# Index

<table>
<thead>
<tr>
<th>Type 2 Diabetes-at a Glance Management of Patients</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td><strong>1.0 Classification, Diagnosis and Screening</strong></td>
<td>3</td>
</tr>
<tr>
<td>1.1 Classification of diabetes</td>
<td>3</td>
</tr>
<tr>
<td>1.2. Diagnosis of diabetes</td>
<td>5</td>
</tr>
<tr>
<td>1.3 Screening</td>
<td>7</td>
</tr>
<tr>
<td><strong>2.0 Assessment and Management</strong></td>
<td>8</td>
</tr>
<tr>
<td>2.1 Structured diabetes care in general practice – Type 2 diabetes</td>
<td>9</td>
</tr>
<tr>
<td>2.2 Type 2 diabetes – initial assessment</td>
<td>10</td>
</tr>
<tr>
<td>2.3 Flow chart: practical management of newly diagnosed diabetes</td>
<td>11</td>
</tr>
<tr>
<td>2.4 Patient education</td>
<td>12</td>
</tr>
<tr>
<td>2.5 Established diabetes - follow up</td>
<td>14</td>
</tr>
<tr>
<td><strong>3.0: Lifestyle Management</strong></td>
<td>16</td>
</tr>
<tr>
<td>3.1 Dietary advice for people who have diabetes</td>
<td>16</td>
</tr>
<tr>
<td>3.2 Physical activity in people who have diabetes</td>
<td>18</td>
</tr>
<tr>
<td>3.3 Overweight and obesity in diabetes</td>
<td>20</td>
</tr>
<tr>
<td><strong>4.0 Drug Treatment</strong></td>
<td>25</td>
</tr>
<tr>
<td>4.1 Oral hypoglycaemic agents</td>
<td>25</td>
</tr>
<tr>
<td>4.2 Incretin Therapies</td>
<td>29</td>
</tr>
<tr>
<td>4.3 Insulin injection sites and injection technique</td>
<td>30</td>
</tr>
<tr>
<td>4.4 Commonly used insulin preparation</td>
<td>31</td>
</tr>
<tr>
<td>4.5 Administration devices</td>
<td>32</td>
</tr>
<tr>
<td>4.6 Storage of Insulin</td>
<td>33</td>
</tr>
<tr>
<td><strong>5.0 Self Monitoring of Blood Glucose - Guidelines</strong></td>
<td>34</td>
</tr>
<tr>
<td>5.1 Targets</td>
<td>34</td>
</tr>
<tr>
<td>5.2 Type 1 diabetes – monitoring</td>
<td>34</td>
</tr>
<tr>
<td>5.3 Type 2 diabetes on insulin – monitoring</td>
<td>34</td>
</tr>
<tr>
<td>5.4 Type 2 diabetes on tablets – monitoring</td>
<td>34</td>
</tr>
<tr>
<td>5.5 Type 2 diabetes on diet alone – monitoring</td>
<td>35</td>
</tr>
<tr>
<td>5.6 Special situations</td>
<td>35</td>
</tr>
<tr>
<td><strong>6.0 Insulin Regimens and Dosage Adjustments</strong></td>
<td>36</td>
</tr>
<tr>
<td>6.1 Insulin regimens</td>
<td>36</td>
</tr>
<tr>
<td>6.2 Over insulinisation</td>
<td>37</td>
</tr>
<tr>
<td>6.3 Too little insulin</td>
<td>38</td>
</tr>
<tr>
<td>6.4 Insulin in the elderly</td>
<td>38</td>
</tr>
<tr>
<td>6.5 Type 2 diabetes - insulin therapy</td>
<td>38</td>
</tr>
<tr>
<td>6.6 Weight gain with insulin</td>
<td>38</td>
</tr>
<tr>
<td>6.7 Starting insulin in general practice in type 2 diabetes</td>
<td>38</td>
</tr>
</tbody>
</table>
### 7.0 Hypoglycaemia
- 7.1 Diabetes therapies most likely to cause hypoglycaemia
- 7.2 Symptoms and signs of hypoglycaemia
- 7.3 Treatment

### 8.0 Type 1 Diabetes: Management of Intercurrent illness
- 8.1 Ketone testing
- 8.2 Sick Day Rules
- 8.3 General advice
- 8.4 Specific instruction
- 8.5 Indications for hospital admission

### 9.0 Complications
- 9.1 Diabetic Retinopathy – screening and management
- 9.2 The diabetic Foot – screening and management
- 9.3 Renal complications - screening and management

### 10.0 Cardiovascular Disease
- 10.1 Dyslipidaemia
- 10.2 Hypertension

### 11.0 Childhood and Adolescence: diabetes
- 11.1 Aims of diabetes care in children and adolescents
- 11.2 Insulin regimens
- 11.3 Monitoring
- 11.4 Alcohol
- 11.5 Sex
- 11.6 Drugs
- 11.7 School

### 12.0 Women and Diabetes
- 12.1 The pregnant women with diabetes
- 12.2 Gestational diabetes
- 12.3 Contraception
- 12.4 HRT

### 13.0 Men and Diabetes
- 13.1 History taking in erectile dysfunction
- 13.2 What is the likely cause?
- 13.3 Examination of patients with erectile dysfunction
- 13.4 Investigations of erectile dysfunction
- 13.5 Management of erectile dysfunction

### 14.0 Diabetes and the Elderly
- 14.1 Goals of care
- 14.2 Co morbidities
- 14.3 Lifestyle
- 14.4 Drug Treatment
- 14.5 Education
- 14.6 Self monitoring of blood glucose (SMBG)
### 15.0 Psychological Support in Diabetes

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.1 Psychological responses to chronic illnesses</td>
<td>80</td>
</tr>
<tr>
<td>15.2 Psychological factors and lifestyle</td>
<td>81</td>
</tr>
<tr>
<td>15.3 Psychological interventions for behaviour change</td>
<td>81</td>
</tr>
<tr>
<td>15.4 Diabetes Counselling</td>
<td>82</td>
</tr>
</tbody>
</table>

### 16.0 Other Useful Information

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.1 Driving and Diabetes</td>
<td>84</td>
</tr>
<tr>
<td>16.2 Travel and Diabetes</td>
<td>86</td>
</tr>
<tr>
<td>16.3 Work and Diabetes</td>
<td>87</td>
</tr>
<tr>
<td>16.4 Entitlements</td>
<td>88</td>
</tr>
</tbody>
</table>

**References:** 91

**Appendix A** 94
- European Cardiology Society SCORE Risk Chart

**Appendix B** 95
- Audit in General Practice

**Appendix C** 97
- Diabetic Review Template

**Appendix D** 99
- Healthy Eating for Diabetes

**Appendix E** 100
- Diabetes Foot Care

**Appendix F** 101
- Stages of Change Model

**Appendix G** 102
- Cost Effective Prescribing

**Appendix H** 103
- Regulations for Driving Overseas

**Appendix I** 104
- Work and Diabetes
Type 2 Diabetes-at a Glance Management of Patients

Diagnosis

Classical symptoms:  Plus random plasma venous glucose greater or equal to 11.1mmol/l or fasting plasma glucose greater or equal to 7.0mmol/l

No symptoms:  Plus two fasting plasma glucose measurements greater or equal to 7.0mmol/l

Lifestyle

Smoking:  Avoid (increases all complications)

Diet:  Healthy eating, eat regularly, with complex carbohydrate as the basis for meals. Eat low glycaemic index foods, minimise refined carbohydrates and total fats (especially saturated fats).

Exercise:  Aim for 30 mins moderate intensity physical activity 5 x per week

Alcohol:  In moderation.

Erectile dysfunction:  Common, consider medication/devices

Driving:  If on oral-hypoglycaemics or insulin – patients must inform the DLS

Foot Care

Recommendation:  Annual screening for risk factors, patient education

Risk factors:  Neuropathy, ischaemia, deformity, callous, oedema, visual impairment, previous ulceration

Eye Care

Recommendation:  Annual retinal screening

Risk factors:  Poor Glycaemic Control, Hypertension, Smoking

Targets

HbA1c:  6.5% - 7.0%¹, Ideally less than 6.5%.

