues for women of childbearing age. Discuss contraception, review medication and glycaemic control. Refer to hospital diabetes ante-natal clinic if planning pregnancy. Urgent referral to ante-natal clinic necessary if already pregnant. | Under 5mmol/l | Treat to target (The lower the better)  
Practice nurse to measure, treatment in discussion with GP. | **GMS target:** less than 5mmol/l  
Established CVD – always prescribe a statin and aspirin.  
All diabetes over 40 should be considered for a statin unless they have no CVD and a positive lipid profile.  
All patients with nephropathy should be aggressively treated. |
| Blood Pressure| 6 monthly (if stable)     | Under 7% (53 mmol/mol)         | Treat to target  
Practice nurse to measure, treatment in discussion with GP. | **GMS target:** Under 7% (53 mmol/mol)  
Drug treatment (Metformin, sulphonylurea or glitazone refer to LIF for drug choice). An increasing number of patients will need to be on insulin.  
With blood sugar control, individual targets are not mandatory e.g. striving to maintain an HbA1c under 7% in an elderly patient living alone with multiple pathologies has significant risks. |
| Cholesterol   | Annually (once at target) |                              |                                                                                                   |                                                                                                               |
| HbA1c         | 6 monthly (once at target) | Under 7% (53 mmol/mol)         | Treat to target  
Practice nurse to measure, treatment in discussion with GP. | **GMS target:** Under 7% (53 mmol/mol)  
Drug treatment (Metformin, sulphonylurea or glitazone refer to LIF for drug choice). An increasing number of patients will need to be on insulin.  
With blood sugar control, individual targets are not mandatory e.g. striving to maintain an HbA1c under 7% in an elderly patient living alone with multiple pathologies has significant risks. |
| Eye Screening | Annually                   | Ensure all patients are screened | Automatic central call and recall  
All patients should have their retina examined annually for retinopathy. There is a National Screening Programme for retinal screening but GPs should ensure “hard to reach” patients receive screening. |                                                                                                               |
| Foot Screening| Annually                   | Early detection of nerve and vascular problems | Annual general foot check inc. evidence of neuropathy (monofilament) or vascular disease (pulses).  
Screening for foot problems can be done by any trained practice staff and patient referred to podiatry if necessary.  
The foot risk score should be recorded for each patient and the tool is available on SCI-DC. | Refer to podiatry if neuropathy or vascular disease is present.  
Screening for foot problems can be done by any trained practice staff and patient referred to podiatry if necessary.  
The foot risk score should be recorded for each patient and the tool is available on SCI-DC. |
| Kidney Disease| Annually                   | Early detection of nephropathy | All patients should have urine checked for proteinuria and microalbuminuria and blood test for eGFR to assess renal function. | If there is evidence of renal disease, optimise BP (use ACE or A2) and optimise glycaemic control.  
Refer to LIF for advice on use of metformin when there is renal impairment particularly in patients with intercurrent acute illness. |
| Thyroid Disease| At diagnosis               | Detect hypothyroidism          | Treat  
If TSH is >2mU/L test for thyroid antibodies, if result is positive then test thyroid function annually. In other cases test on clinical grounds only. |                                                                                                               |
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
- Patient’s weight.

Starting insulin is usually managed as an outpatient under the supervision of a 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 (pg 18).

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 (pg 32) 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. In certain circumstances U500 insulin (in vials and on a named patient basis only) can be administered to reduce the volume required, however, these patients need careful monitoring to avoid severe hypoglycaemia.

The decision to use combined insulin and oral antidiabetic therapy should be taken by a Consultant Diabetologist.
Management of Type 1 diabetes

Type 1 diabetes 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. Type 1 diabetes is the least common type and accounts for between 5 and 15 per cent of all people with diabetes. Type 1 diabetes cannot be prevented.

Type 1 diabetes can only be treated with insulin injections and these are vital. If insulin injections are missed, diabetic ketoacidosis can occur. A healthy diet and regular exercise is recommended also.
Insulin Pump Therapy in Lothian

Introduction

Insulin pump therapy, also known as Continuous Subcutaneous Insulin Infusion (CSII) involves the use of an insulin pump, which is about the size of a mobile phone, delivering a steady flow of rapid acting analogue insulin for 24 hours. It is a more physiological way of delivering insulin to adults and children with type 1 diabetes. The insulin is delivered through a cannula, which is inserted subcutaneously. The cannula is changed on average every three days. A varied dose of rapid acting insulin is delivered over the 24 hours at a preset rate to provide basal insulin. At the touch of a button a bolus is given when carbohydrate is taken and/or to correct high blood glucose.

The National Institute of Health and Clinical Excellence have published criteria that people should meet in order to use a pump. [www.nice.org.uk](http://www.nice.org.uk). If these criteria are met the health board should fund the cost of the pump and consumables.

See [flowchart for process of pump initiation in Lothian](#). (pg 39)

In Lothian there is a multidisciplinary specialist team involved in the assessment, initiation and follow-up of patients on CSII therapy.

Currently adult patients are started in groups of 6. As this is a Lothian wide service these groups include patients from WGH, RIE, St Johns, Roodlands and LCTC. The multidisciplinary team includes Diabetes Specialist Nurses (DSNs) and dietitians from WGH, RIE & SJH.

Benefits of Insulin Pump Therapy

- Decreased variability of insulin absorption
- Absorption of long acting insulin via injection varies by up to 52%
- Accounts for up to 80% day to day variation in blood glucose
- Absorption of rapid acting insulin via pump varies < 3% (Insulin reduced by 30% on first day)
- Infusion set remains in one injection site for 2 or 3 days.

Exact dosing of insulin

- Basal rates can be changed every half hour
- Can be adjusted in 0.05 unit increments
- Temporary basal feature
- Boluses calculated on blood glucose level, CHO, insulin sensitivity
- Boluses delivered immediately/protracted to accommodate type of CHO
- Can be adjusted in 0.1 unit increments.

When CSII is not recommended

- Unwilling to check blood glucose at least 4 times daily
- Unwilling to maintain contact with their health care professional
- Have insufficient vision or hearing to allow recognition of alarms
- Psychological problems/psychiatric referral
- Severe stress.

Contact Details for Health Professionals Involved in Insulin Pump Therapy in Lothian

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Diabetes Specialist Nurse</th>
<th>Contact Number</th>
<th>Dietitian</th>
<th>Contact Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Royal Infirmary of Edinburgh</td>
<td>Joan Grant</td>
<td>0131 242 1471</td>
<td>Debbie Anderson</td>
<td>0131 242 1460</td>
</tr>
<tr>
<td>Western General Hospital</td>
<td>Liz MacKay</td>
<td>0131 537 2542</td>
<td>Sheena Douglas</td>
<td>0131 537 1750</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bleep 8269</td>
<td>Radiopage #6289</td>
<td></td>
</tr>
<tr>
<td>St Johns Hospital</td>
<td>post vacant</td>
<td>01506 523859</td>
<td>Emma Shaw</td>
<td>01506 523176</td>
</tr>
<tr>
<td>Royal Hospital For Sick Children</td>
<td>Lynne Marshall</td>
<td>0131 536 0375</td>
<td>Mary Deane</td>
<td>0131 536 20302</td>
</tr>
</tbody>
</table>
Lothian Pump Therapy Process

Referral from health care professional or self

Assessment for suitability for CSII by specialist team

Apply for funding if appropriate (Clinical lead NHS Lothian). Patient added to waiting list

- Pre-pump preparation
  - See pumps available in Lothian
  - Attend update of CHO counting
  - Date for pump start scheduled

**Pump Start Day**
- Intensive training in basic aspects of using the pump
- Discuss suitable infusion set... pump on... lunch
- Understanding basal and bolus rates
- Guidelines for Hyperglycaemia treatment
- Guidelines for Hypoglycaemia treatment
- Guidelines for sick day rules
- Blood glucose targets and adjustment of basal rates
- Discuss HCP/pump user communication over next 48 hrs
- Contact numbers given and on call provided by DSN (24 hrs for 2-3 weeks)
- All paper work completed
- Explain patient hand held folder
- Discuss number of blood glucose tests required over 48 hrs

**Immediate follow up**
- Appointment for follow up on day 3
- Assess blood glucose readings
- Psychological aspects of wearing the pump
- Pump user re-site infusion set and re-start pump

**Follow up (1 to 3 months)**
- Review diabetes management on pump
- Confirm if patient wishing to continue pump therapy
- Reflective diary discussion (quality of life)
- Follow up appointment at pump and routine clinic
- Letter to GP
- Document in notes
- Future audit
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 regular HbA1c measurements are necessary to ensure that treatment is effective and that targets are being met
• Remember, all prescriptions are free for all patients on oral antidiabetic drugs (pg 32) 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 a refrigerator, 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 the importance of regular meals with consistent carbohydrate content, although this will depend on individual lifestyle and the type of insulin regimen being used
• Appropriate education on hypoglycaemia (pg 44) and diabetic ketoacidosis (DKA) (pg 75) 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, sport etc
• Referral to a dietitian is required to allow diet to be tailored to the individual, taking into account age, lifestyle, and occupation, shift patterns, exercise etc.

Insulin should never be discontinued without prior consultation with a diabetes specialist

Aims of Insulin Treatment

• Abolition of symptoms of hyperglycaemia
• Maintenance of ideal body weight
• Avoidance of hypoglycaemia
• Maintaining as near normal 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 within the same site 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, and local heat increases the rate of absorption (hot baths and showers should be avoided after injection of insulin).

Injection Technique

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

- Check insulin type
- Check insulin dose
- Pinch up fold of skin unless using 5 or 6mm needles
- Inject needle at 90 degrees into this fold; avoid lumpy and hypertrophied areas
- Dispose of syringe and/or needle carefully. *See appendix 7 (pg 107)

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.

Short Acting Insulin

Those of short duration that have relatively rapid onset of action are called soluble insulins. The traditional soluble insulins include Humulin S. For those patients who require animal insulin there are pork insulin preparations such as Hypurin Porcine, Neutral and a beef insulin preparation called Hypurin Bovine Neutral.

Fast Acting Insulin

Fast-acting insulin analogues (Humalog (insulin Lispro), NovoRapid (insulin Aspart) and Apidra (insulin Glulisine)) are available which have a more rapid onset and a shorter duration of action than the soluble insulins. They can be injected immediately before during or after meals.

Intermediate Insulin

Insulins with an intermediate time-action are called Isophane (or NPH) insulins and include Insulatard and Humulin I. For those patients who prefer animal insulins there is Porcine and Bovine Hypurin Isophane.

Long Acting Insulin

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

Insulin Mixtures

Fixed mixtures of insulin are available which contain Soluble and Isophane insulins in varying proportions, e.g. Humulin M3, Hypurin Porcine 30/70 Mix. In addition there are fixed mixtures of analogues such as Humalog Mix 25, Humalog Mix 50 and NovoMix 30.
Insulin Administration Devices and Blood Glucose Monitoring
Equipment

Pen Injection Devices

Many patients use an 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 injection devices is the convenience of carrying and administering the insulin.

Disposable (pre-filled) devices 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. All insulin cartridges and pre-filled pens are now 3 ml and can be obtained on prescription.

Pen needles are available on prescription. 8mm, 6mm and 5mm lengths are used most commonly.

Re-use of Needles is not recommended. Pen injection devices are for use by patients only and should not be used by other health care staff because of the risk of needle stick injury when re-sheathing.

Syringes

Plastic syringes may still be the preferred method of delivery for some patients e.g. those using two different insulin preparations simultaneously that 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 30, 50 and 100 unit sizes.

Syringes are available for use with 12.7mm length and 8mm length needles however use of 12.7mm needles is not recommended for people with diabetes.

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

See Appendix 7 (page 107)

Insulin Regimens and Dosage Adjustment

Principles of Dosage Adjustment

No single solution applies to all situations. Many patients are capable of becoming skilled at self-adjustment of their insulin dose and regimen. Other than fast acting analogues, insulin is not normally adjusted on the basis of a single blood glucose reading. 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 blood glucose values that are out of keeping with the HbA1c concentration
- Review insulin dose distribution
- Review eating patterns including alcohol consumption
- Review whether poor control in one part of the day reflects previous activities
- Consider an adjustment of dose by 10% initially.
Dose adjustment

To adjust insulin doses for a twice daily fixed insulin mixture (eg novomix 30 / mixtard 30):
- If glucose high/low before breakfast, increase/decrease EVENING insulin dose
- If glucose high/low before evening meal, increase/decrease MORNING insulin dose.

For dosage adjustment with a basal-bolus regimen (eg novorapid / humalog and insulatard / leemir / lantus):
- 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.

Other adjustments may necessitate a change of the mixture. For further advice please contact the Diabetes Team (Diabetes SPR or Diabetes Specialist Nurse) via switchboard.

Too much insulin

The following symptoms are suggestive of over-insulisation:
- Recurrent Hypoglycaemia
- Wide excursions of blood glucose
- Weight gain
- Subtle features of chronic hypoglycaemia
  - Headache
  - Craving to eat
  - Personality change in the older person.

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”)
- Mood change (depression)
- Urinary incontinence.

Insulin in the Older Person

Age itself is not a contraindication to insulin therapy
- Targets for glycaemic control in the elderly may not need to be as strict as in the younger patient. A target HbA1c of <7.5% (59 mmol/mol) may be inappropriate
- The aims of treatment are to control hyperglycaemia with particular avoidance of hypoglycaemia
- It may be necessary to avoid the use of short-acting insulins in the very elderly. Regimens using twice daily isophane or once daily long-acting insulin analogue are often effective in this age group, and have a lower risk of hypoglycaemia.
Hypoglycaemia

Hypoglycaemia (hypo) occurs when the blood glucose level falls too low, usually under 4mmol/l. People who take insulin and/or oral hypoglycaemic medications are at risk of having a hypo. A hypo may occur if too much insulin and/or oral medication has been taken, delayed or missed meals, not enough carbohydrate, unplanned or more strenuous exercise than usual, and drinking alcohol without food. Sometimes there is no obvious cause.

- 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 (blood glucose level ≤4mmol/L) but glucose strips may be inaccurate at low blood glucose concentrations or arbitrarily as a laboratory blood glucose <3.5 mmol/l.

Treatment of mild Hypoglycaemia

- Give 15-20g quick acting carbohydrate i.e. 3-5 glucose tablets or a glucose drink (150-200ml fresh orange juice, 90-120ml of original Lucozade, ordinary Coke or lemonade, milk with 2 teaspoons sugar)
- Follow up with longer acting carbohydrate i.e. 2 biscuits, 1 slice bread/toast, fruit or next meal if due.