Fasting glucose:  Less than 6.0mmol/l

BP:  Less than 130/80²

Lipids:  LDL <2.5 mmol/l, Triglycerides <2.3 mmol/l and HDL >1.0 mmol/l²

Main Hypoglycaemic Agents

Metformin:  Drug of choice for 1st line therapy, If no contraindication. Start 500 mg bd and increase over 1 to 3 months to maximum dose tolerated.

Sulphonylureas:  Can cause hypoglycaemia and weight gain

Incretin Therapies:  e.g. Sitagliptin & Exenatide.

Glitazones:  Can be used with metformin or Sulphonylureas, and also as triple therapy.

Insulin

Consider if on max oral therapy and if failing to achieve target. Need to be able to self-monitor and give injections or have a carer who can. Refer to diabetes clinic if appropriate.

Hypoglycaemic Agents

ACE inhibitors:  First line, if no contraindication; monitor U&E

ARB:  Where ACE inhibitors are unsuitable or contraindicated.

Others:  Drug classes that can be used in combination therapy with ACE inhibitors or ARB include long acting calcium channel blockers, thiazide diuretics or beta blockers

CV Risk

Statins:  Unless contraindicated, use statins at a standard dose for all patients >40 years old, all with declared CVD, and/or microalbuminuria. Refer to the ECS SCORE Risk Chart² (Appendix 1). Consider referral for combination statin/fibrate therapy, or if complicated.

Aspirin:  75mg daily in people with evidence of CVD or at high risk.
Introduction

About this Resource Manual
The purpose of this handbook is to provide an up-to-date and evidence-based set of guidelines for the management of diabetes mellitus. The guidelines in this document are advisory and are not intended as rules and regulations for diabetes care. The management of a particular patient should be decided upon by the Medical Practitioner responsible and should reflect the circumstances and needs of the individual.

Authorship
In October 2005, a local taskforce, representing the HSE West Diabetes Teams, as well as Population Health and Primary Care representatives was formed. Input was obtained from many Health Care Professionals in primary and secondary care to ensure that the handbook reflects local practice needs. This continues to be a collaborative venture, the authors are grateful to those who have given advice on this update and welcome future input.

Evidence
The authors of the handbook have referred to and attempted to incorporate all current evidence including recent publications from the International Diabetes Federation\(^2\), National Institute of Clinical Excellence\(^1\), the Scottish Intercollegiate Guidelines Network\(^4\) and the Irish College of General Practitioners and Irish Endocrine Society.

Acknowledgements
The authors wish to thank members of the South Cambridgeshire Diabetes Network for permission to use their Handbook. The authors would also like to acknowledge the Leicestershire Guidelines and the ICGP and thank all Professionals working in diabetes who contributed to this manual.

Aims of this Manual
It is intended that use of this Resource Manual will:
- Minimise premature morbidity and mortality among individuals with diabetes.
- Maximise quality of life by detection and treatment of the complications of diabetes at an early stage.
- Provide equity in access to high quality diabetes care for all residents of the HSE West.

Objectives of this Manual
- To offer all patients with diabetes a high standard of care, including annual review in primary or secondary care.
- To consider appropriate referral of any patients with diabetes who show signs of potential complications, instability in blood glucose concentrations or other risk factors, for specialist assessment.
- To agree an individual management plan with the patient.
- To audit the care of the patients with diabetes by following a well-defined and agreed protocol.
- To identify all those patients diagnosed with both types of diabetes in the HSE West.
- To initialise a systematic call and recall system at the hospital or in general practice.
- To develop a more integrated service between primary and secondary care.

Updates and ownership
The authors sincerely hope that the users of this Handbook will take some ownership of the document and participate in its maintenance and upkeep. Updates will reflect feedback and evidence.
Please send all feedback to:
Lorna Hurley  lorna.hurley@hse.ie,
Rachael Banques  rachael.banques@hse.ie
Caitriona Coleman  caitriona.coleman@hse.ie
Next planned update 2011
1.0 Classification, Diagnosis and Screening

Content of Section 1.0:
1.1 Classification of Diabetes
1.2 Diagnosis of Diabetes
1.3 Screening for Diabetes

1.1 Classification of Diabetes

Type 1 Diabetes (previously IDDM)
This results from an absolute deficiency of insulin due to destruction of pancreatic beta cells. It most commonly presents acutely before the age of 35 years 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. It is more commonly diagnosed over the age of 35 years, although can occur in younger (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. 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) & Impaired Fasting Glycaemia (IFG)

Patients who have IGT and IFG are at risk of future diabetes and/or cardiovascular disease. They should have fasting plasma glucose checked annually (or sooner if symptoms occur) and receive advice on diet and lifestyle, the avoidance of obesity and the benefits of regular exercise. Co-existing cardiovascular risk factors should be treated aggressively.

Impaired Glucose Tolerance (IGT)

Outside of pregnancy, there has been a move away from doing oral glucose tolerance tests (OGTT) for diagnosing diabetes. For those practices that are still undertaking OGTT:

- A 2-hour value above 11.1 mmol/l represents diabetes
- A 2-hour value below 7.8 mmol/l is normal
- An intermediate value 7.8mmol/l to 11.1mmol/l represents a state of impaired glucose tolerance.

In the absence of symptoms, abnormal values need to be confirmed on a separate occasion. See section 1.2 for guidance on performing the OGTT.
Impaired Fasting Glycaemia (IFG)

The term IFG has been introduced to classify individuals who have fasting glucose values above the normal range but below those diagnostic of diabetes. The WHO considers normal fasting plasma glucose (FPG) to be less than 6.1mmol/l. Recently, an Expert Committee of the ADA has recommended that the cut point for normal FPG be reduced to 5.6mmol/l. The upper cut point for diagnosing IFG is 7.0mmol/l.7

Gestational Diabetes Mellitus (GDM)

Gestational diabetes mellitus (GDM) which is usually diagnosed by OGTT at 24 – 28 weeks gestation, is defined as carbohydrate intolerance of variable severity with onset or first recognition during pregnancy. The glucose intolerance might have antedated pregnancy; therefore, a post-natal OGTT should be performed. Women with a history of GDM have a 60% chance of developing diabetes (usually type 2) within the subsequent 20 years, and this risk is increased by obesity. For this reason, they should be advised to control their weight, take regular exercise and have an annual fasting glucose measurement performed.
1.2 Diagnosis of Diabetes

Signs and Symptoms

At least half of people with diabetes are asymptomatic. However, be alert that there might be a diagnosis of diabetes in a patient who presents with the following:

<table>
<thead>
<tr>
<th>Table: Signs &amp; Symptoms of Diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive thirst</td>
</tr>
<tr>
<td>Polyuria – especially at night</td>
</tr>
<tr>
<td>Weight loss</td>
</tr>
<tr>
<td>Tiredness</td>
</tr>
<tr>
<td>Pruritis Vulvae/ recurrent Candidiasis</td>
</tr>
<tr>
<td>Balantis</td>
</tr>
<tr>
<td>Blurred vision/Changes in visual acuity</td>
</tr>
<tr>
<td>Erectile Dysfunction</td>
</tr>
<tr>
<td>Pain/Numbness – legs/feet</td>
</tr>
<tr>
<td>Recurrent infections/Abscesses</td>
</tr>
</tbody>
</table>

Risk Factors for Diabetes

Testing for diabetes should be considered in all individuals >45 yrs with:

It is important to diagnose as early as possible. 50% of newly presenting Type 2s have one or more complications. The following patients have a predetermined risk of diabetes:

<table>
<thead>
<tr>
<th>Table: Risk Factors for Diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary Heart Disease</td>
</tr>
<tr>
<td>Women with Hx Gestational Diabetes</td>
</tr>
<tr>
<td>Impaired Glucose Tolerance</td>
</tr>
<tr>
<td>BMI &gt;30kg/m²</td>
</tr>
<tr>
<td>Family history diabetes</td>
</tr>
<tr>
<td>Habitually physically inactive</td>
</tr>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Polycystic ovary disease &amp; Obesity</td>
</tr>
<tr>
<td>Acanthosis Nigricans-long term steroids</td>
</tr>
<tr>
<td>Patients on atypical anti-psychotics</td>
</tr>
<tr>
<td>CVA, PVD, IHD, Hyperlipidaemia</td>
</tr>
<tr>
<td>Ethnic Minority</td>
</tr>
</tbody>
</table>
Oral Glucose Tolerance Tests (OGTT)

The OGTT is used to establish the presence of diabetes. For those practices who undertake OGTT within their practice, it is important to ensure that the glucose load is correct.

This involves giving anhydrous glucose 75g (equivalent to Glucose BP 82.5g) by mouth to the fasting patient, and measuring blood-glucose concentrations at intervals.

The appropriate amount of glucose should be given with 300mls fluid. Anhydrous glucose 75g may alternatively be given as 113mls Polycal® (Nutricia Clinical) with extra fluid to administer a total volume of 300mls.

For Example:
- Measure 113mls POLYCAL Liquid into a beaker
- Add 250mls-300mls water
- Mix thoroughly

Alternatively 410ml Lucozade Original (not Lucozade Sport) could be administered. (The label must state energy content = 70kcal/100ml).

Please note Lucozade Original have lowered their glucose content of Lucozade December 2007 check energy content on side of label.

Instructions:
- Perform OGTT after at least 3 days of unrestricted diet (> 150g Carbohydrate daily)
- Fast patient overnight (8-14 hours, water allowed) and rest during the test.
- Take fasting plasma glucose sample at 0 hours
- Administer glucose load as above – patient must avoid strenuous exercise during this test
- Take plasma glucose sample 2 hours after the glucose load

<table>
<thead>
<tr>
<th>Table: Guide to Diagnosis</th>
<th>Fasting Plasma Glucose</th>
<th>2-hour Plasma Glucose (on OGTT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;6.1mmol/l</td>
<td>≤7.8 moll/l</td>
</tr>
<tr>
<td>Impaired Fasting Glycaemia</td>
<td>6.1-6.9mmol/l</td>
<td></td>
</tr>
<tr>
<td>Impaired Glucose Tolerance</td>
<td></td>
<td>7.8 -11.1 mmol/l</td>
</tr>
<tr>
<td>Diabetes</td>
<td>≥7.0mmol/l*</td>
<td>≥11.1 mmol/l*</td>
</tr>
</tbody>
</table>

*In the absence of symptoms, abnormal values will need to be confirmed on a separate occasion.
1.3 Screening

The decision to commence a detection programme should be based on the resources available to conduct and treat those who are detected.

Universal screening for undiagnosed diabetes is not recommended.

If a detection programme is commenced, it should target high-risk people identified by the assessment of risk factors, including:

- Family history
- Ethnic background
- BMI ≥ 30
- Previous gestational diabetes
- Known cardiovascular disease, hypertension or hyperlipidaemia
2.0 Assessment and Management

Content of Section 2.0:
2.1 Structured Diabetes Care in General Practice for Type 2 Diabetes
2.2 Type 2 Diabetes – Initial Assessment
2.3 Flowchart- Practice Management of Newly Diagnosed Type 2 Diabetes
2.4 Patient Education
2.5 Established Diabetes Follow-up

Key Interventions:

- **Improving blood glucose control** reduces the risk of developing the microvascular complication of diabetes in people with both Type 1 and Type 2 diabetes.
- Improving blood glucose control may reduce the risk of people with diabetes developing cardiovascular disease.
- **Controlling raised blood pressure** in people with diabetes who have co-existing hypertension reduces their risk of developing both microvascular complications and cardiovascular disease.
- **Reducing cholesterol levels** in people with diabetes who have raised cholesterol levels may reduce their risk of cardiovascular disease.
- **Smoking cessation** in people with diabetes who smoke reduces their risk of both cardiovascular disease and microvascular complications.
- **Regular recall and review** of people with diabetes can improve the quality of diabetes care and subsequent outcomes for people with diabetes.

NSF for Diabetes UK
2.1 Structured Diabetes Care in General Practice
(for Type 2 Diabetes)

The management of Type 2 diabetes involves behavioral change best achieved through integrated care and education; this is deliverable in General Practice where the patient already has a relationship with the practice team.

Integrated Care

The key components of providing a comprehensive diabetes service are:

- Register
- Recall
- Review

Diabetes Register

Each GP practice should work towards establishing a practice-based register of all persons with diabetes in its practice population. This data collected in a standard format is easy to update and share between Primary and Secondary care services. It is also necessary for including patients in new initiatives e.g. annual retinopathy screening and also allows for audit. The register *could* contain:

- Patient’s name
- Address
- DOB
- Telephone Number
- Classification of Diabetes
- Date of diagnosis
- Treatment
- Under care of GP/Hospital/Shared Care
- History of complications
- Mobility
- Date last seen

Recall

Patients should be recalled regularly, for example on a 3-6 monthly basis for assessment, and be recalled for Flu/Pneumonia vaccinations. Computerized practices are able to flag recall on most clinical systems and date of last assessment should be quickly accessed from the register.

Review

Along with regular reviews the patient needs a full annual review as outlined in section 2.5.1 The Annual Review.

For computerized surgeries most clinical systems have a sequence or review template to follow for recording clinical data. It is important to follow an agreed plan or protocol.

See Appendix for example of Diabetic Review Template
2.2 Type 2 diabetes – Initial Assessment

**Clinical Assessment**

**Height & Weight:** For calculation of Body Mass Index BMI (Kg/m²)

**Waist measurement:** Target for females: <80cms / 31.5inches¹⁰
Target for males: <94cms / 37inches¹⁰

**Blood pressure:** Measure more frequently than annually if hypertensive

**Foot inspection:** Refer to Podiatrist if necessary. Check for presence of foot deformity and examine shoes

**Peripheral pulses:** Record presence or absence of pedal pulses in each limb

**Peripheral nerves:** History of pain, tingling or numbness. Assess protective sensation using a 10 g monofilament test on metatarsal heads and big toe. Consider measuring pain sensation using neurotips, checking ankle reflexes and vibration sensation using 128 cycles/sec tuning fork.

**Eyes**
All patients should have regular diabetic retinopathy screening from diagnosis

**Lifestyle Assessment**

**Physical Activity**
Determine weekly physical activity habits

**Smoking Status**
Current / Past / Never

**Alcohol Consumption**
Women = 2 units/day; Men = 3 units/day

**Use of Aspirin**
In known CVD or high risk

**Pregnancy & contraception**
Discuss future pregnancy/contraception plans in women of childbearing age. Section 12.1 for Pre Pregnancy Checklist

**Dietary History**

**Refer:**
Refer to structured education programme (if available) or dietitian as soon as possible

**Leaflets:**
Supply initial diet advice sheet prior to seeing Dietitian
See Appendix for Health Eating advice sheet

**Laboratory Tests**

**Glycaemic Control:** Baseline HbA1c

**Renal Function:** Creatinine and electrolytes, urinalysis, Albumin-creatinine ratio (ACR)

**Lipids:** Assess once diabetes has been stabilised at 12 weeks. Full fasting lipid profile

**Other blood tests:** Rule out secondary causes of diabetes:
Thyroid Function Tests
Serum Ferritin Levels
Coeliac Screen in patients with Type 1 diabetes
2.3 Flow Chart: Practical Management of Newly Diagnosed Diabetes

1. Full assessment & diagnosis

2. Moderate or heavy ketonuria or young age (less than 30 yrs)
   - Yes: Refer to Hospital urgently for assessment and initial education
   - No:
     - Refer to Dietitian/ Practice Nurse, and start education programme

3. Reinforce dietary advice

4. At 12 weeks: test HbA1c
   - Is it less than 6.5%?
     - HbA1c: greater than 6.5%: Start oral hypoglycaemic agent
     - HbA1c: less than 6.5%: Follow-up and re-assess in the community

NB Patients with severe symptoms or significant hyperglycaemia, despite adherence to adequate diet, might require an oral hypoglycaemic agent sooner than 12 weeks.
## 2.4 Patient Education

Diabetes education is an ongoing process that should include the patient and family. Advice and information must be given at the appropriate time if key messages are to be absorbed and understood. To be able to educate a diabetic patient properly, the educator must have sufficient knowledge of the disease and all aspects of management. The following topics need to be discussed as part of an individualised education programme.