Treatment of moderate Hypoglycaemia

- GlucoGel 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.

Treatment of Severe Hypoglycaemia

- Glucagon 1mg IM (may take up to 15 minutes to take effect). Glucagon mobilises glycogen from the liver and will not work if given repeatedly or in starved patients with no glycogen stores or those with severe liver disease. In this situation or if prolonged treatment is required, IV glucose is better. Patients may experience abdominal pain/discomfort, nausea or vomiting following Glucagon administration
- If IV access available, give 250ml of 10% glucose (over 5 minutes). Repeat capillary blood glucose measurement ten minutes later. If blood glucose less than 4mmol/L, repeat
- If IV access available, give 125ml of 20% glucose (over 5 minutes). Repeat capillary blood glucose measurement 10 minutes later. If blood glucose less than 4mmol/L, repeat
- Once the person is able to swallow, additional carbohydrate should be given by mouth.

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

<table>
<thead>
<tr>
<th>Autonomic</th>
<th>Neuroglycopenic</th>
<th>Non-specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweating</td>
<td>Weakness</td>
<td>Headache</td>
</tr>
<tr>
<td>Trembling</td>
<td>Visual disturbance</td>
<td>Nausea</td>
</tr>
<tr>
<td>Pounding heart</td>
<td>Difficulty speaking</td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>Tingling</td>
<td></td>
</tr>
<tr>
<td>Hunger</td>
<td>Dizziness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difficulty concentrating</td>
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<td>Visual disturbance</td>
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<td>Difficulty speaking</td>
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<td>Tingling</td>
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<td>Tiredness</td>
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<td>Confusion</td>
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Unusual Associations and Presentations of Hypoglycaemia

<table>
<thead>
<tr>
<th>Cardiovascular</th>
<th>Neuropsychological</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolongation of QT-interval</td>
<td>Focal/generalised convulsions</td>
<td>Fracture of long bones/vertebrae</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>Coma</td>
<td>Joint dislocation</td>
</tr>
<tr>
<td>Non-sustained ventricular tachycardia</td>
<td>Hemiparesis; TIA's</td>
<td>Soft tissue injury</td>
</tr>
<tr>
<td>Silent myocardial ischaemia</td>
<td>Ataxia, Choreoathetosis</td>
<td>Head injury</td>
</tr>
<tr>
<td>Angina</td>
<td>Focal neurological deficits</td>
<td>Burns</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>Decortication</td>
<td>Hypothermia</td>
</tr>
<tr>
<td>Sudden death</td>
<td>Cognitive impairment</td>
<td>Road traffic accidents</td>
</tr>
<tr>
<td></td>
<td>Behavioural/personality change</td>
<td></td>
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<tr>
<td></td>
<td>Autotmatism/aggressive behaviour</td>
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<tr>
<td></td>
<td>Psychosis</td>
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</tbody>
</table>

*Some information taken from ABCD/Diabetes UK Hospital Management of Hypoglycaemia in Adults guideline (Draft 6 22/10/2009).

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)

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.
Microvascular and Macrovascular Complications

Prevention of Complications

- Intensive glycaemic control is associated with a significant reduction in clinically important microvascular events in patients with Type 1 diabetes (Evidence from Diabetes Control and Complications Trial 1993).

- In Type 2 patients, intensive glucose and blood pressure control results in a lower risk of microvascular and macrovascular disease (UK Prospective Diabetes Study 1998).

Targets

HbA1c targets need to be individually set, weighing up the risk of hypoglycaemia against the increased vascular complications in those with higher HbA1c.

The target HbA1c may be 6.5% (48 mmol/mol) in those on diet or diet and Metformin, a little higher around 7% (53 mmol/mol) in those on sulphonylureas and insulin. Although a target of 7% may be desirable it can be difficult to achieve, particularly in patients taking insulin. These patients HbA1c targets will need to be individually set.
Eye Complications

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

Retinopathy:

Diabetic retinopathy is the most common 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% (53 mmol/mol) 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. Some degree of retinopathy will 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.

Retinopathy may be present at diagnosis in type 2 diabetic patients.

Overview of Lothian Diabetic Retinopathy Screening (DRS) Programme:

All Patients should still attend the optometrists annually for the general eye examination. It is free of charge to people with diabetes.

- The Lothian DRS Programme aims to offer annual retinopathy screening to all people with diabetes who are aged over 12, except those whom it is inappropriate to screen (see reasons for suspension below)
- The DRS Office is responsible for call, recall and follow up of people who are recorded on SCI DC. If a patient does not attend, up to 2 reminders are sent
- Screening is offered in a range of sites across Lothian. People are offered appointments at the site nearest their general practice but are able to select an alternative preferred location if convenient. Trained screeners take the images. Most patients do not require mydriasis
- All images are transferred to the grading centre for grading by trained and accredited graders who all undergo quality assurance
- A proportion of patients are invited to attend for a slit lamp examination if the images are not able to be graded
- Screening results are sent in writing to patients, their GPs, and where relevant their Diabetes Consultants. Results and images are also transferred onto SCI-DC. If patients require ophthalmology referral, the DRS office will arrange this
- Soarain, the retinopathy screening software gets its demographic feed from SCI-DC. All patients aged 12 years and over will be invited annually provided they have been placed on the diabetes register on SCI-DC. It is the practices’ responsibility to make sure that patients are correctly registered on SCI-DC
- Patients who are attending the diabetic eye clinics at PAEP or St. John’s do not need to be screened either by the optometrists or at diabetes clinics. Those attending other eye clinics for other conditions will not necessarily be screened for Retinopathy
- Please note that the Diabetic Retinopathy Screening Service is not available through Ophthalmology at Princess Alexandra Eye Pavilion (PAEP). The Diabetic Eye Clinics are for those...
with referable retinopathy only. Exceptional cases are normally seen at the discretion of the medical ophthalmologist

- All patients who need to be referred to the ophthalmology clinics are to be initiated by:
  - The Lothian Diabetic Retinopathy Screening Service.
  - An accredited Optometrist according to the referral criteria directly or via their GPs
- All other ocular emergencies should be referred to Acute Referral Clinic at PAEP and St John’s hospital by the usual way.

Role of Primary Care Team in Retinopathy Screening

- It is essential to ensure all people with diabetes diagnosed with diabetes are on SCI-DC in order to ensure they are registered for DRS. **In order to do this, all patients with diabetes must be correctly read coded on the practice clinical system and the data will then automatically be extracted onto SCI-DC**
- Encourage people with diabetes to attend for DRS, and/or ophthalmology follow up as appropriate
- Check letters about people with diabetes who have not attended screening or follow up and ensure the address is correct; inform the DRS office of any necessary changes and encourage the patient to attend
- Inform DRS office of people with diabetes who have relevant special needs, e.g. for communication support or transport
- Encourage people with diabetes also to attend for annual optometrist check-ups
- Explain the nature of a screening programme and the implications of a positive and negative result
- Use DRS results and images on SCI-DC to encourage people with diabetes to maintain glycaemic control and address other risk factors including smoking
- Where appropriate suspend people with diabetes from DRS on SCI-DC; ensure all suspensions are appropriate.

Good practice

It is essential that all people with diabetes are recorded on SCI-DC to ensure they are registered for DRS. As noted above, this will be achieved if they are correctly coded on the practice clinical system. It is also good practice to:

- Check the SCI-DC webpage ([https://diabetes.mhs.scot.nhs.uk/Lothian/scidc/](https://diabetes.mhs.scot.nhs.uk/Lothian/scidc/)) annually against the list of people with diabetes in the practice clinical management system to ensure the list is complete
- The annual check should include checking the ‘suspended patients’ lists to ensure that people are not excluded inappropriately
- Ensure relevant staff are trained in how to register, suspend and un-suspend people on SCI-DC.
Reasons for suspension from Diabetic Retinopathy Screening

Informed choice to opt out
If a patient expresses a choice not to be invited for screening, this should be discussed with the patient who should be given an information leaflet about DRS, the discussion recorded in the notes and the patient asked to sign the standard disclaimer letter. The patient will be suspended for maximum 3 years, and then a letter will be sent to the GP asking if they wish the person to be re-included.

Under age
The system will automatically suspend people who are aged under 12 and re-include them on their 12th birthday.

Total loss of vision
Patients should only be suspended if they have no perception of light, as advised by an ophthalmologist. Many people who are recorded blind still have some useful vision.

Terminal illness
Where a patient is terminally ill and the GP believes that screening will cause distress, they may be suspended from screening.

Treatment not possible
People with disabilities should not be suspended from screening unless it would not be possible to treat them, should this be required. If a person has physical disabilities that prevent them adopting a position where an image can be taken, they should be referred to an ophthalmologist for advice on whether treatment would be possible. They should be temporarily suspended pending this advice.

Under care of an ophthalmologist
Patients who are attending ophthalmology (Dr Swa, Dr Singh or Dr Fairley’s clinics) will be suspended by the DRS office.

Temporarily unavailable
A patient may be temporarily suspended if they are away for an extended time.

Deceased
 Normally when a patient is deceased, CHI should be updated and this information will pass to SCI-DC and the DRS software automatically. If there is a delay the practice may suspend the patient.

Not diabetic
Sometimes people are wrongly recorded on SCI-DC as having diabetes. In this case, the source system (usually the practice system) should be amended, which will automatically suspend the patient from screening.

Further information on the national DRS programme is available at: http://www.ndrs.scot.nhs.uk/

Key contacts:

<table>
<thead>
<tr>
<th>Role</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRS Office</td>
<td>0131 536 4145 or 4146</td>
</tr>
<tr>
<td>DRS Programme Manager</td>
<td>Norah Grant [<a href="mailto:Norah.grant@luht.scot.nhs.uk">Norah.grant@luht.scot.nhs.uk</a>]</td>
</tr>
<tr>
<td></td>
<td>0131 536 3928</td>
</tr>
<tr>
<td>DRS Lead clinician</td>
<td>0131 536 1874</td>
</tr>
</tbody>
</table>
Foot Complications

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 footcare
- 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.

HPC (Health Professions Council) Registered Podiatrists play an important role in the education, monitoring and treatment of patients presenting with the lower limb complications of 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 (Pg 103)
- Use of a 10g Monofilament and palpation of foot pulses is recommended as a minimum.

Ongoing management depends upon risk stratification. (pg 53)

Testing Pressure Sensation with a Monofilament

- Monofilaments are designed to deliver a standard stimulus, usually a 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.

Basic Footcare Advice for Patients

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

Follow this advice and have feet checked regularly

For patient leaflets regarding foot health education please go to [http://www.mydiabetesmyway.scot.nhs.uk/body/footcare.asp](http://www.mydiabetesmyway.scot.nhs.uk/body/footcare.asp)
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.
Referral Pathway for Active Diabetic Foot Disease (The ulcerated foot)

Risk Status

**Active Foot Disease**
- Non-healing ulcer i.e. no sign of improvement within 4 weeks
- Assess wound (use Texas classification system appendix 2 pg 101)
- Spreading infection
- Critical ischaemia
- Gangrene
- Hot swollen foot with or without pain – possible active Charcot
- Painful peripheral neuropathy
- If in doubt refer

**High Risk**
- Foot intact and stable
- Previous ulceration or amputation
- Referral to specialist diabetes foot service for ongoing management in the community

**Referral pathway**

**Hospital Specialist Diabetes Foot Clinics**

**MEDICAL ADMISSION**

Severe infection
- Rapid deterioration of ulcer
- Deep abscess
- Spreading cellulitis
- Systemically unwell

Access to surgical team if required

If in doubt seek advice from the Hospital Specialist Diabetes Foot Clinic

**URGENT VASCULAR REVIEW**

Acute / critical ischaemia
- Discoloration of toes: pale, dusky, black
- Signs of necrosis
- Pain at rest, often at night

If in doubt seek advice from the Hospital Specialist Diabetes Foot Clinic

**Management**

**Royal Infirmary of Edinburgh**
OPD 2  Fax: 242 1454  Tel: 242 1482

**Western General Hospital**
Metabolic Unit
Fax: 537 3071  Tel: 537 1297

**St Johns Hospital**
OPD 1 Fax: 01506 523857  Tel: 01506 523 175

**ALL PATIENTS WITH ACTIVE FOOT DISEASE:**
- Ongoing review by appropriately skilled and experienced specialist diabetes podiatrist
- Information given about future foot care and how to access services in an emergency
- Refer to Orthotist for footwear if clinically required
- Antibiotics as required
- Referral if required to vascular, medical, surgical
- Liaise with community nursing and podiatry services

**Community podiatry specialist diabetes foot service**

Springwell House, Ardmillan Trr
Fax: 537 7471 Tel: 537 7470

St Johns Hospital, Podiatry, Block B, Residencies Tel: 01506 523 180
Referral Pathway for Diabetes Foot Screening and Assessment

**Low Risk**
- Protective sensation intact (10g pressure)
- One or more pulse present in each foot
- No previous ulcer
- No major foot deformities

**Moderate Risk**
- Loss of protective sensation
- Diminished/absent pulses
- No previous ulcer
- Foot deformity with callus
- Physical disability
- Visual impairment

**High Risk**
- Two or more of the following:
  - Foot ulcer present or previous
  - Loss of protective sensation
  - Absent or diminished pulses
  - Peripheral vascular disease (PVD)
  - Foot deformity with callus
  - Limited joint mobility
  - Amputation
  - Charcot deformity

**Active Foot Disease**
- Active foot ulcer / non healing
- Spreading infection
- Critical Ischaemia
- Gangrene
- Hot swollen foot with/ or without pain - possible active Charcot
- Painful peripheral neuropathy

**Definition**
- **Low Risk**
  - Protective sensation intact (10g pressure)
  - One or more pulse present in each foot
  - No previous ulcer
  - No major foot deformities

- **Moderate Risk**
  - Loss of protective sensation
  - Diminished/absent pulses
  - No previous ulcer
  - Foot deformity with callus
  - Physical disability
  - Visual impairment

- **High Risk**
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    - Foot ulcer present or previous
    - Loss of protective sensation
    - Absent or diminished pulses
    - Peripheral vascular disease (PVD)
    - Foot deformity with callus
    - Limited joint mobility
    - Amputation
    - Charcot deformity

- **Active Foot Disease**
  - Active foot ulcer / non healing
  - Spreading infection
  - Critical Ischaemia
  - Gangrene
  - Hot swollen foot with/ or without pain - possible active Charcot
  - Painful peripheral neuropathy

**Action**
- **Low Risk**
  - Optimise diabetes control
  - Written and verbal foot health education as appropriate
  - Agreed and tailored management/treatment plan according to patient needs

- **Moderate Risk**
  - Prevention of breakdown
  - Footwear assessment
  - Yearly risk assessment by HCP
  - Podiatry referral for podiatric problems

- **High Risk**
  - Specialist opinion when appropriate
  - Review of footwear with referral to orthotist if appropriate

- **Active Foot Disease**
  - Rapid referral to multi-disciplinary foot team
  - Or emergency admission if rapidly deteriorating or systemically unwell
  - Or urgent referral to vascular with acute Ischaemia
  - Agreed and tailored management/treatment plan according to patient needs
  - Provide written and verbal education with emergency contact numbers

**Referral and Access**
- **Low Risk**
  - Refer only for problems requiring podiatry input

- **Moderate Risk**
  -Regular Podiatry as appropriate

- **High Risk**
  - Refer to Community based Podiatry Diabetes Service

- **Active Foot Disease**
  - Refer to hospital based Multi-disciplinary Diabetes Foot Clinic for specialist intervention
    - RIE 0131 2421482 Fax: 2421454
    - WGH 0131 5371297 Fax: 537-3071
    - St Johns 01506 523175 Fax: 523857
  - Admit to hospital via GP or A&E
Kidney Complications

Diabetic 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. The lifetime risk of developing diabetic nephropathy is about 25% in type 1 diabetes and 15% in type 2 diabetes
- Risk factors predisposing to diabetic nephropathy include poor glycaemic control, hypertension, smoking and a family history of vascular disease
- The presence of nephropathy is an independent and powerful predictor of chronic renal failure, macrovascular disease and death
- Screening is vital as early detection and effective treatment can slow progression of renal failure and identify those at particularly high vascular risk
- The possibility of non-diabetic renal disease should be considered if atypical features, including haematuria, absence of retinopathy and short duration of type 1 diabetes are present.