### Checklist

<table>
<thead>
<tr>
<th>Topic</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is diabetes?</td>
<td>Give Explanation...........................................</td>
</tr>
<tr>
<td>Refer to Structured Diabetes Education Programme</td>
<td>See details of local programmes below...............</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Self-monitoring of blood glucose is generally the preferred approach</td>
</tr>
<tr>
<td></td>
<td>Technique..................................................</td>
</tr>
<tr>
<td></td>
<td>Recording results........................................</td>
</tr>
<tr>
<td></td>
<td>Action to be taken.........................................</td>
</tr>
<tr>
<td></td>
<td>Ketone testing for patients with Type 1 DM............</td>
</tr>
<tr>
<td>Hypoglycaemia</td>
<td>Causes......................................................</td>
</tr>
<tr>
<td></td>
<td>Signs and symptoms........................................</td>
</tr>
<tr>
<td></td>
<td>Prevention..................................................</td>
</tr>
<tr>
<td></td>
<td>Treatment..................................................</td>
</tr>
<tr>
<td>Oral Agents</td>
<td>Preparation and dosage.................................</td>
</tr>
<tr>
<td></td>
<td>Mode of action.............................................</td>
</tr>
<tr>
<td></td>
<td>Possible side effects.....................................</td>
</tr>
<tr>
<td>Self-care during minor illness</td>
<td>Where, When and How to contact the doctor or Hospital........................................</td>
</tr>
<tr>
<td>Foot care</td>
<td>Provide foot care leaflet. Example in appendix. Where, when &amp; who to contact if problems arise</td>
</tr>
<tr>
<td>Diet, Physical Activity</td>
<td>See separate sections on these topics................</td>
</tr>
<tr>
<td>Alcohol and smoking</td>
<td>As appropriate.............................................</td>
</tr>
<tr>
<td>Driving</td>
<td>Notify DLS in Dept of Transport and insurance Company..................................................</td>
</tr>
<tr>
<td>Contraception / pregnancy</td>
<td>Refer to hospital diabetes clinic once pregnancy confirmed. See appendix pre-pregnancy checklist</td>
</tr>
<tr>
<td>Travel</td>
<td>Home and abroad...........................................</td>
</tr>
<tr>
<td>Complications</td>
<td>Understanding of risk or future complications......</td>
</tr>
<tr>
<td>Entitlements</td>
<td>Long-term illness card, if appropriate................</td>
</tr>
</tbody>
</table>
Structured Diabetes Education

People living with diabetes have a crucial role in managing their condition on a day-to-day basis, so supporting self care should be central to any local diabetes service. Patient education is a vital part of this support package.

Standards for such structured education programs are established to ensure they are evidence-based, have very clear aims and objectives which will enable the patient to learn within an environment that is conducive to his/her personal learning needs; be delivered by suitably trained educators, be structured, quality-assured and audited.

Courses available in HSE West

**DESMOND:**
Diabetes Education and Self-Management for On-going and Newly Diagnosed. A one-day or 2 session structured education programme for patients newly diagnosed with type 2 diabetes.

**X-PERT:**
X-Pert Patient Education versus Routine Treatment. A structured education programme for adults with type 2 diabetes facilitated through 6 weekly two hour sessions.

**CODE:**
Community Orientated Diabetes Education. CODE is a 5-session programme for individuals with type 2 diabetes operated by the Diabetes Federation of Ireland.

**DAFNE (for Type 1 Diabetes):**
Dose Adjusted For Normal Eating. DAFNE is an intensive 5-day self-management skills training programme for individuals with type 1 diabetes. All aspects of diabetes education are covered, with a strong emphasis on a liberal diet and the ability to match rapid acting insulin to food by estimating the carbohydrate content of all meals, snacks and drinks taken.

See appendix Guide to Local Services for information on your local scheme
### 2.5 Established Diabetes - Follow up

#### The Annual Review Visit

**Clinical Assessment**

| **Weight:** | For calculation of body mass index (kg/m$^2$) |
| **Waist measurement:** | Target for females: <80cms / 31.5inches
Target for males: <94cms / 37inches

| **Blood Pressure:** | If hypertensive, measure more frequently than annually |
| **Foot Inspection:** | Perform annual foot examination. See section 9 for detailed instructions. Record presence or absence of pedal pulses in each limb Assess for peripheral neuropathy If considered ‘at risk’, examine at each visit and send for Podiatry review. Check for foot deformity and examine shoes. Give foot care leaflet (see appendix) |
| **Eyes:** | Examine at least annually for diabetic retinopathy. See Section 9. Test visual acuity. Perform dilated fundoscopy Refer for retinal photograph. |
| **Risk Factors:** | Review alcohol consumption, smoking habits, physical activity levels and CHD risk factors where relevant. Smoking advice: Quit line Local 1850 201 203 |
| **Lifestyle Advice:** | Tailored physical activity advice Contraception, pregnancy, and sexual health advice |

**Laboratory Tests**

| **Glycaemic Control:** | HbA1c |
| **Renal Function:** | Creatinine and electrolytes Urinalysis ACR in a spot urine specimen (send to biochemistry) |
| **Lipids:** | Full lipid profile, fasting if possible |
| **Liver function tests:** | Can be useful if on statins or Thiazolidinediones |

**Self-Monitoring**

Review home monitoring results with the patient and agree on individualised goals. See section 5.

**Drug Therapy**

Consider altering therapy if HbA1c is greater than 6.5%
Consider use of Statin, ACE, Anti-hypertensive, Aspirin, treatment for obesity and sexual dysfunction.
Laboratory results and home diabetes should be reviewed with the patient and self-management goals for the next year or six months should be agreed.

**Dietary Review**

By practice nurse of Dietitian if requested by the patient.
Annual Review in Housebound Patients

The above review can be appropriate for this group of patients. If, however, it is desirable to limit the extent of the review, the most appropriate parts of the review are:

- Blood pressure
- Foot inspection
- Blood tests

Retinal screening is also important

Established Diabetes - Follow up: The Interim Visit

While the frequency and structure of routine visits will vary, most patients will require 3-6 monthly review. Assessment should involve the following:

- HbA1C
- Discussion of home monitoring results and self management goals
- Diabetes treatment review
- Blood Pressure measurement
- Discuss lifestyle issues
3.0 Lifestyle Management

Content of Section 3.0:
3.1 Dietary Advice
3.2 Physical Activity
3.3 Overweight and Obesity

3.1 Dietary Advice

Nutritional advice and information is essential for the effective management of Type 1 and Type 2 diabetes. Dietary changes have been shown to be effective in improving blood glucose levels, hyperlipidaemia, hypertension and overweight or obesity.

The aim of nutritional advice is to provide those who need advice with the information required to make appropriate choices on the type and quantity of the food that they eat. The advice must take into account the individual’s personal and cultural preferences, beliefs and lifestyle, and must respect the individual’s wishes and willingness to change.

Referring to a Dietitian

When to refer to a Dietician:

People with diabetes should be offered an appointment with their Dietitian at their annual review and also referred to a Dietitian if they:

- Are newly diagnosed with diabetes.
- Have commenced treatment with oral hypoglycaemics or insulin.
- Have poor glycaemic control, thought to have a dietary cause.
- Are overweight and motivated to lose weight (BMI greater than 27).
- Hyperlipidaemia with a risk factor greater than 20% based on European Society Guidelines.
- Have diabetic nephropathy.
- Need pre-pregnancy counselling.
- Have gestational diabetes, impaired glucose tolerance or are pregnant with existing diabetes.
- Have Coeliac disease with diabetes.
- Require education/re-education regarding a specific issue e.g. exercise, alcohol, eating out, sick day rules, hypos, reading food labels etc.
- Have had a recent admission with DKA.

Because some GP practices do not have timely access to dietetic services, it is likely that the GP and/or Practice Nurse will need to provide some initial dietary advice.

Patient Education Leaflets

Leaflets have been developed to facilitate this aspect of care and can be obtained from your local Community Nutrition and Dietetic Service or Health Promotion Office. Please refer to your local Guide to Diabetes Services for more information and contact details. A Healthy eating information leaflet is available. See Appendix.
Where to Refer to

All direct referrals to Dietitians should be via your local Community Nutrition and Dietetic Services which are based in each county, see guide to local diabetes services in Appendix.

Patients seen by the Hospital-based Diabetes Team would be referred to a Hospital based Dietitian, if appropriate.

Dietary Advice for people with Diabetes

All dietary advice provided by Dieticians should be in accordance with the Diabetes UK guidelines titled ‘The Implementation of nutritional advice for people with diabetes’.11

The aims of dietary advice are:
- To maintain or improve health through the use of appropriate food choices.
- To reduce the risk of microvascular and macrovascular disease through management of hyperglycaemic and hypoglycaemia, hypertension and dyslipidaemia.

Dietary Goals

Recommendations provided could include the following:
- Have a healthy, balanced, nutritionally adequate diet.
- Regular carbohydrate-based meals.
- Even carbohydrate distribution to aid glycaemic control.
- Increase in high-fibre foods.
- Reduce total fat (ideally to less than 35% of total energy).
- Reduce saturated and transaturated fat (to less than 10% of energy).
- Increase fish intake, especially oily fish, to 2 to 4 times weekly.
- Use of monounsaturated fat as the main source of dietary fat.
- Increase fruit and vegetables intake to five portions per day.
- Limit sucrose (table sugar) to up to 10% of total energy, if weight is in the healthy weight range.
- Use non-nutritive sweeteners if overweight or hypertriogylyceridaemic.
- Limit salt to less than or equal to 6 g of sodium chloride per day.
- Drink alcohol in moderation (maximum of 3 units per day for men and 2 units per day for women).
- Advice on hypoglycaemia prevention and treatment.
- Promote 5-10% weight loss, if overweight or obese.
- Advice on appropriate snacking considering insulin, medication and blood glucose levels.

See healthy eating handout in the appendix. This may be a helpful start while the patient is waiting for a dietetic consolation.
3.2 Physical Activity in People who have Diabetes

General advice about exercise for health

- All patients should be encouraged to be physically active because this improves general levels of fitness and glycaemic control.
- Regular physical activity might also aid weight loss and improve lipid and blood pressure control.
- For those unaccustomed to exercise, or who have significant diabetic complications, medical advice should be obtained.
- Advice on physical activity should be realistic and should emphasise the incorporation of activity into everyday life (e.g. taking the stairs, getting off the bus a stop earlier, and parking further away) but also include information on local facilities such as swimming pools and health clubs.
- Goals should be realistic:
  - Current recommendations state that to benefit health, people should aim for 30 mins of moderate intensity activity on five days a week. This does not have to be a continuous stretch of 30 minutes, but can be in multiples of 10-15 minutes.\textsuperscript{12}
  - To prevent the transition to overweight or obesity, then 45-60 minutes of moderate intensity activity is required.\textsuperscript{13}
  - If one’s goal is to lose weight or maintain weight loss, then between 60-90 minutes per day is recommended.\textsuperscript{13}

- Moderate intensity: feeling warm and breathing more deeply than usual – e.g. walking at a brisk pace.
- Many people with Type 2 diabetes may have already developed complications by the time of diagnosis. Therefore, patients should be screened for cardiovascular disease and other complications prior to undertaking an exercise programme.

Safety considerations

Diabetes UK recommends the following Safety considerations\textsuperscript{14}

Hypoglycaemia

This is a possible problem in people on insulin or sulphonylurea medication. Guidance on avoidance:

- Blood glucose levels should be monitored before and after activity. If the physical activity lasts for one hour or more, blood glucose levels should also be monitored during exercise.
- Increase carbohydrate intake: If the person is exercising shortly after a meal, they can have extra starchy carbohydrate with the meal (e.g. bread, pasta, rice, potatoes, cereal). If they cannot eat more at that meal, or if the exercise is one or two hours after the last meal, they will probably need to take a snack containing carbohydrate before the exercise (e.g. cereal bar, small chocolate bar, biscuits). If participating in vigorous activity, the person will probably need a top-up of glucose during the activity. As they may be thirsty and hydration is important, it is usually convenient to take this top-up as a glucose drink, sports drink or fruit juice.
• Reducing insulin: This is possible if the activity is planned. Adjustments are a matter of trying out various strategies, as they will vary with different individuals, doing different activities, at different times of the day etc. Liaison with the diabetes team will be necessary.
• Insulin injection sites should be away from the areas used during exercise e.g. the abdomen.
• Fast acting carbohydrate snacks or drinks should be immediately available to hand while the person is being active (e.g. Lucozade or glucose sweets)
• Delayed hypoglycaemia can occur up to 36 hours after exercise as the muscles refuel. Meal adjustments and bedtime snacks are advisable after vigorous activity.

Hyperglycaemia

If a person has higher blood glucose levels (>15mmol/l) than normal before activity, there may not be enough insulin to mobilise glucose for muscular work and they must check for ketones. Physical activity should be postponed until blood glucose levels have returned to normal. If ketones are present, the person should consult their doctor as soon as possible. Activity must not be resumed until blood glucose level starts to decrease and are back in a safe range.

N.B. Everyone is very different and they need to do a certain amount of experimentation of adjusting the insulin and carbohydrate they take to find out what effect different activities have on them. By doing regular blood glucose tests the individual will be able to find out whether they have eaten enough or altered their insulin regime correctly. This should be discussed with the person’s diabetes team.
3.3 Overweight and Obesity in Diabetes

Weight loss in overweight and obese individuals improves insulin sensitivity and glucose tolerance.

Once patients who are overweight have been identified, they should be assessed for motivation to lose weight. It is important to discuss the issues around weight management, raise awareness of the health risks and assess their level of interest. If ready, appropriate and realistic goals should be discussed with the patient. For example, a 5-10% weight loss may be realistic for many. Different approaches suit different individuals. The aim is to identify and match these appropriately to the individual.

The following guidelines have been adapted from the Diabetes UK Weight Management Pack. See also the National Taskforce for Obesity recommendations (2005) which were published by the Department of Health and Children. See the National taskforce on Obesity Treatment Algorithm.

Assessment
Assessment should include the following:

- Body Mass Index (BMI): $W \text{ (kg)}/H^2 \text{ (m)}$. See table 2 below.
- Waist Circumference:
  - To measure waist circumference, the measurement needs to be taken at the mid-point between the top of the hip-bone and lowest rib. Ensure the tape is snug but does not compress the skin and is parallel to the floor. The measurement is made at the end of a normal expiration. Highest health risk associated with waist circumference:
    - Women: >80cms / 31.5inches;
    - Men: >94cms / 37inches
- Blood pressure
- Lipids
- HbA1c
- Fitness level and physical activity level
- Smoking status

Consideration should also be given to the suitability of current diabetes medication as intensive blood glucose management can be associated with weight gain. Attempts at weight reducing dietary changes should be tried before commencing or increasing diabetes medication.

<table>
<thead>
<tr>
<th>Table 2: BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (kg/m²)</td>
</tr>
<tr>
<td>Underweight</td>
</tr>
<tr>
<td>Normal</td>
</tr>
<tr>
<td>Overweight</td>
</tr>
<tr>
<td>Obese</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Morbid Obese</td>
</tr>
</tbody>
</table>
Weight Management

A) Lifestyle change
B) Drug treatment
C) Surgery

A) Lifestyle Change

Monitoring blood glucose levels is required when any changes to food or activity is taking place, since these will affect blood glucose control.

Healthy eating and physical activity will help control the risk factors associated with diabetes and prevent weight gain. Dietary changes negotiated with the patient need to achieve a calorie deficit and therefore facilitate weight loss.

Patients could be advised to:
- Reduce their total fat intake.
- Include high-fibre carbohydrate-rich foods at each meal.
- Increase their intake of fruit and vegetables to five portions per day.
- Reduce their sugar intake if excessive.
- Reduce portion size of meals if diet is already low in fat.
- Increase physical activity levels. According to the National Taskforce on Obesity Report 2005\textsuperscript{13} adults require 45-60 minutes of moderate intensity activity to prevent the transition to overweight or obesity, or
- 60-90 minutes per day for weight loss and the maintenance of weight loss. It is recommended that children should be involved in at least 60 minutes of moderate physical activity a day.\textsuperscript{13}
- Dietary changes and targets negotiated with the patient need to be realistic, achievable and desired by the patient.

Assessing Readiness to Change

To ensure that weight management strategies are appropriately suited to the individual it is important to first establish their ‘readiness to change’. Motivation to change behaviour will have a significant impact on the outcome of any weight management programme. See Appendix for The Stages of Readiness to Change and suggested interventions.