Stages of Diabetic Renal Disease:

<table>
<thead>
<tr>
<th>Stages</th>
<th>eGFR</th>
<th>Laboratory Features</th>
</tr>
</thead>
</table>
| Stage 1 | >90  | • Normal urinary albumin excretion rate  
|         |      | • Normal serum creatinine     |
| Stage 2 | 60 – 89 | • Increased urinary albumin excretion rate (microalbuminuria)  
|         |      | • Dipstick negative for proteinuria  
|         |      | • Normal serum creatinine / eGFR |
| Stage 3 | 30 - 59 | • Dipstick positive proteinuria  
|         |      | • Serum creatinine normal or minimally elevated  
|         |      | • eGFR likely to be abnormal     |
| Stage 4 | <30  | • Progressive decline in renal function  
|         |      | • Rising serum creatinine / falling eGFR |
| Stage 5 | <15  | • End stage renal failure        |

Microalbuminuria and Proteinuria

- **Microalbuminuria** refers to urine albumin concentrations that are below the limit of detection of routine urine dipsticks
- **Proteinuria** refers to urine albumin concentrations that are detectable by routine dipsticks
- In Type 1 and Type 2 diabetes, persistent microalbuminuria, is a marker of early diabetic nephropathy, premature macrovascular disease and death
- Microalbuminuria in Type 1 and 2 diabetes should be viewed as an additional and independent cardiovascular risk factor. Co-existing coronary heart disease (CHD) risk factors should be treated aggressively in all patients who have persistent microalbuminuria
- In both types of diabetes, improved diabetic control (Target HbA1c ≤ 7% or 53 mmol/mol) and particularly aggressive anti-hypertensive therapy should retard the progression of nephropathy
- All patients with nephropathy should be treated with a statin, probably aspirin, and strongly advised to stop smoking.
Who should be tested?

- Test all patients over the age of 12 annually for microalbuminuria in patients who are dipstick negative for urinary protein.

Which sample should be sent and what should be requested?

The first voided morning urine sample in a clean universal container should be sent.

- 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 if present on 2 out of 3 occasions over 3 months. A single elevated ACR should prompt two or more further samples to confirm or refute the diagnosis.
- In those with confirmed microalbuminuria repeat testing is indicated as a lowering of ACR indicates a good response to treatment.

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 ++) a specimen of urine should be sent for the measurement of a protein:creatinine ratio (PCR). Random urine samples may be used but have a higher false positive rate.

Interpretation of Results

<table>
<thead>
<tr>
<th>DIAGNOSIS</th>
<th>ACR (mg/mmol)</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>&lt;2.5 men</td>
<td>Repeat annually.</td>
</tr>
<tr>
<td></td>
<td>&lt;3.5 women</td>
<td></td>
</tr>
<tr>
<td>Microalbuminuria</td>
<td>2.5 – 30 men</td>
<td>Repeat to confirm persistently abnormal result. If known microalbuminuria keep testing to ensure levels are not rising</td>
</tr>
<tr>
<td></td>
<td>3.5 – 30 women</td>
<td></td>
</tr>
<tr>
<td>Proteinuria</td>
<td>&gt;30</td>
<td>Repeat to confirm persistently abnormal result. If known proteinuria keep testing to ensure levels are not rising</td>
</tr>
</tbody>
</table>
Management of Diabetic Renal Disease

Prevention:
- Good blood glucose control (HbA1c <7% or 53 mmol/mol), good blood pressure control (BP <130/80mmHg)

Treatment:
- Target BP for all patients with diabetes under GMS is 145/85. SIGN recommends 130/80mmHg but once the ACR becomes elevated then this target should be as low as possible. However, targets may need to be higher in high risk groups of patients particularly those with ischaemic heart disease
- Encourage smoking cessation
- Improve glycaemic control
- Introduce an ACE Inhibitor in patients with Type 1 diabetes with microalbuminuria or overt proteinuria, regardless of BP (unless symptomatic hypotension). Use highest tolerated doses. In those intolerant use angiotensin receptor blocker (ARB)
- Remember the possibility of teratogenesis in females of childbearing age
- Introduce an ACE Inhibitor in patients with Type 2 diabetes. Remember the possibility of co-existing renovascular disease especially in those with intermittent claudication. In those intolerant use ARB
- 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 Diabetes Clinic:
Patients with any of the following:
- Proteinuria (Total urinary protein >1 g/l, protein:creatinine ratio (PCR) > 100 mg/mmol)
- Elevated serum creatinine or eGFR < 30 ml/min/1.73m2.

Criteria for Referral to Renal Clinic:
- Nephropathy that is out of keeping with diabetic history (short duration, lack of other complications etc)
eGFR and Diabetes:

Website

A range of information is available on the RIE Renal unit website [http://www.edren.org/](http://www.edren.org/)

Email Advice

Should you have a concern or question about renal function and diabetes, there is an email advice line (also available through Refhelp). This is very useful for getting informal advice about patients and their treatment that may avoid unnecessary referral or anxiety.

Metformin treatment and renal impairment

There has always been concern about the use of Metformin in renal failure (previous advice gave a threshold of a creatinine of greater than 150mmol/l for stopping metformin). It is clear that worsening renal function increases the risk of lactic acidosis with Metformin use. The risk increases as eGFR deteriorates.

**Once the eGFR falls below 30 ml/min, Metformin must not be used.**

Between 30 and 60 ml/min Metformin can be used with caution. There is no immediate need for action provided the patient is well. However acute lactic acidosis does occur in patients' whose eGFR is in the range 30-45 when they develop what would have been a trivial illness (such as diarrhoea and vomiting) which compromises renal function and causes acute renal failure. This is compounded if the patient is also taking diuretics and/or ACE inhibitors and/or non-steroidal anti-inflammatory drugs (NSAIDs) in combination with Metformin. Unlike acute illnesses in type 1 diabetes (where insulin treatment must be continued) stopping any of the above cocktail of drugs for a day or two during an acute dehydrating (diarrhoea & vomiting) illness will not cause any immediate problem for the patient and will help protect renal function until the patient improves. Blood glucose measurements should be used to assess any glycaemic deterioration.
Microalbuminuria Screening in People with Diabetes

Who to Screen:
- Type 1 diabetic patients >12 years
- Type 2 patients from diagnosis

Screening Method:
- Early morning urine specimen for albumin:creatinine ratio (ACR)
- A random sample may be used but the early morning sample is preferable as there are fewer false positive results

is the ratio >2.5 men or >3.5 women

Other causes?
- UTI, cardiac failure, blood in urine, vigorous exercise, uncontrolled diabetes
- Repeat Urine ACR:
  - 3 samples during next 3 months

2 of 3 tests positive?

What to do:
- Input ACR values and record the diagnosis microalbuminuria on database
- Review glycaemic & BP control
- Consider ACE inhibitor or ARB (Angiotensin Receptor Blocker)

NB consider referral if BP targets are not met, progressive increase in ACR or elevated creatinine due to other diseases

Screening Internal:
- Annual Screening
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 hyperlipidaemia of Type 2 diabetes is mild hypercholesterolaemia, low HDL-cholesterol and hypertriglyceridaemia.
- 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 physical activity.

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 >3.5 mmol/L.
- All patients with existing cardiovascular disease should take Aspirin. If aspirin is contraindicated, alternative antiplatelet therapy, such as clopidogrel, should be considered.
4. Drug Treatment: Patients without cardiovascular disease (Primary Prevention)

- Most people with Type 2 diabetes aged above 40 should receive treatment with a statin and it should be considered in people with Type 1 diabetes. A positive decision NOT to prescribe lipid-lowering therapy may be considered in people aged 40-50 years who have no other risk factors for CVD and in people with a particularly high HDL cholesterol (e.g. >1.8mmol/l)
- **Type 1 and Type 2 patients with evidence of nephropathy** (microalbuminuria or proteinuria present) are at particularly high cardiovascular risk and should be treated aggressively.

5. 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.

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

First line lipid-lowering therapy is Simvastatin. Current NHS Lothian Lipid Management Guidelines state start with 40mg simvastatin at night. Atorvastatin should be commenced if patients fail to reach targets with Simvastatin. Monitoring of liver function and, if muscle pain, creatinine kinase is recommended. Fibrates have been less well tested in clinical trials. They are mainly of benefit in those with mixed hyperlipidaemia and low HDL cholesterol. They may be considered in people who do not tolerate statin therapy.

Anti-platelet Therapy

Advice has been that Aspirin, or clopidogrel if aspirin intolerant, should be prescribed to patients whose 10 year risk of an event is >15%. However, the 2008 POPADAD trial shows that there is no benefit from daily prophylactic aspirin in type 1 or type 2 diabetes. This is borne out in advice from the drug and therapeutics bulletin.

Management of Hypertension for Type 1 or Type 2 Diabetes

Type 1 Diabetes

- In the absence of nephropathy (microalbuminuria or proteinuria), the prevalence of hypertension in Type 1 diabetes is similar to non-diabetic individuals
- Blood pressure rises as microalbuminuria becomes established
- Anti-hypertensive therapy reduces urinary albumin excretion and delays progressive loss of glomerular function. The greatest benefit is seen with ACE Inhibitors.

Type 2 Diabetes

- 40-50% of patients with Type 2 diabetes have hypertension at the time of diagnosis
- Hypertension accelerates the decline in renal function in established nephropathy.
Confirm the Diagnosis of Hypertension

Measurement of BP – see appendix 5 page 104

**Thresholds and Targets for CV Risk in Diabetes**

- The threshold for anti-hypertensive therapy is BP > 140/90 mmHg
- The target BP is < 130/80 mmHg in the absence of nephropathy
- In patients with Type 1 diabetes and nephropathy, ACE Inhibitors are first-line therapy and a target BP as low as possible is recommended

- In **uncomplicated patients** (no target organ damage, BP < 140/90 mmHg), delay pharmacological intervention and reassess after 3-6 months of lifestyle measures
- If **target organ damage** (retinopathy, nephropathy, left ventricular hypertrophy) present, start antihypertensive therapy **immediately**
- If hypertension is **sustained or severe** (Diastolic BP > 110 mmHg) or multiple cardiovascular factors are present, institute therapy within **1-2 weeks**
- All hypertensive patients should receive lifestyle advice.

**Diagnosis: Use of Ambulatory Blood Pressure Monitoring (ABPM)**

- The average daytime BP and not the average 24 hour BP should be used to make treatment decisions
- BP measured by ABPM is systematically lower than surgery or clinic measurements in hypertensive patients; the average difference in techniques is 12/7 mmHg; the target ABP is < 130/80 mmHg
- **Outcome trials in hypertension have all been based on surgery or clinic BP measurement, not on ABPM data.**

ABPM is available via the Edinburgh Direct Access ABPM service whereby GPs can refer patients to the Diabetes Out-patient Departments at the WGH, RIE and SJH. A recent study involving patients attending the Direct Access service at the WGH found that results gained from Ambulatory Blood Pressure Monitoring were comparable with those for patients using self blood pressure monitors. Consequently self BP monitors are now routinely used instead of ABPM’s as these are preferred by the majority of patients attending the Diabetes Out-patient clinics. The home BP monitors are used in accordance with the European Society of Hypertension guidelines whereby patients record their own BPs twice a day for seven consecutive days. The BPs recorded in the first two days are ignored and an average of the remaining BP’s is calculated to give the average daytime BP measurement. Ambulatory Blood Pressure Monitors used are Spacelabs 90207 (Spacelabs Inc., Redmond, Washington, USA.) Self BP monitor used are Microlife Watch BP Home.


**Treatment of Hypertension in Type 1 Diabetes**

- All drugs effective, therefore choice should be tailored to individual patient’s needs. For further information, see Lothian Joint Formulary.
If microalbuminuria or proteinuria is present in Type 1:

- ACE Inhibitors are first-line choice
- Angiotensin II antagonists can be used if ACE Inhibitors produce adverse effects e.g. cough
- Other classes of drugs may be added, with the exception of short acting dihydropyridine calcium channel blockers (e.g. Nifedipine), which are not as effective at limiting protein excretion.

**Treatment of Hypertension Type 2 Diabetes**

- All classes of drugs are effective at lowering BP, therefore choice should be tailored to individual patient's needs
- ACE inhibitors and long acting calcium channel blockers are the preferred first-line agents
- ACE Inhibitors are the recommended first-line therapy if nephropathy is present, as they are renoprotective
- Polypharmacy is likely: 30% will require 3 or more drugs to achieve target BP.

**Management of Hypertension in the Elderly (Age 75+)**

- Treating hypertension in the elderly confers protection against future stroke.
- Make a clinical decision on the relative benefits and risks of treating frail, very elderly patients
- Consider low dose Thiazide or long acting Calcium Channel Blocker as first line therapy
- Examine for signs of postural hypotension.
- BP targets may be relaxed.

**Management of Isolated Systolic Hypertension**

- Defined as SBP > 160 mmHg with DBP < 90 mmHg
- Common in middle-aged and elderly Type 2 patients
- Consider long acting Calcium Channel Blockers or low dose Thiazides diuretics for initial drug choice.