Weight Management Programme

Information on how to set up a Weight Management Programme in General Practice can be obtained from Diabetes UK: www.diabetes.org.uk

Considerations

Successful weight management requires ongoing monitoring and support and time is an important issue with this group. Ideally this support should be given in a specialist clinic by professionals equipped with specialist skills and training to manage obesity. Some patients may require the input of a Clinical Psychologist, if available. Other considerations are the physical surroundings including the availability of extra-wide chairs and weighing scales with a large weight capacity.
Relapse Management
If a person has not been successful in meeting the goals of their weight management programme over a three to six month period, you need to assess why. This will include addressing the following factors:
- Motivation
- Barriers to change
- Family and social pressures
- Evidence of psychological and psychiatric problems including eating disorders and depression

B) Drug Treatment for Obesity

Drugs should **never** be used as the sole element of treatment. The individual should be monitored on a regular basis; drug treatment should be discontinued if weight loss is less than 5% after the first 12 weeks or if the individual regains weight at any time whilst receiving drug treatment.

**Orlistat Treatment**

Orlistat is licensed for treating obesity, or those who are overweight (BMI greater than 28) who have co-morbidity such as diabetes.

Orlistat:
- Enhances weight loss produced by diet and exercise by preventing approximately 30% of dietary fat from being absorbed.
- It is not an appetite suppressant.
- It does not replace the need to advise on diet or exercise.
- It should only be used as an adjunct to lifestyle changes.

NICE Guidance 22\(^\text{16}\) suggests its use in:
- Obese patients who have a BMI of greater than 30
- Overweight patients who have a BMI of greater than 28 and who have associated risk factors

**Trial period before use:**
- There should be a three-month trial period of diet and lifestyle changes before drug therapy is considered, with the advice of a dietician.

**Regular reviews:**
- Patients should be reviewed monthly.
- Orlistat drug treatment should be stopped in those failing to lose 5% of initial body weight after 12 weeks. Continued therapy beyond 6 months requires 10% weight loss.
- Treatment should not exceed two years.

**Sibutramine Treatment**

Sibutramine is a centrally acting anti-obesity drug that modifies eating behaviour and may have an effect on reducing the fall in metabolic rate that occurs with weight loss.

NICE Guidance 31\(^\text{17}\) suggests its use in overweight and obese patients:
- Obese patients who have a BMI of greater than 30
- Overweight patients who have a BMI of greater than 27 and who have associated risk factors

**Before use:**
• Patients should have made previous attempts to lose weight by diet and exercise.
• The SPC states that it should only be prescribed to patients who have **not** adequately responded to such treatment, i.e. failed to achieve or maintain a 5% weight loss within three months.

How to use it:
• There are a number of contra-indications and potential drug interactions with sibutramine.
• You will need to monitor regularly blood pressure after starting treatment.
• Its licence currently restricts its duration of use to one year.

**Rimonabant (withdrawn from the market 2008)**

Rimonabant (Accomplia) had been licensed for the treatment of Obesity but has now been withdrawn from the market in October 2008 for safety concerns.

**C. Surgery**

Surgical treatment of obesity has always been regarded as radical, but recent surgical techniques have produced promising data supporting the efficacy of surgery in the management of morbid obesity in certain cases. Patients with type 2 diabetes who have obesity surgery can see drastic improvements in insulin sensitivity and occasionally see their diabetes disappear altogether. These effects are still apparent several years later, although patients continue to require lifelong specialist support to adjust to new eating patterns.

Surgical treatment of obesity is available at University Hospital Galway and Loughlinstown Hospital, Dublin.
National Taskforce on Obesity (2005) Treatment Algorithm

Measure BMI

- 20-25 kg/m²
  - Remeasure 3 years

- 25-30 kg/m² without comorbidities
  - Advice re diet and exercise
  - Advice re wt Maintenance

- >30 or >25 kg/m² with comorbidities
  - Raise issue
  - Waist Circumference
    - BP/Urine
    - Bloods
  - Ready To change
  - No
  - Yes
  - Agree Targets
    - 5% wt loss in 3/12
    - 5-10cm Waist Circumference in 3/12
  - Lifestyle changes for 3 months

- Successful
  - Continue +/- drug therapy
  - Long Term Maintenance

- Unsuccessful
  - Add Drug Therapy
  - Unsuccessful
  - Discuss maintaining weight at current level

- >40 kg/m²
  - Early Referral
    - Hospital obesity clinic if initial wt loss involving diet & exercise unsuccessful
  - Consider Bariatric Surgery
4.0 Drug Treatment

Content of Section 4.0 include:
4.1 Oral Hypoglycaemic Agents
4.2 Incretin Hormones
4.3 Insulin Injection Sites and Injection Techniques
4.4 Commonly Used Insulin Preparations
4.5 Administration Devices
4.6 Storage of Insulin

4.1 Oral hypoglycaemic agents

Glycaemic targets need to be individualised according to age, co-morbid conditions, and motivation to change. Re-testing of HbA1c may be done every 8 to 10 weeks. Ideally HbA1c should be less than 6.5% (where feasible and desired) and the patient should be monitored within the regular programme. Acarbose is not included in this flow chart but may be added, although the side effects are often not acceptable. For further details of drug treatment see following flow chart:

**Flow Chart of Treatment**

- **HbA1c**: greater than or equal to 6.5% after trial with diet
  - **Plus renal impairment**: Start Sulphonylurea
    - **HbA1c remains greater than or equal to 6.5%**: Add Glitazone
      - **HbA1c remains greater than or equal to 6.5%**: Consider Insulin. Discuss with or refer to the Specialist Diabetes Team
  - **No renal impairment**: Start Metformin
    - **HbA1c remains greater than or equal to 6.5%**: Add Sulphonylurea, Incretin Therapies or Glitazone
      - **HbA1c remains greater than or equal to 6.5%**: Consider triple therapy. Discuss with Specialist Diabetes Team
Oral Hypoglycaemic drugs – Notes on Properties and Use

<table>
<thead>
<tr>
<th>Biguanide</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Action:</strong></td>
<td>Decreases gluconeogenesis and increases peripheral glucose utilization</td>
</tr>
<tr>
<td><strong>Generic name:</strong></td>
<td>Metformin (Glucophage)</td>
</tr>
<tr>
<td><strong>Dose:</strong></td>
<td>Daily dose: 500 mg to 3 g. Max single dose: 1000 mg. Dose frequency: 2 to 3 times daily.</td>
</tr>
<tr>
<td><strong>Side effects:</strong></td>
<td>GI upset, rarely lactic acidosis</td>
</tr>
<tr>
<td><strong>Avoid use:</strong></td>
<td>In hepatic, renal or cardiac failure, critical limb ischaemia or hypoxia. Prescribing information states the drug should be stopped if creatinine is greater than 130. In practice, many patients are left on the drug until creatinine reaches 150.</td>
</tr>
<tr>
<td><strong>General Comments:</strong></td>
<td>First choice especially if obese. Take with or after food. Introduce at 500 mg twice daily, followed by a titration up to the maximum tolerated dose over 2 to 3 months if necessary. If side effects occur, return to max tolerated dose. No hypos if used as mono-therapy.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sulphonylurea</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Action:</strong></td>
<td>Stimulates insulin secretion from the pancreas.</td>
</tr>
<tr>
<td><strong>Generic names &amp; doses:</strong></td>
<td>A) Gliclazide (Diamicron) Daily dose: 40 mg to 320 mg; Max single dose: 160 mg; Dose frequency: 1 to 2 times daily B) Gliclazide MR (Diamicron MR): Single dose: 30 mg; Max daily dose: 120 mg; Dose frequency: daily C) Glimepiride (Amaryl): Daily dose: 1 mg-6 mg; Max single dose:6 mg; Dose frequency: daily D) Glipizide (Glibenese / Minodiab): Daily dose: 2.5 mg to 20 mg; Max single dose:10 mg; Dose frequency: 1 to 2 times daily. E) Glibenclamide (Daonil / Semi-daonil / Euglucon / Diabetamide / Gliken) Daily dose: 2.5 mg to 15 mg; Max single dose: 15 mg; Dose frequency: daily. <strong>Avoid Use:</strong> in elderly (long acting; higher risk of hypos). Rarely prescribe today due to risk of hypo’s.</td>
</tr>
<tr>
<td><strong>Side effects:</strong></td>
<td>Hypoglycaemia, Weight gain, GI upset, headache, hypersensitivity reactions.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alpha Glucosidase Inhibitor</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Action:</strong></td>
<td>Delays digestion of starch and sucrose. Reduces postprandial rise in blood glucose.</td>
</tr>
<tr>
<td><strong>Generic Name &amp; Dose:</strong></td>
<td>Acarbose (Glucobay) Daily dose: 50 mg to 600 mg. Max single dose: 200 mg Dose frequency: 1 to 3 times daily</td>
</tr>
<tr>
<td><strong>Side effects:</strong></td>
<td>Flatulence, minimised by gradual titration of dose. Caution: when used in combination with metformin, there is an increased risk of GI side effects.</td>
</tr>
<tr>
<td><strong>General comments:</strong></td>
<td>Take with or after food. (May have a role in some people intolerant of other therapies).</td>
</tr>
</tbody>
</table>
**Prandial Glucose Regulator**