**Indications for Hospital Referral**

- Evidence of nephropathy (persistent microalbuminuria, overt proteinuria or serum creatinine > 150 µmol/L)
- Presence of cardiac failure or retinopathy
- Clinical possibility of renovascular disease or other secondary cause of hypertension
- BP difficult to control despite appropriate therapy
- Rise in serum creatinine (>50% from baseline) after ACE Inhibitor started.

**Use of ACE Inhibitors**

- Consider the presence of renal artery stenosis in patients with Type 2 diabetes
- Suspect underlying renovascular disease if widespread atheroma present (e.g. carotid or abdominal bruits, aortic aneurysm, absent peripheral pulses)
- Before starting ACE Inhibitor, measure baseline urea, creatinine & electrolytes
- Repeat after 4-7 days, again after 3 months and thereafter annually
- Stop drug if significant hypotension or a significant rise in creatinine occurs (>50% from baseline)
- Refer or discuss with secondary care physician if in doubt.

*SIGN recommend that ACE inhibitor therapy should be given to patients with diabetes who fall into any of the following categories:

- following Myocardial Infarction (MI)
- heart failure due to left ventricular systolic dysfunction
- patients with stable angina*
General Advice

- All classes of anti-hypertensive drugs are effective at lowering BP.
- Select drug with once (or maximum twice) daily dosage to improve adherence.
- **Remember patients with diabetes are likely to be on multiple drugs.**
- **Drug choices should, if possible, be tailored to an individual patient’s needs e.g.**
  - ACE Inhibitor if previous MI with left ventricular dysfunction or persistent microalbuminuria or proteinuria present.
  - Cardio selective Beta-blocker or rate-lowering Calcium Channel Blocker if coexisting angina.
  - Thiazide diuretics are especially useful in older patients or patients with systolic hypertension. Bendroflumethiazide should not be prescribed in doses higher than 2.5mg daily.
  - Angiotensin II Receptor Antagonists should be reserved for patients experiencing adverse effects on ACE Inhibitors e.g. cough.

Dosage Adjustment

- An interval of at least 4 weeks should be allowed to observe the full response, unless it is necessary to lower BP more urgently.
- The 2.5mg dose of Bendroflumethiazide should not be titrated up.

Combination Therapy

- Less than half of patients with hypertension will be controlled by monotherapy.
- Sub-maximal doses of two drugs result in larger BP responses and fewer adverse effects than maximal doses of a single drug.
- Fixed dose combination preparations should be avoided due to cost and lack of flexibility in dose titration.
Algorithm: Recommendations for combining blood pressure drugs/ABCD rule

- **Younger (e.g. < 55 years) and non-black**
- **Older (e.g. ≥ 55 years) or black**

**Step 1**
- A (or B*)
- C or D

**Step 2**
- A (or B*)
- C or D

**Step 3**
- A (or B*)
- C
- D

**Step 4**
- Resistant hypertension
- Add: either α blocker or spironolactone or other diuretic

A: ACE inhibitor or angiotensin receptor blocker
B: β blocker
C: Calcium channel blocker
D: Diuretic (thiazide/thiazide-like)

*Combination therapy involving B and D induces more new onset diabetes compared to other combination therapies

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*See Appendix 5 (pg 104) for guidelines on measurement of blood pressure
Diabetes and Men

Erectile Dysfunction

Erectile failure occurs in at least 50% of all men with diabetes. 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 and recreational drugs may also be involved. Testosterone deficiency and hyperprolactinaemia cause loss of libido and where present, the possibility of an underlying pituitary tumour should be excluded.

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

History

1. Define the precise problem(s)
   - 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
   - Alcohol intake, recreational drugs and smoking status
   - Previous urological disease or intervention
   - Previous use of erectile dysfunction therapies, i.e. Sildenafil or Caverject -effectiveness and undesirable side effects
   - Known renal disease
   - Polypharmacy
   - Diabetes control (HbA1c).

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

<table>
<thead>
<tr>
<th>Psychogenic</th>
<th>Organic</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Was the onset rapid?</td>
<td>- Was the onset gradual?</td>
</tr>
<tr>
<td>- Is there an inconsistent response varying with time/partner?</td>
<td>- Is there a consistent lack of erections?</td>
</tr>
<tr>
<td>- Does the patient still get nocturnal or early morning erections?</td>
<td>- Have the patient's nocturnal or early morning erections stopped?</td>
</tr>
<tr>
<td>- Does the patient still respond to self-stimulation?</td>
<td>- Does the patient find no response to self-stimulation?</td>
</tr>
<tr>
<td>- Has the patient had an important life event that might contribute to erectile dysfunction?</td>
<td>- Does the patient have underlying disease which might be a contributing factor?</td>
</tr>
</tbody>
</table>

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 and medical history

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, autonomic 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, check testosterone levels. 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 and advise on smoking
   - Withdraw causative drugs where possible
   - Correct associated endocrine disease where present
   - Involve partner as appropriate
   - Emphasise the importance of weight loss.

2. Pharmacological Treatments
   - Oral preparations - first choice sildenafil; second choice tadalafil [PRN or once daily preparation] and vardenafil. N.B. all contra-indicated in patients using oral, sublingual or transdermal nitrate. Education on use restrictions, action and duration and possible side effects of the PDE-5 inhibitors should be discussed.
   - Intra-cavernosal injection of vasoactive drugs
   - Intra-urethral agents

See Ljf 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.

Erectile Dysfunction may indicate a vascular problem and should prompt an aggressive search for other vascular problems.
Diabetes and Women

Contraception

Contraception should be discussed with all diabetic women in the child-bearing age group.

1. Combined Oral Contraceptive Pill (OCP)

- Low dose oestrogen preparations are safe for use in the majority of women with diabetes
- They may cause a rise in BP and raise HDL cholesterol and triglycerides (oestrogen).
- Monitor BP, weight and HbA1c twice yearly, assess lipids annually and discontinue if hypertension or deteriorating lipid metabolism occurs.
- Avoid when complications of diabetes or risk factors for vascular disease present or in older women (> 35 years). However a value judgement should be made in women for whom avoidance of pregnancy is essential.

2. Progestogen-Only Pill (POP)

- No vascular side-effects or effects on lipid metabolism
- Less effective than the combined OCP
- Irregular periods or inter-menstrual bleeding may occur
- No vascular side-effects or effects on lipid metabolism
- Less effective than the combined OCP
- Irregular periods or inter-menstrual bleeding may occur.

Injectable and implantable progestogens are suitable for some patients, particularly if compliance is an issue. However deterioration in glycaemic control may occur.

3. Intra-Uterine Contraceptive Device

- The main advantage is the lack of metabolic effects
- There is a theoretical risk of infection causing salpingitis

4. Mechanical Contraception

- Not recommended if it is essential to avoid pregnancy due to the high failure rate.

5. Sterilisation

- Sterilisation may be advised if further pregnancy represents a serious risk to health.
- Obesity adds to the risk of the procedure and the failure rate is 0-0.5 per women years

Hormone Replacement Therapy in Diabetes

- Hormone replacement therapy (HRT) alone helps to relieve the hot flushes and episodes of excessive sweating associated with the menopause.
- It is now evident that HRT confers an increased risk of venous thromboembolic disease, breast cancer and ischaemic heart disease. These risks bear on the duration of HRT treatment and its relief of peri-menopausal symptoms, with most practitioners recommending 2-3 years treatment only.
- This recommendation presently holds true for non-diabetic women and the same recommendation most probably applies to diabetic women also.

Where once HRT was recommended as prophylaxis against bone fracture in treatment of osteoporosis, the risks of HRT are now thought to outweigh potential benefit, in terms of bone protection, offered by HRT prescription.
Gestational Diabetes

Gestational diabetes mellitus (GDM) affects 2-4% of pregnancies and is defined as carbohydrate intolerance of variable severity, with onset or first recognition in pregnancy. A screening programme for GDM should identify those pregnant women with blood glucose levels that are associated with an adverse fetal outcome or an increased risk of future diabetes in the mother.

- In normal women during pregnancy, the range for fasting blood glucose is lower than in non-pregnant women
- Glycosuria with normal blood glucose levels is common, due to a lowering of the renal glucose threshold.

Screening for GDM

- Urine should be tested at each antenatal visit for glycosuria (preferably fasting sample)
- Timed laboratory venous plasma glucose measurements should be made
  - At booking visit
  - At 28 weeks gestation
- A 75g OGTT should be performed if the plasma glucose is
  - > 5.5 mmol/L 2 hours or more after food
  - > 7.0 mmol/L within 2 hours of food
- Diagnosis of GDM is made on OGTT as follows:
  - Fasting glucose ≥ 5.5 mmol/L or
  - 2 hour glucose ≥ 9.0 mmol/L

N.B. The diagnostic criteria for GDM are lower than for the non-pregnant population.

Management of GDM

- Refer to combined diabetes antenatal team immediately
- Dietary advice should be given in all cases
- If fasting or pre-prandial glucose is consistently greater than 6mmol/L, metformin is often now initiated as first line therapy. Glucose targets are similar to patients with established diabetes
- In most cases, therapy can be discontinued at delivery
- Ensure that normal glucose levels returns after delivery
- A 75g OGTT should be performed at around 6 weeks post-partum and the results interpreted according to WHO criteria
- The condition is associated with an increased risk of future diabetes (usually Type 2 DM)
- Check fasting plasma glucose annually in women with a history of GDM to identify asymptomatic diabetes and screen for the condition in a future pregnancy.

Women with previous GDM should be made aware of the benefits of physical activity and importance of weight control, to avoid the development diabetes
Pregnancy in Women with Diabetes

Women with diabetes who become pregnant or are considering pregnancy should be referred to a diabetes ante-natal clinic (or to their local diabetes clinic) immediately

St John’s Hospital phone: 01506 523 856
Royal Infirmary of Edinburgh phone: 0131 242 1470
Western General Hospital phone: 0131 537 1746/1655

Improved diabetic control in early pregnancy can reduce the incidence of congenital malformations and early spontaneous fetal loss.

- Take a full medical, obstetrical and gynaecological history
- Review current medication. Note: ACE Inhibitors, Angiotensin Receptor Blockers and Statins should be discontinued
- Prescribe Folate 5mg daily for at least a month pre-conception and during first trimester
- Assess for presence of diabetic complications and treat blood pressure if required
- Check rubella antibody status, thyroid biochemistry and urinalysis
- Advise on diet and weight reduction if relevant and strongly discourage smoking
- Educate on the importance of good glycaemic control and avoidance of ketoacidosis
- Aim to obtain HbA1c near to the non-diabetic range, while avoiding hypoglycaemia. A change in regimen may be necessary
- Instruct partners to recognise and manage hypoglycaemia
- In women with type 2 diabetes, metformin may be continued. Other OHAs are usually discontinued and insulin therapy is invariably required.

Women who are well-controlled and free of complications can be advised to stop contraception and to keep a record of periods. Other women may require additional time to optimise glycaemic control or to have investigation and treatment of complications.

Advertise patients to perform a pregnancy test if there is a lapse of five weeks between periods and contact a Diabetes Specialist Nurse as soon as obtaining a positive result.

Ante-natal Care

- Ante-natal care should be hospital-based, from a multi-disciplinary team
- Individualise insulin regimens and recommend 4-times daily glucose monitoring
- Aim to maintain glucose 4-7 mmol/L and HbA1c within the normal non-diabetic range
- Remember insulin requirements increase progressively from the 2nd trimester until the last month of gestation, when a slight fall-off may be noted
- Hypoglycaemia and loss of awareness is common in early pregnancy. Hypoglycaemia does not appear to have long-term adverse effects on fetal development
- Ketoacidosis can cause foetal death at any stage. All women should test urine for ketones if blood glucose is high, if vomiting occurs or if they are unwell.
- All women should have regular retinopathy screening and measurement of blood pressure and renal function, as retinopathy and nephropathy may deteriorate during pregnancy
- Patients generally attend for ante-natal care at intervals of 2-4 weeks from booking up to 28 weeks, every 2 weeks until 34 weeks and thereafter weekly until delivery.

Delivery

- The timing of delivery is individualised; in women with good diabetic control and no complications, the pregnancy may be continued to 39-40 weeks
- Caesarean section rates are often higher than in non-diabetic women.

Post-natal Care

- Insulin requirements fall dramatically after delivery, therefore reduce insulin doses immediately to pre-pregnancy levels, to avoid hypoglycaemia
- Encourage slightly higher blood glucose levels than during pregnancy
- In breast-feeding mothers, reduce insulin dose further once lactation is established
- Discuss contraception while the patient is still in hospital
- All women should be seen by the diabetes pregnancy care team six weeks after delivery
Diabetes and Ramadan

Ramadan is a period for worship, self-discipline, austerity and charity. Fasting is obligatory for all healthy adult Muslims, with no food or drink being consumed between dawn and sunset. Nor should anything be inhaled either tobacco or other drugs. There are only 2 meals a day - pre-dawn and after sunset. As the Islamic calendar year begins with the sighting of the new moon, Ramadan starts 10 days earlier each year.

Diabetes and Fasting

Exemptions from fasting:
- Children under the age of puberty
- Pregnant and breast feeding women
- Those with learning difficulties
- The old and frail
- The acutely unwell
- Those with chronic illnesses for whom fasting may be detrimental to health
- People with diabetes fall into this last category, but the majority may prefer to meet their religious obligations by fasting.

Those who Might be Advised Not to Fast

- People with impaired hypoglycaemia awareness
- People with Type 1 or type 2 with poor glycaemic control
- Individuals known to be non-compliant with diet or medication
- Patients with a history of recurrent DKA
- Patients with intercurrent infections
- Patients with renal impairment of any severity (risk of dehydration and uraemia)
- Elderly people with reduced alertness
- Those who have previously experienced severe deterioration in glycaemic control during Ramadan.

Hazards of Fasting

The alteration of eating pattern without appropriate adjustment to the dosage and timing of insulin and/or oral medication may result in deterioration of glycaemic control. People treated with insulin or sulphonylureas run the risk of hypoglycaemia and some people with Type 1 diabetes may risk DKA. When Ramadan occurs during the summer months prolonged fasting may create greater potential hazards. It is important therefore to discuss the management of hypo and hyperglycaemia. Patients should be advised to break their fast if there is severe deterioration in glycaemic control, both hypo and hyperglycaemia. It may be necessary to prescribe Hypostop (glucose gel) and/or a Glucagen Hypokit. People need to be warned of the risks of dehydration if the fast is long and to drink plenty of fluids when not fasting.

Precautions for Those Who Fast

The importance of continued compliance with dietary recommendations should be emphasized. Breaking the fast after sunset may lead to over eating. Healthy eating guidelines should be encouraged - foods high in sugar and fats should be avoided. Meals with complex carbohydrate/starchy foods should be eaten. Patients need to monitor blood glucose with adjustment of medication as needed, though some people will not take blood sugar tests during their fast.

Patients who are treated with diet alone should not experience any problems with fasting during Ramadan.
Patients on Oral Medication or Incretin Mimetics

Patients taking Metformin alone are at little risk of hypoglycaemia and fasting poses little hazard. If a dose is usually taken at lunchtime it can be omitted or taken with the sunset meal. Patients taking a short acting sulphonylurea e.g. Gliclazide or Glipizide should take the largest dose with their evening meal and can half their morning dose if necessary. Alternatively the morning dose of sulphonylurea can be substituted by a post-prandial regulator such as Rapaglinide.

Long acting agents such as Glibenclamide and Glimepiride are hazardous and should be avoided, being substituted with Gliclazide before the sunset meal.

Patients taking a glitazone and sulphonylureas may take the glitazone at the usual time. Patients taking incretin mimetics, such as Exenatide (Byetta), may continue to take the injections before their meals as usual, so long as the meals are 6 hours or more apart. Otherwise only 1 injection should be taken before the sunset meal.

DPP4 inhibitors, such as Sitagliptin (Januvia), if taken once daily should be taken before the sunset meal; if taken twice daily can be taken as usual before meals at sunrise and sunset. Glucosidase inhibitors such as Acarbose if taken 3 times daily, the midday dose may be omitted or taken with the sunset meal.

Patients on Insulin

Patients should contact their DSN for advice before they fast. There should be no need for a drastic reduction in the total dose of insulin for people with Type 2 diabetes. Many patients with Type 2 diabetes are insulin resistant and will still require large doses.

Many patients with Type 2 normally use premixed insulin e.g. Humalog Mix 25/50 or Novomix 30. It is advisable to reverse the morning and evening dose if the morning dose is usually larger. If the doses are the same, the morning dose should be reduced by about 50% and a corresponding larger dose taken before the sunset meal. Or a short acting insulin e.g. Novorapid or Humalog can be substituted before breakfast (30% of usual morning dose of premixed insulin) with their evening dose of premixed insulin kept the same.

Patients who are on a basal bolus regime should take their short acting insulin Humulin S, Novorapid, Humalog before each meal taken. If taking long acting analogues e.g. Levemir or Lantus the dose and timing continues as before. For those using long acting insulin such as Insulatard, Humulin I daily, the timing and dosage remains the same. For those taking Insulatard or Humalin I bd, the morning dose can be reduced by 50%.

People with insulin pumps may adapt their basal rate of insulin depending on activity while fasting and omit boluses except when eating.

Further adjustment to insulin dosages are likely to be needed after these initial suggestions have been instituted.
Diabetic Neuropathy

Please refer to Diabetes and Men and Foot Complications also

Neuropathy is a frequent complication of diabetes. It most commonly presents as a symmetrical sensory neuropathy affecting the lower limbs, but can also cause isolated motor neuropathies, cranial nerve palsies and alteration of autonomic function.

The prevalence of neuropathic changes is related to the average glycated haemoglobin (HbA1c) and therefore attention to good blood glucose control can substantially reduce the risk of development and progression of neuropathy.

Autonomic Neuropathy

Abnormal autonomic function tests can be expected in 20-40% of adult diabetic population and the risk increases with duration of diabetes. Autonomic neuropathy may be manifest in one or more of the following ways:

Cardiac

- Postural Hypotension (symptomatic in up to 12%)
- Resting tachycardia or loss of sinus arrhythmia (up to 20%) Associated with increased sudden cardiac death.

Gastrointestinal

- Dysphagia with delayed gastric emptying, nausea/vomiting
- Constipation/diarrhoea.

Urogenital

- Erectile dysfunction
- Urinary retention/overflow incontinence.

Cutaneous

- Anhydrosis (absent sweating)
- Gustatory sweating.

Other

- Anaemia
- Hypoglycaemia unawareness
- Abnormal pupillary reflexes
- Neuropathic oedema
- Charcot feet.

Treatment

The management of autonomic neuropathy is symptom control. Some improvement can occur with improved glycaemic control, which should always be addressed in addition to specific measures.

Postural Hypotension

Symptomatic postural hypotension is one the commonest manifestations of autonomic neuropathy. Management is via controlled standing in the first instance. If this fails:

- Fludrocortisone 50 to 200 microg
- Ephedrine up to 50mg three times a day
- Mitodrine starting at 10mg three times a day
- Pressure garments
- All have a role.
Neuropathic Bladder

Assessment

Bladder ultrasound and formal urodynamic studies are required for full assessment (usually via an urology referral).

Management

- Advise regular toileting
- Intermittent self catheterisation is frequently successful at controlling overflow
- Long term catheter may be required
- Antibiotics might be needed if recurrent urinary infections
- Alpha blockers can be considered but may be limited by symptomatic postural hypotension.

Gastroparesis

Assessment

Delayed gastric emptying may cause recurrent hypoglycaemia. Consider gastric emptying studies if a patient with long standing diabetes has persistent nausea/vomiting.

Treatment

- Prokinetic agents may be of some value
- Metoclopramide (5-10 mg pre meals)
- Domperidone (10-20mg pre meals)
- Erythromycin – is mainly useful as Intravenous therapy in acute attacks
- Surgery, gastric pacemakers and/or drainage procedures can very occasionally be useful.

Large Bowel Involvement

This problem may be a direct result of gastrointestinal neuropathy, causing either constipation or diarrhoea.

Treatment

- Constipation - treated with standard bulking and softening preparations
- Episodic diarrhoea - may respond to:
  - Loperamide (2mg qds) or codeine phosphate (30mg qds)
  - A short course of antibiotics may help if there is bacterial overgrowth
  - Somatostatin analogues can reduce secretory / watery diarrhoea.

Exclude also other possible causes of diarrhoea, including metformin therapy, the possibility of coeliac disease particularly in Type 1 patients or exocrine pancreatic dysfunction in cases of secondary diabetes.

Anhydrosis

Typically seen in the feet this can lead to skin cracking and infection. Treatment is with emollients applied frequently and liberally.

Gustatory Sweating

Gustatory sweating is fortunately uncommon; best managed by avoidance of foods found by the sufferer to exacerbate the problem. The topical anticholinergic agent glycopyrrolate may be beneficial but is often limited by adverse effects.
Anaemia

Anaemia is a frequent problem but rarely recognised as a complication of diabetes. It is believed to be due to reduced erythropoetin levels. Erythropoietin is under autonomic control. Lack of sympathetic tone can lead to low levels and then to anaemia.

Neuropathic Oedema

Damage to control of capillary blood flow can lead to accumulation of fluid in dependent extremities in the presence of a normal serum albumin and the absence of fluid overload.

Treatment

Ephedrine, an alpha-adrenergic agonist may be useful but care is required in the presence of hypertension and angina.

Peripheral sensory neuropathy

Sensory neuropathy most commonly presents as symptomless symmetrical sensory loss in distal extremities i.e. feet and less commonly hands. The risk of development is related to blood glucose control and duration of diabetes. The most important clinical manifestation is in the feet where sensory loss predisposes to callus formation and neuropathic ulceration. Sensory neuropathy may also present with symptoms of numbness, paraesthesia or inappropriate pain.

Assessment

Feet should be systematically assessed on an annual basis for signs of sensory loss using 10g monofilaments and vibration sense. See basic foot screening checklist (pg 102)

Management

Attempts should be made to optimise blood glucose control, which may result in some improvement. Management is otherwise through education of patients in the care of at risk feet, and the acute management of ulceration should it occur.

Cranial nerve palsies

Diabetic neuropathy is a common cause of cranial nerve palsy. Any nerve can be affected. The third cranial nerve is the most common and often associated with pain in the orbit. It must be distinguished from other causes (aneurysm and tumour), and magnetic resonance imaging (MRI) is therefore usually required. Typically pupillary responses are preserved in diabetes (in contrast to other causes). Fourth, sixth and seventh nerve palsies are the next most frequent.

Peripheral motor neuropathy

This typically presents as a neuropathy affecting small muscles of the feet and can lead to disturbance of the architecture of the foot which leads to abnormal pressures particularly on the metatarsal heads and an increased risk of ulceration. It may also be manifest as a mononeuropathy affecting a single peripheral nerve trunk, most commonly the femoral nerve leading to diabetic amyotrophy with wasting of the quadriceps muscle. Gradual recovery is usual in this circumstance and may be accelerated by improved glycaemic control through the use of insulin.
Hyperglycaemic Emergencies

Diabetic Ketoacidosis (DKA)

DKA occurs due to relative or absolute lack of insulin. Common precipitants include a new diagnosis of type 1 diabetes, infection and deliberate omission of insulin.

**Diagnosis**

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

The degree of hyperglycaemia is not a reliable guide to the severity of the metabolic disturbance in DKA and in children, pregnant women, malnourished or alcoholic patients; blood glucose may not be much raised.

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

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

Consider DKA in any unconscious or hyperventilating diabetic patient.

**Immediate management**

In the early stages, where patient is fully conscious and able to take adequate oral fluids, an increased insulin dose may stabilise the situation. However in most cases an emergency admission to hospital is required where the treatment with intravenous insulin, fluids and electrolytes is required to restore the metabolic equilibrium.

Patients aged less than 16 years old should be admitted to the Royal Hospital for Sick Children.

**Acute complications**

- Hypokalaemia: due to insulin and fluid administration, resolution of acidosis and inadequate potassium replacement. All of which are predictable and therefore avoidable
- 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
- Acute respiratory distress syndrome – may require temporary non-invasive or invasive ventilatory support
- Thromboembolism – presentation and management as standard.

**Diabetic Hyperosmolar Non-Ketotic Syndrome (HONK)**

- 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 of HONK

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.

Hyperosmolar syndrome requires immediate hospital admission and is managed in a similar way to diabetic ketoacidosis. Patients may be discharged on insulin or oral hypoglycaemic agents.

Management of Intercurrent Illness in Insulin Treated Diabetes

THE GOLDEN RULE: Insulin should NEVER be omitted.
Extra doses of fast-acting insulin are often required during illness

This advice applies to adults; for children, contact the Paediatric Diabetes team

- Maintain an adequate fluid intake (sugar free, i.e. water) of 100-200mL (approximately 1 glass) every hour.
- Maintain a regular intake of carbohydrate, regardless of blood glucose. At mealtimes, if unable to eat, but tolerating fluids, take carbohydrate in the form of 200mL of one of the following:
  - Regular diluting juice
  - Fruit juice
  - Drinking Chocolate or Ovaltine
  - Milk
  - Flat (sugary) fizzy Drink or Lemonade.
- Increase blood glucose monitoring to at least 4 hourly and test for ketones twice daily if able to do so. Ensure that glucose monitoring technique and equipment is accurate and arrange to review patient.
- Do not be afraid to increase insulin; in general, as much as doubling the dose may be necessary. Remember to taper dose back to normal when recovered.
- Ketonuria/ketonaemia is an early sign of decompensation and if acted upon promptly, it will often prove possible to avert hospital admission.
- If vomiting, hospital admission may be necessary: Consider administering an anti-emetic injection, also "Dioralyte/Rehidrat" may also be required.

The hospital diabetes team is there for advice.
When in doubt – please phone
or
NHS 24: 08454 24 24 24
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).

Use of Blood Ketone Testing In the Management of Intercurrent Illness in Insulin Dependent Diabetes

- Ketoacidosis can occur in the presence of normal blood glucose levels
- Type 2 diabetes patients treated with insulin very rarely become ketotic as they invariably have some residual insulin secretion

Test for Ketones in Type 1 Diabetes when:

- evidence of intercurrent infection
- Symptoms of ketoacidosis – thirst, polyuria, vomiting, confusion, blurred eyesight
- If blood glucose levels remain high (>10mmol/l) despite increasing insulin doses

<table>
<thead>
<tr>
<th>Blood Ketone Level</th>
<th>Action</th>
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<tbody>
<tr>
<td>&lt;0.6 mmol/l</td>
<td>Nil</td>
</tr>
<tr>
<td>0.6 – 1.5 mmol/l</td>
<td>Test again in 2 – 4 hours</td>
</tr>
<tr>
<td>1.5 – 3.0 mmol/l</td>
<td>Increase insulin if ketones no decreasing in 2 hours, admit</td>
</tr>
<tr>
<td>&gt;3.0 mmol/l</td>
<td>Check for ketoacidosis, measure H+, will usually need admission</td>
</tr>
</tbody>
</table>

Management of Intercurrent Illness in Patient with Type 2 Diabetes

Patients who are taking Metformin and/or ACE inhibitors or ARBs must be reminded to discontinue these medications during any severe illness, particularly if dehydrated or septic to avoid the development of lactic acidosis and/or acute renal failure.
Algorithm for Management of intercurrent illness in Type 1 Diabetes Mellitus

Unwell or High blood sugar ≥ 17mmol/L

Intractable vomiting or clinically obvious ketoacidosis

yes

Refer to hospital

no

Test urine for ketones***

Large

Phone diabetes nurse or doctor for advice

Small or moderate

Repeat blood glucose after 2-4hrs - if still elevated may need extra insulin*

Blood glucose high

Requires extra short acting insulin*

Blood glucose > 17mmol/L after 4hrs

no

Test blood glucose 4 times daily and ketones twice daily until stable**

Blood glucose low Or normal

Insufficient oral intake

Encourage oral intake then give extra insulin according to blood glucose

* The diabetes team will advise patients individually on how much extra insulin should be taken in the event of ketonuria or sustained hyperglycaemia, usually 10% of TDD.
** Refer to hospital if clinical deterioration
*** Blood ketones may be tested for instead of urine ketones, see page 77 for interpretation of results.
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 for Adolescents
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 lifestyle issues, including, alcohol use, contraceptive advice, and drug use, particularly with regard to the possible effect on their diabetes.

Adolescent Clinic
Diabetes clinics for this group are held at the Royal Infirmary, Western General, St John’s Hospital and Roodlands Hospital. Doctors, Diabetes Specialist Nurses, and Dietitians from the paediatric and adult services staff the clinics.

The transfer from paediatric to adolescent 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. However, for the majority it is often around their 14th birthday. Transfer to adult clinics usually occurs after the young person’s 18th birthday.

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.

Blood Ketone testing is now used more frequently, but some still urine test for Ketones. The major advantage of Blood Ketone testing is the convenience. But also that Ketones are detected earlier in the blood than in the urine and therefore, managed more effectively.