**Action:** Insulin secretagogues with rapid on/off action.

**Generic Names & Doses:**

A) Repaglinide (NovoNorm)
- Daily dose: 0.5 mg to 16 mg; Max single dose: 4 mg;
- Dose frequency: with each meal

B) Nateglinide (Starlix)
- Daily dose: 60 mg to 360 mg; Max single dose: 120 mg;
- Dose frequency: with each meal

**Side Effects:** Weight gain, hypoglycaemia

**General Comments:** Take before meals (omit when meals not taken).
Consider as short-acting sulphonylurea. Can be useful if patient has high post-prandial peaks. Licensed as monotherapy, or with metformin. (Evidence suggests less efficacious than sulphonylureas)

---

**Thiazolidinedione (TZD)**

**Warning**

**See FDA boxed warning below**

**Action:** Improve insulin action via binding to PPAR-gamma nuclear receptor

**Generic Names & Doses:**

A) Rosiglitazone (Avandia):
- Daily dose: 4 mg to 8 mg; Max single dose: 8 mg;
- Dose frequency: daily. **Caution:** Monitor liver function tests before starting, and periodically thereafter.

B) Pioglitazone (Actos):
- Daily dose: 15 mg to 30 mg; Max single dose: 30 mg;
- Dose frequency: daily. **Caution:** Monitor liver function before treatment and periodically thereafter.

**Side Effects:** Weight gain, fluid retention, anaemia and cardiac failure

**Contraindications:** Specialist advice recommended when using in triple combination (i.e. with metformin and sulphonylurea). Ideally, used with metformin (minimise weight gain), or with sulphonylurea if metformin is contraindicated or not tolerated.

**General Comments:** Require 4 to 6 weeks for full onset of effect. Monitor liver function tests before starting and at the intervals recommended in the latest BNF. Advise patients to seek immediate medical attention if symptoms such as nausea, vomiting, abdominal pain, fatigue, anorexia and dark urine develop; discontinue if jaundice occurs or liver enzymes significantly raised. (BNF)

**Note:** NICE recommendations endorse the product license, which states that TZDs should be used in conjunction with metformin OR a sulphonylurea but not metformin AND sulphonylurea. In practice, triple therapy can be used with input from the specialist diabetes team. A robust response to a TZD would constitute a 2% point drop in HbA1c. Because of this, it is not recommended to initiate a trial of triple therapy if HbA1c is above 9.0% because even a robust response will still not achieve target. Patients embarking on a trial of triple therapy should be told the following: “Insulin is likely to be necessary in the future” (i.e. tablets do not work for ever). The new tablet takes 6–8 weeks to have its effect. If hypoglycaemia occurs, the drug to dose reduce is the sulphonylurea. (Be alert to the contra indication of cardiac failure and the possibility of development of significant oedema).
**Thiazolidinedione plus Metformin**

**Action**
Improve insulin action via binding to PPAR-gamma nuclear receptors inhibits gluconeogenesis and increases peripheral glucose utilization

**Generic Name & Dose**
Rosiglitazone plus Metformin (Avandamet) Daily dose
2mg/500mg, 2mg/1gm twice daily. 4mg/1gm twice daily.
Max single dose 8mg/2gm: Dose frequency; daily/twice daily.

**General comments:**
Require 4 to 6 weeks for full onset of effect. Monitor liver function tests before starting, and periodically thereafter. Not currently licensed with insulin. Titration with the individual components (Rosiglitazone and Metformin) may be desirable before initiation of Avandamet.

---

**FDA Boxed Warning for Thiazolidinedione**

**WARNING: Congestive heart failure and myocardial ischemia**

Thiazolidinediones including Rosiglitazone cause or exacerbate congestive heart failure in some patients. After initiation of AVANDIA and after dose increases observe patients carefully for signs and symptoms of heart failure (including excessive rapid weight gain, dyspnea and /or oedema). If these signs and symptoms develop the heart failure should be managed according to current standards of care. Furthermore discontinuation or dose reduction of AVANDIA must be considered. AVANDIA is not recommended in patients with symptomatic heart failure. Initiation of AVANDIA in patients with established NYHA class III or IV heart failure is contraindicated.

A meta-analysis of 42 clinical studies (mean duration 6 months: 14237 total patients) most of which compared AVANDIA to placebo showed AVANDIA to be associated with an increased risk of myocardial ischemic events such as angina or myocardial infarction. Three other studies (mean duration 41 months: 14067 patients) comparing AVANDIA to some other approved oral antidiabetic agents or placebo have not confirmed or excluded this risk. In their entirety the available data on the risk of myocardial ischemia are inconclusive.
### 4.2 Incretin Therapies

<table>
<thead>
<tr>
<th><strong>Sitagliptin</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Action:</strong></td>
<td>An inhibitor of DPP-4, increases insulin secretion and lowers glucagon secretion.</td>
</tr>
<tr>
<td><strong>Trade Name</strong></td>
<td>Januvia</td>
</tr>
<tr>
<td><strong>&amp; Dose:</strong></td>
<td>Daily dose – 100mgs. Dose Frequency: Once daily</td>
</tr>
<tr>
<td><strong>Side effects:</strong></td>
<td>Nausea. Upper abdominal pain. Diarrhoea</td>
</tr>
<tr>
<td><strong>General Comments:</strong></td>
<td>Not recommended for patients with moderate or severe renal insufficiency.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Exenatide</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Action:</strong></td>
<td>A synthetic form of exendin-4, is an incretin mimetic which increases insulin secretion, suppresses glucagon secretion, and slows gastric emptying</td>
</tr>
<tr>
<td><strong>Trade Name</strong></td>
<td>Byetta</td>
</tr>
<tr>
<td><strong>&amp; Dose:</strong></td>
<td>Initiate 5mcgs by injection twice daily within 60minutes of morning and evening meals for at least one month. The dose can then be increased to 10mcgs twice daily.</td>
</tr>
<tr>
<td><strong>Side Effects:</strong></td>
<td>Decreased appetite, headache, dizziness, dyspepsia, abdominal pain, gastro-oesophageal reflux disease, abdominal distension, hyperhidrosis, feeling jittery, and asthenia.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sitagliptin plus Metformin</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Action:</strong></td>
<td>Januvia combines Sitagliptin, a DPP-4 inhibitor with metformin</td>
</tr>
<tr>
<td><strong>Trade Name</strong></td>
<td>Janumet</td>
</tr>
<tr>
<td><strong>&amp; Dose:</strong></td>
<td>Sitagliptin 50mg/Metformin 500mg twice daily with meals Sitagliptin 50mg/Metformin 1000mg twice daily with meals Maximum daily dose is 100mg Sitagliptin/2000mg metformin</td>
</tr>
<tr>
<td><strong>Side Effects:</strong></td>
<td>Diarrhoea, upper respiratory tract infection, headaches. Contraindicated in moderate to severe renal impairment and hepatic disease.</td>
</tr>
</tbody>
</table>

**Warning Lactic Acidosis**

Lactic acidosis is a rare but serious complication that can occur because of metformin accumulation. The risk increases with conditions such as sepsis, dehydration, excess alcohol, hepatic insufficiency, renal impairment and acute congestive heart failure.
4.3 Insulin Injection Sites and Injection Technique

Injection Sites

- The use of a variety of injection areas is recommended to discourage lipohypertrophy and lipoatrophy.
- Absorption of insulin is likely to be less variable when injected in the abdomen compared to in the thighs or arms; this should be taken into account when assessing an individual’s control.