Insulin Regimens

- Many teenagers opt for multiple injection regimens (4 or more per day) as this gives increased flexibility in lifestyles, 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. School nurses are now informed of all newly diagnosed young people with diabetes. In addition education sessions are provided, for school staff, through Edinburgh Education and East Lothian Education and St John’s Hospital from June to September annually.

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

**Activity Holidays**

Some young people 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 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.**

Education and Advice Checklists
## New Patient with Diabetes Checklist

<table>
<thead>
<tr>
<th>NHS Lothian</th>
<th>______________________ Diabetes Clinic</th>
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<tbody>
<tr>
<td>Patient Details</td>
<td>Contact Tel. No.</td>
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<td>Date</td>
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### WHAT IS DIABETES?
- What is diabetes explained
- Video – action of insulin
- Symptoms of diabetes
- Type 1 and Type 2 diabetes defined

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<tr>
<th>COMMENTS</th>
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### DIET
Referral to dietitian – see dietary education checklist

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<tr>
<th>COMMENTS</th>
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</table>

### TREATMENT
- Diet
- Tablets – action, timing, side-effects
- Prescriptions
- Insulin
- hypos

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<tr>
<th>COMMENTS</th>
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</table>

### 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>
<thead>
<tr>
<th>COMMENTS</th>
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</table>
## COMPLICATIONS
- Eyes
- Feet
- Kidneys
- Heart/circulation
- Cholesterol/lipids
- Blood pressure
- Erectile dysfunction

## ANNUAL CHECK-UP EXPLAINED
- Blood tests/urine tests
- HbA1c
- Weight
- Blood pressure
- Visual acuity and retinopathy screening
- Foot examination

## LIFESTYLE AND LIFE EVENTS
- Smoking
- Exercise
- Driving and insurance
- Illness – sick day rules
- Foot care
- Diabetes UK info given – application form
- Contraception/pregnancy
- Contact telephone numbers given

## FOLLOW-UP
- Hospital appointment
- Shared care
# Patient Dietary Education Checklist

**NHS Lothian ____________________ Diabetes Clinic**

**Patient Details**

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## What is diabetes?

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## Effect of food on blood sugar levels

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## Diabetic medications – type, when taken, and how they work

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## Healthy eating –

- regular meal pattern
- meals based on low glycaemic index
- decreased simple sugars
- decreased fat intake
- increased fibre intake
- 5 portions fruit and vegetables/day
- decreased salt intake

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## Alcohol – volume, frequency and effects

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<th>Date discussed</th>
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## Benefits of achieving/maintaining ideal weight, and advice for healthy weight loss

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## Portion sizes

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## Hypoglycaemia – prevention and treatment (where appropriate)

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## Exercise

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## Diabetic products

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## Artificial Sweeteners

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## Non-alcoholic drinks

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## Snacks

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## Comments:

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**Lothian Diabetes Managed Clinical Network**

84
# Diabetes Re-education Checklist

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<th>Patient Details</th>
<th>Contact Tel. No.</th>
<th>Date</th>
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## Duration of Diabetes

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<th>Last HbA1c</th>
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<tr>
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<th>CURRENT</th>
<th>CHANGE TO</th>
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<tr>
<td>Insulin regime and technique</td>
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<tr>
<td>Monitoring and equipments</td>
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<tr>
<td>Dose adjusting</td>
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<td>Hypos</td>
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<tr>
<td>Exercise</td>
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<td>Employment/shifts</td>
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<td>Alcohol</td>
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<td>Smoking</td>
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<td>Diet</td>
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<td>Footcare</td>
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<td>Stress</td>
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<tr>
<td>Driving</td>
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<tr>
<td>Complications</td>
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</tbody>
</table>
## Usual Daily Pattern

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<td></td>
<td>Weekdays</td>
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<td>Weekdays</td>
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| Get up   |           |           |
| Breakfast injection |           |           |
| Breakfast |           |           |
| A.M. snack |           |           |
| Lunch injection |           |           |
| Lunch |           |           |
| P.M. snack |           |           |
| Evening injection |           |           |
| Evening meals |           |           |
| Bedtime 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

<table>
<thead>
<tr>
<th>WHAT IS DIABETES?</th>
<th>COMMENTS</th>
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<tbody>
<tr>
<td>Symptoms – why?</td>
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<tr>
<td>Injection technique</td>
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<td>Sites – rotation</td>
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<tr>
<td>Disposal</td>
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<td>Storage of insulin</td>
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<td>Needle length</td>
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<tr>
<td>Pen type / syringe size</td>
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<th>INFORMATION ABOUT INSULIN</th>
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<tr>
<td>Insulin type</td>
<td></td>
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<td>Action / duration</td>
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<td>Timing of injections</td>
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<td>Finger pricker – lancets</td>
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<tr>
<td>Timing of tests / frequency</td>
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<td>Target levels</td>
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<tr>
<td>Adjusting of insulin dose</td>
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<td>Downloading – clinic</td>
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<td>Downloading – home</td>
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<td>Documenting</td>
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<tr>
<td>Relation to HbA1c – target</td>
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<table>
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<tr>
<td>Carbohydrate counting</td>
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<td>Signs and symptoms</td>
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<td>Causes</td>
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<td>Treatment</td>
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<td>Glucagen</td>
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<td>Causes</td>
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<td>Treatment</td>
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<tr>
<td>Ketostix / blood ketones</td>
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<td>Sick day rules</td>
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<td>LIVING WITH DIABETES</td>
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<td>-----------------------------------------</td>
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<tr>
<td>• Exercise</td>
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<tr>
<td>• Alcohol</td>
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<td>• Effects of stress</td>
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<td>• Sexual activity</td>
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<td>• Contraception / pregnancy</td>
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<td>• Holidays</td>
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<td>• Smoking</td>
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<tr>
<td>• Recreational drugs</td>
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<tbody>
<tr>
<td>• Eyes</td>
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<td>• Feet</td>
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<tr>
<td>• Kidneys</td>
<td></td>
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<tr>
<td>• Heart</td>
<td></td>
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<tr>
<td>• Erectile dysfunction</td>
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<tr>
<td>• DCCT / UKPDS</td>
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<tr>
<th>CLINIC APPOINTMENTS</th>
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<tbody>
<tr>
<td>• Annual Review – what care to expect</td>
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<tr>
<td>• Routine – what care to expect</td>
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<tr>
<td>• Free prescription</td>
<td></td>
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<tr>
<td>• Free eye test with optician</td>
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<tr>
<td>• Inform DVLA and Insurance</td>
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<tr>
<td>• DUK application form</td>
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<table>
<thead>
<tr>
<th>CONVERSIONS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• OHA – what to continue</td>
<td></td>
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</table>

Next Clinic Appointment:

Next DSN Appointment:

Patient literature given:
# Pre-Pregnancy Checklist for Women with Diabetes

<table>
<thead>
<tr>
<th>PRESENT HbA1c</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discuss reason for good control. Advise to prevent pregnancy until conditions are right (HbA1c 7 – 7.5 or 53 – 59 mmol/mol)</td>
<td>Less than 7% (53) ideally</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTRACEPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current method used</td>
</tr>
<tr>
<td>Keep diary of menstrual periods</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FOLIC ACID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date started; Dose; 5mg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SMOKING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount per day</td>
</tr>
<tr>
<td>Advice given to stop/leaflet given</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BLOODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c, rubella, thyroid and renal function, FBC, red cell folate, vitamin B12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BP</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>RETINOPATHY SCREENING</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>BLOOD GLUCOSE MONITORING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meter, diary, frequency.</td>
</tr>
<tr>
<td>Prior to conception at least 2-3 days per week</td>
</tr>
<tr>
<td>Once pregnant 4 time a day</td>
</tr>
<tr>
<td>Aiming for blood glucose levels between 4 – 6 pre-meals</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CURRENT INSULIN REGIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type, pen syringe, needle size, injection sites/technique</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HYPOGLYCAEMIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discuss risk of moderate – severe hypo increased</td>
</tr>
<tr>
<td>a) in women who have many hypos</td>
</tr>
<tr>
<td>b) in women who have had diabetes for a long time</td>
</tr>
<tr>
<td>c) if history of severe hypos in previous pregnancies</td>
</tr>
<tr>
<td>COMMON HYPO PATTERN IN PREGNANCY</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>a) in early pregnancy – conception to 16 weeks</td>
</tr>
<tr>
<td>b) in last few weeks usually at night</td>
</tr>
<tr>
<td>c) round the time of delivery, during labour and</td>
</tr>
<tr>
<td>immediately after</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HYPERGLYCAEMIA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Test for ketones if blood sugar is high i.e.</td>
<td></td>
</tr>
<tr>
<td>more than 9.0 or if ill or vomiting</td>
<td></td>
</tr>
<tr>
<td>Give oral and written instructions on how to</td>
<td></td>
</tr>
<tr>
<td>obtain advice at any time of day or night</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DISCUSS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucagen, info leaflet – hypo, ID card, dextrosol, there is no evidence that hypos can cause abnormalities in pregnancies</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>DIETITIAN</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment of diet in relation to diabetic control and general health (folate, iron, calcium) and food hygiene and safety.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPLICATIONS OF DIABETES</th>
<th></th>
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</thead>
</table>

| OTHERS                                         |                                                                 |

| FOLLOW-UP ARRANGEMENTS                         |                                                                 |
## Travel Checklist

NHS Lothian ___________________________ Diabetes Clinic

Patient Details Contact Tel. No.

Date

Signed

Details of trip

Companion: Insulin type:

Destination: Usual doses:

Departure/return dates: Last HbA1c:

<table>
<thead>
<tr>
<th>Health checks</th>
<th>Comments</th>
<th>Completed</th>
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</thead>
<tbody>
<tr>
<td>• Diabetic annual review</td>
<td>Date:</td>
<td></td>
</tr>
<tr>
<td>• Podiatrist</td>
<td>Prescription</td>
<td></td>
</tr>
<tr>
<td>• GP</td>
<td>Antibiotics</td>
<td></td>
</tr>
<tr>
<td>• Vaccinations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Dentist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Optician</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Bureaucracy                                       |                   |           |
| • Medical Insurance                               | Given Y / N        |           |
| • Customs letter                                  |                   |           |
| •Identification                                   |                   |           |
| • Driving licence                                 |                   |           |

| Diabetes drugs                                    |                   |           |
| • Insulin type                                    | Give spare Y / N  |           |
| • Pen device and needles                          | Contact company   |           |
| • Disposal                                        |                   |           |
| • Availability                                    |                   |           |
| • Transporting                                    |                   |           |
| Diabetes equipment | 
|-------------------|-----|
| • Blood glucose meter | Obtain spare/battery Y/N |
| • Test strip availability | Temperature effect |
| • Finger pricker | Give spare Y/N |
| • Blood glucose monitoring sticks | Ensure adequate supplies |
| • Ketostix / Multistix | Ensure adequate supplies |

| Getting there | 
|----------------|----------------|
| • Meals | Give time zone sheet |
| • Time zones | |

| Info for travel companion | 
|-----------------------------|-----------------------------|
| • General diabetes | Show glucagen kit |
| • Hypoglycaemia | Give hypo literature |
| | Dextrosol - humidity |

| Food and alcohol | 
|------------------|------------------|
| • Specific CHO foods | Give translations e.g. sugar-free |
| • Dose adjusting | |
| - food | |
| - alcohol | |

| Illness | 
|---------|------------------|
| • Blood glucose monitoring | Obtain |
| • Dose adjusting | |
| • Ketostix | |
| • Diet | |

| Website details | 
|-----------------|------------------|
| e-mail address | |

| DUK translations | 
|------------------|------------------|

| Follow up on return | 
|---------------------|------------------|
| DSN appt. | |
| Diabetic clinic appt. | |
## Travelling across time zones

NHS Lothian  
_______________ Diabetes Clinic  

Patient Details  
Contact Tel. No.  
Date  

Insulin type:  
Insulin dose:  
Destination:  

### Flight details – outward journey

<table>
<thead>
<tr>
<th></th>
<th>Our time</th>
<th>Their time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Departure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Departure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrive</td>
<td></td>
<td></td>
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</tbody>
</table>

**INSULIN INJECTIONS**

### Flight details – return journey

<table>
<thead>
<tr>
<th></th>
<th>Their time</th>
<th>Our time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Departure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Departure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrive</td>
<td></td>
<td></td>
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</tbody>
</table>

**INSULIN INJECTIONS**

Signature:  
Date:  

COMMENTS:
## Glossary of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE</td>
<td>Angiotensin-converting enzyme</td>
</tr>
<tr>
<td>ABPI</td>
<td>Ankle Brachial Pulse Index</td>
</tr>
<tr>
<td>ABPM</td>
<td>Ambulatory Blood Pressure Monitor</td>
</tr>
<tr>
<td>ACR</td>
<td>Albumin Creatinine Ratio</td>
</tr>
<tr>
<td>ARB</td>
<td>Angiotensin Receptor Blocker</td>
</tr>
<tr>
<td>bd</td>
<td>Bis die (twice a day)</td>
</tr>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>BNF</td>
<td>British National Formulary</td>
</tr>
<tr>
<td>BP</td>
<td>Blood Pressure</td>
</tr>
<tr>
<td>BPH</td>
<td>Benign Prostatic Hypertrophy</td>
</tr>
<tr>
<td>CHD</td>
<td>Coronary Heart Disease</td>
</tr>
<tr>
<td>CHI</td>
<td>Community Health Index</td>
</tr>
<tr>
<td>CHO</td>
<td>Carbohydrate</td>
</tr>
<tr>
<td>CSII</td>
<td>Continuous Subcutaneous Insulin Infusion</td>
</tr>
<tr>
<td>CVD</td>
<td>Cardiovascular Disease</td>
</tr>
<tr>
<td>CVR</td>
<td>Diabetes Cardiovascular Risk</td>
</tr>
<tr>
<td>DAFNE</td>
<td>Dose Adjustment for Normal Eating</td>
</tr>
<tr>
<td>DBP</td>
<td>Diastolic Blood Pressure</td>
</tr>
<tr>
<td>DCCT</td>
<td>Diabetes Control and Complications Trial</td>
</tr>
<tr>
<td>DESMOND</td>
<td>Diabetes Education and Self-Management for Ongoing and Newly Diagnosed</td>
</tr>
<tr>
<td>DKA</td>
<td>Diabetic Ketoacidosis</td>
</tr>
<tr>
<td>DM</td>
<td>Diabetes Mellitus</td>
</tr>
<tr>
<td>DOLI</td>
<td>Diabetes Ownership Lifestyle Improvement</td>
</tr>
<tr>
<td>DR</td>
<td>Diabetic Retinopathy</td>
</tr>
<tr>
<td>DRS</td>
<td>Diabetic Retinopathy Screening</td>
</tr>
<tr>
<td>DSN</td>
<td>Diabetes Specialist Nurse</td>
</tr>
<tr>
<td>DUK</td>
<td>Diabetes UK</td>
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<tr>
<td>DVLA</td>
<td>Driver and Vehicle Licensing Agency</td>
</tr>
<tr>
<td>eAG</td>
<td>Estimated Average Glucose</td>
</tr>
<tr>
<td>ED</td>
<td>Erectile Dysfunction</td>
</tr>
<tr>
<td>eGFR</td>
<td>Estimated Glomerular Filtration Rate</td>
</tr>
<tr>
<td>ESRF</td>
<td>End Stage Renal Failure</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>FPG</td>
<td>Fasting Plasma Glucose</td>
</tr>
<tr>
<td>GDM</td>
<td>Gestational Diabetes Mellitus</td>
</tr>
<tr>
<td>GI</td>
<td>Glycaemic Index or Gastrointestinal</td>
</tr>
<tr>
<td>GMS</td>
<td>General Medical Services</td>
</tr>
<tr>
<td>GP</td>
<td>General Practitioner</td>
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<tr>
<td>HADS</td>
<td>Hospital Anxiety and Depression Scale</td>
</tr>
<tr>
<td>HbA1c</td>
<td>Glycosylated Haemoglobin test</td>
</tr>
<tr>
<td>HBGM</td>
<td>Home Blood Glucose Monitoring</td>
</tr>
<tr>
<td>HDL</td>
<td>High Density Lipids</td>
</tr>
<tr>
<td>HEBS</td>
<td>Health Education Board for Scotland</td>
</tr>
<tr>
<td>HONK</td>
<td>Hyperosmolar Non-Ketotic Syndrome</td>
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<tr>
<td>HPC</td>
<td>Health Professions Council</td>
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<tr>
<td>HRT</td>
<td>Hormone Replacement Therapy</td>
</tr>
<tr>
<td>IDDM</td>
<td>Insulin Dependent Diabetes Mellitus</td>
</tr>
<tr>
<td>IDF</td>
<td>International Diabetes Federation</td>
</tr>
<tr>
<td>IFCC</td>
<td>International Federation of Clinical Chemistry and Laboratory Medicine</td>
</tr>
<tr>
<td>IFG</td>
<td>Impaired Fasting Glycaemia</td>
</tr>
<tr>
<td>IGT</td>
<td>Impaired Glucose Tolerance</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>LDRG</td>
<td>Lothian Diabetes Representative Group</td>
</tr>
<tr>
<td>LDSAG</td>
<td>Lothian Diabetes Services Advisory Group</td>
</tr>
<tr>
<td>LGV</td>
<td>Large Goods Vehicle</td>
</tr>
<tr>
<td>LHP</td>
<td>Local Healthcare Partnership</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>LJF</td>
<td>Lothian Joint Formulary</td>
</tr>
<tr>
<td>LUHD</td>
<td>Lothian University Hospitals Division</td>
</tr>
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<td>MCN</td>
<td>Managed Clinical Network</td>
</tr>
<tr>
<td>MI</td>
<td>Myocardial Infarction</td>
</tr>
<tr>
<td>MODY</td>
<td>Mature Onset Diabetes of the Young</td>
</tr>
<tr>
<td>MR</td>
<td>Magnetic Resonance</td>
</tr>
<tr>
<td>MRSA</td>
<td>Methicillin Resistant Staphylococcus Aureus</td>
</tr>
<tr>
<td>MTF</td>
<td>Metformin</td>
</tr>
<tr>
<td>NICE</td>
<td>National Institute for Health and Clinical Excellence</td>
</tr>
<tr>
<td>NIDDM</td>
<td>Non-Insulin Dependent Diabetes Mellitus</td>
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<tr>
<td>NPH</td>
<td>Neuphane Insulin</td>
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<tr>
<td>NRT</td>
<td>Nicotine Replacement Therapy</td>
</tr>
<tr>
<td>NSAID</td>
<td>Non-steroidal Anti-inflammatory Drug</td>
</tr>
<tr>
<td>OCP</td>
<td>Oral Contraceptive Pill</td>
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<tr>
<td>OGTT</td>
<td>Oral Glucose Tolerance Test</td>
</tr>
<tr>
<td>OHA</td>
<td>Oral Hypoglycaemic Agent</td>
</tr>
<tr>
<td>OPD</td>
<td>Outpatient Department</td>
</tr>
<tr>
<td>PAEP</td>
<td>Princess Alexandra Eye Pavilion</td>
</tr>
<tr>
<td>PCR</td>
<td>Protein Creatinine Ratio</td>
</tr>
<tr>
<td>PCV</td>
<td>Passenger Carrying Vehicle</td>
</tr>
<tr>
<td>POP</td>
<td>Progestogen Only Pill</td>
</tr>
<tr>
<td>POPADAD</td>
<td>The Prevention of Progress of Arterial Disease and Diabetes</td>
</tr>
<tr>
<td>PVD</td>
<td>Peripheral Vascular Disease</td>
</tr>
<tr>
<td>qds</td>
<td>Quaque die (4 times a day)</td>
</tr>
<tr>
<td>QIS</td>
<td>Quality Improvement Scotland</td>
</tr>
<tr>
<td>REH</td>
<td>Royal Edinburgh Hospital</td>
</tr>
<tr>
<td>RHSC</td>
<td>Royal Hospital for Sick Children</td>
</tr>
<tr>
<td>RIE</td>
<td>Royal Infirmary of Edinburgh</td>
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<tr>
<td>S/E</td>
<td>Side Effects</td>
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<tr>
<td>SCI-DC</td>
<td>Scottish Care Information – Diabetes Collaboration</td>
</tr>
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<td>SDG</td>
<td>Scottish Diabetes Group</td>
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<td>SDRN</td>
<td>Scottish Diabetes Research Network</td>
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<td>SIGN</td>
<td>Scottish Intercollegiate Guidelines Network</td>
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<td>SJH</td>
<td>St. John’s Hospital</td>
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<tr>
<td>SNDRi</td>
<td>Scottish National Dietetic Research Institute</td>
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<td>Selective Serotonin Reuptake Inhibitor</td>
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<td>Sulphonylurea</td>
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<td>T2DM</td>
<td>Type 2 Diabetes Mellitus</td>
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<td>TFT</td>
<td>Thyroid Function Test</td>
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<tr>
<td>TIA</td>
<td>Transient Ischaemic Attack</td>
</tr>
<tr>
<td>TPO</td>
<td>Thyroid Peroxidase Antibodies</td>
</tr>
<tr>
<td>TSH</td>
<td>Thyroid Stimulating Hormone</td>
</tr>
<tr>
<td>UTI</td>
<td>Urinary Tract Infection</td>
</tr>
<tr>
<td>WGH</td>
<td>Western General Hospital</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organisation</td>
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</tbody>
</table>
Appendices
Appendix 1: Initial Dietary Advice

Steps to Healthy Eating for Diabetes for Type 2 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 treated with diet only, or a combination of diet, tablets or insulin.

There is no need to follow a 'special' diet; a sensible eating plan is best. The following steps provide a simple guide. Your Doctor or Nurse will refer you to a State Registered Dietitian to discuss your diet in more detail.

1. Have regular meals
2. Choose fewer sugary foods
3. Eat starchy food at each meal (preferably high fibre)
4. Have less fat, especially saturated fat
5. Eat plenty of fruit and vegetables every day
6. Keep your salt intake low
7. Achieve + maintain a healthy weight for your height
8. Limit your alcohol intake
9. Maintain an active lifestyle

*With thanks to SNDRi for permission to use the above diagram.

Step 1: 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.

Step 2: Choose Fewer 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, Splenda
- Diet or low calorie drinks and squashes
- Low sugar jams and marmalades, or small quantities of ordinary products
- 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

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.

Step 3: Eat Starchy Foods at Each Meal, preferably high fibre

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

**Step 4: Have Less Fat**

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 flavoured 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

**Step 5: Eat Plenty of 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.

**Step 6 Keep Your Salt Intake Low**

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.

**Step 7: Limit Your Alcohol Intake**

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]

**Step 8: Achieve and Maintain a Healthy Weight for Your Height**

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.
Step 9: Maintain an Active Lifestyle

Being active is good for all of us but it is especially important if you have diabetes. Looking after yourself when you have diabetes means increasing your physical activity as well as managing your diet and taking your tablets. They are all equally important in controlling your blood sugar levels.

It is now recommended that moderate activity such as 30 minutes, or more, brisk walking every day has health benefits. This may be broken up into 10 minutes bursts throughout the day. This might be something you could achieve now or you may be able to build up to it over a period of time.

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
Making Changes – Diet Diary

Having read the information in this section record your usual daily food intake here. Please include drinks. Write down any changes you could make.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast</td>
<td></td>
</tr>
<tr>
<td>Snack</td>
<td></td>
</tr>
<tr>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>Snack</td>
<td></td>
</tr>
<tr>
<td>Evening Meal</td>
<td></td>
</tr>
<tr>
<td>Supper</td>
<td></td>
</tr>
<tr>
<td>Alcohol/Extras</td>
<td></td>
</tr>
</tbody>
</table>
## Appendix 2: Texas Wound Chart

*University of Texas Diabetic Wound Classification Diabetes Care 1998; 21: 855-859*

<table>
<thead>
<tr>
<th>Stage</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Pre or post lesion – intact</td>
</tr>
<tr>
<td>1</td>
<td>Superficial wound</td>
</tr>
<tr>
<td>2</td>
<td>Penetrating to tendon or capsule</td>
</tr>
<tr>
<td>3</td>
<td>Penetrating to bone or joint</td>
</tr>
<tr>
<td>A</td>
<td>+Infection</td>
</tr>
<tr>
<td>B</td>
<td>+Infection</td>
</tr>
<tr>
<td>C</td>
<td>+Ischaemia</td>
</tr>
<tr>
<td>D</td>
<td>+Infection and ischaemia</td>
</tr>
</tbody>
</table>

*Legend:
- A: Pre or post lesion – intact
- B: +Infection
- C: +Ischaemia
- D: +Infection and ischaemia*
Appendix 3: Basic Foot Screening Checklist

1. **Ask the patient**
   - neuropathic symptoms: Y N
   - intermittent claudication: Y N
   - previous foot ulcer: Y N
   - amputation: Y N

2. **Look at both feet**
   - infection: Y N
   - ulceration: Y N
   - calluses or corns: Y N
   - skin breaks: Y N
   - nail disorders: Y N
   - foot deformity: Y N

3. **Check foot pulses**
   - LEFT
     - Dorsalis pedis: Y N Y N
   - Posterior tibial: Y N Y N
   - RIGHT
   - 2 or more pulses absent may indicate vascular disease

4. **Test for neuropathy**
   - LEFT
     - Monofilament
     - Detected at sites marked •
     - Y N Y N
   - RIGHT
   - Failure to perceive 1 out of 5 sites tested in either foot indicates an ‘at risk’ foot

5. **Assess footwear**
   - Suitable: Y N

6. **Assess education need**
   - Does the patient understand the effects of diabetes the foot? Y N
   - Can the patient identify appropriate foot care practices? Y N
   - Are the patient’s feet adequately cared for? Y N

7. **Assess self care capacity**
   - Does the patient have impaired vision? Y N
   - Can the patient reach own feet for safe self care? Y N
   - Other factors influencing ability to safely care for own feet? Y N

All people with diabetes need to have their feet screened every 12 months or more often if problems are identified.

Risk levels and referral pathways are illustrated in the Foot Complication section (pg 50)
Appendix 4 Hospital Diabetes Foot Ulcer Referral

Please refer a diabetes foot ulcer or problem as soon as possible.
If the foot ulcer has not resolved within 4 weeks of treatment please refer.

Please complete and send to one of these Diabetes Foot Clinics:

Royal Infirmary of Edinburgh
OPD2
Fax: 242 1454
Tel: 242 1453

Western General Hospital
Metabolic Unit
Fax: 537 3071
Tel: 537 1297

St Johns Hospital
OPD1
Fax: 01506 523 857
Tel: 01506 523 175

Patients Name………………………………………..
Address………………………………………………
……………………………………………………
Date of Birth………………………………………..
CHI no………………………………………………
Tel no Home………………………………………..
Mob…………………………………………………..

Date of referral…………………………………….
Referring clinician…………………………………
Clinic………………………………………………
GP…………………………………………………..
GP Tel No…………………………………………
Diabetes: Type 1 / Type 2
Date of diagnosis…………………………………

Ulcer History

Date of onset………………………………………
Site………………………………………………
Size………………………………………………
Texas Grade……………………………………
Neuropathy / Ichaemia / Neurischaemia
Previous amputation…………………………
Swab taken? Yes / No
Result (if known) ………………………………..
Antibiotics prescribed…………………………
Dose and duration……………………………..

Previously attended vascular clinic? Yes / No
Date (if known) …………………………………

Smoker Yes / No

Dressings undertaken by (circle all applicable) Practice Nurse / District Nurse / Podiatrist / Patient / Carer

Summary of previous treatment / concerns

...........................................................................................
...........................................................................................
...........................................................................................
...........................................................................................
...........................................................................................

Transport needs
...........................................................................................
Appendix 5: Measurement of Blood Pressure

- Use properly maintained and calibrated equipment.
- 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 Systolic BP > 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.
- If analogue equipment is used lower the scale slowly.
- Read BP to the nearest 2 mmHg.
- In the elderly and pregnant measure Diastolic BP at Phase 4 and note in records.
- Take two measurements at each visit.
Appendix 6: District Nurse Insulin Adjustment Protocol

Insulin Dose Prescription and Adjustment Regimen for Once Daily Insulin

I authorise the district nursing staff to administer the following insulin prescription for:

Name: ____________________________ Latest HbA1c ____________

Date ____________

Insulin name:

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Insulin</th>
<th>Dose</th>
<th>Signature of medical practitioner</th>
</tr>
</thead>
</table>

TO TITRATE INSULIN, THE BLOOD GLUCOSE READINGS MUST BE FASTING

PATIENT’S TARGET BLOOD GLUCOSE RANGE (mmol/l) (__________) (see Green Book for current dose):

<table>
<thead>
<tr>
<th>If the before breakfast blood glucose level is ABOVE target</th>
<th>If the before breakfast blood glucose level is BELOW target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase insulin by ___ units every ____ day until target is achieved</td>
<td>Decrease insulin by___ _units if blood glucose is less than 4 mmol/l (hypo) or below target</td>
</tr>
</tbody>
</table>

General Advice on Insulin Dose Adjustment

Insulin may need adjusting for patients:
- newly started on insulin; illness/infection; increased exercise; diet; patterns in blood sugar levels; weight loss or weight gain periods.
- Blood glucose target range should be set individually for each patient.
- Adjust according to the chart above and monitor for at least 3 days to judge the effect before further adjustment.
- **Do not increase dose on a “single” raised blood glucose.**
- Dose adjustment is individual and needs to be monitored closely.
- Document change of insulin dose in the nursing notes and diabetic record book

Treating hypos (less than 4mmols/l)

Give fast acting glucose eg one small glass (120mls) Lucozade followed by slow acting CHO eg sandwich/digestives x 2 + milk, and repeat blood glucose in 15 – 30 minutes.

If problems persist in controlling the blood glucose level, seek advice from:
- Diabetes Specialist Nurses on 242 1470 (RIE), 537 2542 (WGH) or 01506 523856 (SJH) from 9am – 5pm weekdays
- Diabetic Registrar on call – 242 1000 or 537 1000 (9am-8pm weekdays and 9-5pm weekends. All other times, Med SHO refer to Consultant as required)

For further information please refer to Lothian Diabetes Handbook
Insulin Dose Prescription and Adjustment Regimen for Fixed Mixture Twice Daily Insulin

I authorise the district nursing staff to administer the following insulin prescription for:

Name

Insulin name:

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Insulin</th>
<th>Dose</th>
<th>Signature of medical practitioner</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


TO TITRATE INSULIN, THE BLOOD GLUCOSE READINGS MUST BE PRE-MEAL

Patient’s target blood glucose range (mmol/l) (________)(see Green Book for current dose):

Blood glucose level ABOVE target

Morning Insulin
If PM blood test is above target on ____ consecutive days, increase AM insulin by ____ units the next day until target is achieved

Evening Insulin
If AM blood test is above target on ____ consecutive days, increase PM insulin by ____ units until target is achieved

Blood glucose level BELOW target

Morning Insulin
If PM blood test is less than 4 mmols/l (hypo), or below target, decrease AM insulin by ____ units the next day

Evening Insulin
If AM blood test is less than 4 mmols/l (hypo), or below target, decrease PM insulin by ____ units the same day

General Advice on Insulin Dose Adjustment
Insulin may need adjusting for patients;

- Newly started on insulin, illness/ infection, increased exercise, diet, patterns in blood sugar levels, and weight loss or weight gain periods.
- Blood glucose target range should be set individually for each patient.
- Adjust according to the chart above and if insulin is increased, monitor for at least 3 days to judge the effect before further adjustment.
- Do not increase dose on a “single” raised blood glucose.
- Dose adjustment is individual and needs to be monitored closely.
- Document change of insulin dose in the nursing notes and diabetic record book.

Treating hypos (less than 4mmols/l)
Give fast acting glucose eg one small glass (120mls) Lucozade followed by slow acting CHO eg sandwich/digestives x 2 + milk, and repeat blood glucose in 15 – 30 minutes. Do not omit insulin, but follow advice as in ‘Blood glucose level below target’ above.

If problems persist in controlling the blood glucose level, seek advice from:
- Diabetes Specialist Nurses on 242 1470 (RIE), 537 2542 (WGH), or 01506 523856 (SJH) from 9am – 5pm weekdays
- Diabetic Registrar on call – 242 1000 or 537 1000 (9am-8pm weekdays and 9-5pm weekends. All other times, Med SHO refer to Consultant as required)

For further information please refer to Lothian Diabetes Handbook
Appendix 7: Disposal of Sharps

Anything that can puncture the skin could be classified as a sharp. In this policy the following items are included in the term.

- Insulin syringes with attached needles
- Needles for use with pen devices
- Lancets for use in home blood testing

Responsibility

It is the responsibility of the patient or carer to safely dispose of all sharp items. All staff involved in the education of patients with diabetes have responsibility to ensure sharps disposal education is provided and that patients/carers are clear how to dispose of sharps.

Methods of sharp disposal

Where community nurses provide insulin injections or do blood glucose testing, universal precautions must be followed. These are:

- Do not use a pen injection device
- Do not re-sheath needles
- Use an approved sharps disposal box
- Seal and change the box when it is no more than 2/3 full
- Dispose of used lancets in the sharps box

Sharps Box

Specialist groups of patients may be provided with a sharps box by primary care or their diabetes clinic such as those patients requiring community nurse supervision or those who are registered blind or have poor physical ability and dexterity. Sharps boxes should be returned to the clinic they were received from. GP surgeries can take these and dispose of them with their regular medical waste.

Needle clipping device

Most patients are provided with a needle-clipping device in place of a sharps box if they are able to use one appropriately. Needle clipping devices are available on FP10 prescription from primary care.

Needles should only be disposed of in a sharps box or by using a needle clipping device.

Disposal of clipped syringes and pen needle hubs

These should be disposed of in a household container e.g. a plastic bottle with a secure lid. The container can then be put safely in the household waste when half full.

Lancets

Lancets used for blood glucose monitoring can not be clipped with the device and so lancets should be disposed of in a plastic bottle with a secure lid and the bottle put in the household waste when half full.

(Adapted from the Northumbria NHS Health Care Trust diabetes protocol)
Appendix 8: Lothian Diabetes Register

Information for patients

NHS Lothian keeps a register, called SCI-DC (Scottish Care Initiative – Diabetes Collaboration), to help ensure that patients with diabetes receive the best possible care. It allows clinical information to be shared by everyone involved in their care. This includes their GP and any relevant nurse, hospital doctor or other health professional. It is also made available to the eye screening service to ensure that all patients are invited for an annual eye screen.

The Lothian Diabetes Managed Clinical Network are required to send collected information every year for the Scottish Diabetes Survey to compare Lothian’s diabetes care with other health boards. This information is collected together in such a way that no individual patient can be identified. The information is also used locally for planning services and checking on quality of care. This is essential to help with our efforts to continually improve the diabetes care in Lothian.

The Lothian Diabetes Data and Confidentiality Group, which includes patients as members, exists to protect the data and to ensure its correct and lawful use. Patient records are kept in accordance with the Data Protection Act, 1998. A patient can ask to see what details are held about them on the register at any time. They can ask for their details to be removed from the register although this would make it very difficult to ensure they are getting all the care they need.

News and Events in Diabetes

The Lothian Diabetes Representative Group, which is run by patients for patients, would like us to use the register to send people with diabetes information about its annual conference and other similar events that might be of interest. The group exists to identify the needs and issues of people affected by diabetes and influences policy decisions affecting their well-being. Patient details will not be passed on.

Research

NHS Lothian believes that investment in research is important to improve care and services for the future. The diabetes community is keen to contribute to worthwhile research projects in diabetes. Staff involved in diabetes care in Lothian may wish to approach you to see if you would be willing to take part. You would be given information about the project. You would not be under any obligation to take part, and whether you do or do not would not affect your care.

If a patient wishes their details to be removed or do not want their data to be used to contact them with news and events or if they do not wish to be approached through the register about possible involvement in research they can contact Mary Scott at the address below.

Mary Scott,
Lothian Diabetes MCN Manager
Metabolic Unit
Western General Hospital
Edinburgh EH4 2XU
Tel: 0131 537 3074
Email: mary.m.scott@luht.scot.nhs.uk

If patients want their details to remain on the register there is no need to take any further action.
Appendix 9: HbA\textsubscript{1c} Standardisation for Clinical Health Care Professionals

From 1 June 2009, the way in which HbA\textsubscript{1c} results are reported in the UK is changing. This leaflet explains why and how this will happen.

What is HbA\textsubscript{1c}?

Glucose in the blood binds irreversibly to a specific part of haemoglobin in red blood cells, forming HbA\textsubscript{1c}. The higher the glucose, the higher the HbA\textsubscript{1c}. HbA\textsubscript{1c} circulates for the lifespan of the red blood cell, so reflects the prevailing blood glucose levels over the preceding 2-3 months.

What does it tell us?

The Diabetes Control and Complications Trial (DCCT) in Type 1 diabetes and the UK Prospective Diabetes Study (UKPDS) in Type 2 diabetes both showed that the risk of microvascular and macrovascular complications of diabetes increases as HbA\textsubscript{1c} increases. HbA\textsubscript{1c} thus gives a measure of an individual’s risk of the long-term complications of diabetes.

Why measure it?

Serial measurements of HbA\textsubscript{1c} show how an individual’s glucose control, and thus risk of complications, changes in response to alterations in management. HbA\textsubscript{1c} should be measured 2-6 monthly. Target HbA\textsubscript{1c} levels can be set for individual patients and therapy adjusted accordingly.

How is HbA\textsubscript{1c} reported currently?

Current HbA\textsubscript{1c} assays in the UK and other parts of the world are aligned to the assay used in the DCCT, so that an individual’s risk of complications can be inferred from the result.

What are the current targets?

General targets for HbA\textsubscript{1c} of 6.5 - 7.5 % should be set for an individual, taking into consideration their risk of severe hypoglycaemia, cardiovascular status and co-morbidities.

Why Change?

After the DCCT, a new standard specific for HbA\textsubscript{1c} was prepared by the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC). In future, manufacturers will supply IFCC standardised values for their calibrators as well as DCCT-aligned values. The units for reporting HbA\textsubscript{1c} will also be changed so that HbA\textsubscript{1c} reported by laboratories is traceable to the IFCC reference method. Global comparison of HbA\textsubscript{1c} results will therefore be possible.

What are the IFCC units?

HbA1c results traceable to the IFCC reference method will be expressed as mmol per mol.

How do old and new relate?

A guide to the new values expressed as mmol/mol is:

<table>
<thead>
<tr>
<th>DCCT- HbA\textsubscript{1c} (% )</th>
<th>IFCC-HbA\textsubscript{1c} (mmol/mol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0</td>
<td>42</td>
</tr>
<tr>
<td>6.5</td>
<td>48</td>
</tr>
<tr>
<td>7.0</td>
<td>53</td>
</tr>
<tr>
<td>7.5</td>
<td>59</td>
</tr>
<tr>
<td>8.0</td>
<td>64</td>
</tr>
<tr>
<td>9.0</td>
<td>75</td>
</tr>
<tr>
<td>10.0</td>
<td>86</td>
</tr>
<tr>
<td>11.0</td>
<td>97</td>
</tr>
<tr>
<td>12.0</td>
<td>108</td>
</tr>
</tbody>
</table>
What are the targets in IFCC units?

The equivalent of the DCCT HbA\textsubscript{1c} targets of 6.5 % and 7.5 % are 48 mmol/mol and 59 mmol/mol in the IFCC units, with the non-diabetic reference range of 4.0 % to 6.0 % being 20 mmol/mol to 42 mmol/mol.

When is the changeover to IFCC units?

HbA\textsubscript{1c} results expressed in the IFCC units are obviously very different to those currently in use.

From **1 June, 2009**, results will be provided in the UK as both IFCC-standardised units (mmol/mol) and DCCT-aligned units (%). This will give everyone time to become familiar with the new units and how they relate to DCCT numbers, and thus to the risk of complications.

From **1 June 2011**, results will be reported only in the IFCC units.

What are the limitations of HbA\textsubscript{1c} measurement?

HbA\textsubscript{1c} results (DCCT or IFCC) will be misleading in certain situations eg a variety of haematological conditions where there is abnormal red cell turnover, where there is abnormal haemoglobin, and in some patients with renal or liver disease. In pregnancy, HbA\textsubscript{1c} falls by around 0.5 % due to haemodilution and other factors. In the presence of abnormal haemoglobin, HbA\textsubscript{1c} results can vary depending on the method used to measure HbA\textsubscript{1c} and the particular haemoglobinopathy involved. For these reasons, such HbA\textsubscript{1c} results should be used to detect trends in a patient’s glycaemic control rather than for target setting.

If any condition leads to a change in red cell survival, then HbA\textsubscript{1c} measurement by any means can, at best, be used to track changes in glycaemia. Other measures of glycaemia may then be required, such as more reliance on self monitored blood glucose values or the use of a serum fructosamine assay, if available.

Why not report eAG?

Conceptually, converting the HbA\textsubscript{1c} result to an equivalent “average glucose” level might help our understanding and interpretation of HbA\textsubscript{1c}. A recent large study reported on how to calculate an estimated average glucose (eAG) from an HbA\textsubscript{1c} result.

However, the study was carried out in a restricted population; issues have been raised about the study design; and an eAG will have limited applicability to the majority of patients who do not measure their own blood glucose levels. In some patients, the estimate may also prove inaccurate enough to be misleading. It has been agreed that in the UK, eAG results will not be reported for the moment. Further research into the applicability and utility of eAG to the wide range of people with diabetes is on-going and eagerly awaited.
Appendix 10: Lothian Ethnic Minority Diabetes Pharmacy Service Referral

<table>
<thead>
<tr>
<th>Name of patient or group:</th>
<th>Source of referral:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address:</td>
<td>Reason for referral:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Tel No:</td>
<td></td>
</tr>
<tr>
<td>Date of Birth:</td>
<td></td>
</tr>
<tr>
<td>Preferred spoken language:</td>
<td>Signature of person referring:</td>
</tr>
<tr>
<td>Ethnicity:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of GP:</th>
<th>Tel No:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address:</td>
<td>Date:</td>
</tr>
<tr>
<td></td>
<td>GP to be contacted? Y [ ] N [ ]</td>
</tr>
</tbody>
</table>

Send to Dr Lubna Kerr
Metabolic Unit
Western General Hospital
Edinburgh
Telephone: 07769 683 779

Criteria for referral to the Ethnic Minority Diabetes Service

Please refer patients with diabetes to this service for any of these issues:

- Of Ethnic Minority origin
- HbA1c is above 8%, cholesterol above 5 and BP above 130/80
- Would benefit from education about diabetes in their own language
- Would benefit from an explanation and review of their diabetes medication
- have diabetes when pregnant and would benefit from extra advice (pregnant woman with diabetes should be referred in the first instance to a diabetes ante-natal clinic)

Patients who are referred to the bilingual pharmacist will:

- Receive education on a 1 to 1 basis on diabetes at a location that suits them and in an appropriate language
- Get advice on healthy eating and exercise
- be referred to a culturally sensitive exercise class and cookery class
- have their diabetes medication reviewed
- have access to a new and exciting 3 in 1 clinic, which allows patients to take part in traditional therapies (nurse, dietitian and pharmacist) alternative therapists (reflexology, head and neck massage, shiatsu) and exercise

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