Injection Technique

- Insulin administration is best taught by a nurse who has specialist skills in diabetes.
- Check insulin dose.
- Pinch up fold of skin.
- Avoid lumpy and atrophic areas.
- Inject needle at 90 degrees into this fold.
- Dispose of syringe and/or needle carefully.
- There is no need to swab the skin before or after injection.
### 4.4 Commonly used Insulin Preparations

<table>
<thead>
<tr>
<th>Name &amp; Label</th>
<th>Insulin Type</th>
<th>Time Action</th>
<th>Presentation</th>
<th>Device Names</th>
<th>Recommended Needles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actrapid®</td>
<td>Short acting</td>
<td>Onset 30-60 mins Duration 7-8 hrs</td>
<td>10ml vial</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Humulin-S</td>
<td>Short Acting</td>
<td>Onset 30-60 mins. Duration 6-8hrs</td>
<td>10ml vial</td>
<td>3ml Cartridge</td>
<td>No</td>
</tr>
<tr>
<td>Insuman Rapid</td>
<td>Short Acting</td>
<td>Onset 15 mins Duration up to 9hrs</td>
<td>No</td>
<td>3ml Cartridge</td>
<td>3ml Optiset</td>
</tr>
<tr>
<td>Lantus (Glargine)</td>
<td>Long Acting Analogue</td>
<td>Onset 1.5hrs Duration 24 hrs</td>
<td>10ml vial</td>
<td>3ml Cartridge</td>
<td>AutoPen, SoloStar and Optiset</td>
</tr>
<tr>
<td>Levemir ® Insulin detemir</td>
<td>Long Acting Analogue</td>
<td>Onset 1-2hrs Duration 24hrs</td>
<td>No</td>
<td>3ml Penfill Cartridge</td>
<td>3ml FlexPen® or Innole t®</td>
</tr>
<tr>
<td>NovoRapid® (Insulin aspart)</td>
<td>Rapid Acting Analogue</td>
<td>Onset 10 -20 mins Duration 3-5hrs</td>
<td>10ml vial</td>
<td>3ml Penfill</td>
<td>3ml FlexPen®</td>
</tr>
<tr>
<td>Humalog (Lispro)</td>
<td>Rapid Acting Analogue</td>
<td>Onset 0-5mins Duration 3-5hrs</td>
<td>10ml vial</td>
<td>3ml Cartridge</td>
<td>3ml Humalog Pen</td>
</tr>
<tr>
<td>Apidra (Glulisine)</td>
<td>Rapid Acting Analogue</td>
<td>Onset 10-20 mins Duration 3-4hrs</td>
<td>10ml vial</td>
<td>3ml Cartridge</td>
<td>3ml SoloStar and OptiSet</td>
</tr>
<tr>
<td>Insulatard®</td>
<td>Intermediate Acting</td>
<td>Onset 1-2 hrs. Duration 8-12hrs</td>
<td>10ml vial</td>
<td>3ml Penfill</td>
<td>3ml Innolet®</td>
</tr>
<tr>
<td>Humulin 1</td>
<td>Intermediate Acting</td>
<td>Onset 1-2 hrs Duration 8-12hrs</td>
<td>10ml vial</td>
<td>3ml Cartridge</td>
<td>3ml Humulin Pen</td>
</tr>
<tr>
<td>Insuman Basal</td>
<td>Intermediate Acting</td>
<td>Onset 45-60 mins Duration is up to 20 hrs</td>
<td>10ml vial</td>
<td>3ml Cartridge</td>
<td>3ml OptiSet</td>
</tr>
<tr>
<td>Mixtard ® 30/70 &amp; Humulin M3</td>
<td>Pre-mixed combination 30% soluble insulin &amp; 70% Isophane insulin</td>
<td>Onset 30-60 mins Duration 8-12hrs</td>
<td>10ml vial</td>
<td>3ml Penfill®</td>
<td>3ml Innolet®</td>
</tr>
<tr>
<td>Novomix 30 (Novorapid Mix 30/70)</td>
<td>Rapid acting human insulin analogue &amp; protamine-crystalised insulin aspart. Intermediate acting human insulin analogue</td>
<td>Onset 10-20 mins Max effect 1-4 hrs Duration up to 24 hrs</td>
<td>Vial for 25/75 Comb only</td>
<td>3ml Cartridge</td>
<td>3ml OptiSet Device</td>
</tr>
<tr>
<td>Humalog Mix 25 or Mix 50</td>
<td>Pre-mixed Combination - % Rapid Acting analogue % Intermediate Acting Insulin</td>
<td>Onset 30 -60 mins Duration 8-12 hrs</td>
<td>No</td>
<td>3ml Cartridge for Mix 25 only</td>
<td>3ml Humalog Mix Pen</td>
</tr>
</tbody>
</table>
4.5 Administration devices

Pen injection devices

Most patients use a pen injector device for insulin administration. These are available in two forms, either:
- A pre-filled (disposable) type.
- A reusable form for use with a cartridge

The advantage of pen injection devices is the dose convenience of carrying and administering the insulin, as well as the dose accuracy. Advice from a diabetes specialist nurse may be helpful in deciding on a device for a particular patient.

There are generally 3 types of pen devices:
1) Disposable (pre-filled) pens: These are particularly useful for patients with impaired dexterity (e.g. Innolet, Optiset, Flexpen, Solostar)
2) Cartridge loading pens
3) Pen needles

Syringes

The use of syringes is now uncommon, but may still be the preferred method of delivery for some patients e.g.
- Those using two different insulin preparations simultaneously, which require self mixing, or
- Those patients using large volumes of insulin, which cannot be accommodated in a pen.

Syringes and needles are obtained on prescription and are available in 0.3 ml, 0.5 ml and 1.0 ml sizes.
Syringes are available for use with standard length needles (12.7 mm) and short length needles (8 mm).

Re-use of needles

- The Health and Safety Executive (HSE) recommendation is that needles are single use items – the manufacturers also advise that the silicone coating/lubricant is lost with re-use. Therefore, reuse is not recommended.

Disposal of sharps

European community safety guidance has recommended that sharps should not be disposed of with household waste.
The HSE has no statutory responsibility for clinical waste generated in the home. However, in recognizing the risks associated with healthcare sharp waste, some HSE areas have put in place arrangements to ensure the safe disposal of sharps. See guide to local services.

Syringes
- Do not separate needle from Syringe. Dispose as single unit.
- Discard all used syringes, needles, vials/ampules into the sharps bin
- Do not overfill the sharps bin. Close when ¾ full.

Lancets
- Lancets should also be safely disposed of in a sharps bin.
Pen devices

- Safely remove needles from pen devices, firstly replace the big outer needle cap, and then unscrew the needle. Dispose of it carefully in a sharps bin.
- Used cartridges and pen devices should be disposed of with the same care, in a sharps bin.

Continuous Sub Cutaneous Insulin Infusion (CSII) (‘pump’) Therapy

- In February 2003, NICE issued guidance on CSII pump therapy. It recommended that it be considered for Type 1 patients who have failed to achieve optimal control on conventional multiple daily insulin therapy including a trial of insulin glargine.
- It emphasised that patients being considered for pump therapy should have good self management skills and that the diabetes team should have pump expertise.

4.6 Storage of Insulin

Prior to use, all insulin should be kept in the refrigerator at temperatures between 2-8°C.

The in-use storage conditions for vials, cartridges and pens are outlined in the following table:

<table>
<thead>
<tr>
<th>Insulin</th>
<th>Vial</th>
<th>Cartridge</th>
<th>Pen</th>
<th>InnoLet®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actrapid</td>
<td>6 weeks up to 25°C</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Humalog</td>
<td>N/A</td>
<td>4 weeks up to 30°C</td>
<td>4 weeks up to 30°C</td>
<td>N/A</td>
</tr>
<tr>
<td>Insulatard</td>
<td>6 weeks up to 25°C</td>
<td>6 weeks up to 30°C</td>
<td>N/A</td>
<td>6 weeks up to 30°C</td>
</tr>
<tr>
<td>Lantus</td>
<td>N/A</td>
<td>4 weeks up to 25°C</td>
<td>4 weeks up to 25°C</td>
<td>N/A</td>
</tr>
<tr>
<td>Levemir</td>
<td>N/A</td>
<td>6 weeks up to 30°C</td>
<td>6 weeks up to 30°C</td>
<td>N/A</td>
</tr>
<tr>
<td>Mixtard 30</td>
<td>6 weeks up to 25°C</td>
<td>6 weeks up to 30°C</td>
<td>N/A</td>
<td>6 weeks up to 30°C</td>
</tr>
<tr>
<td>NovoRapid</td>
<td>4 weeks up to 30°C</td>
<td>4 weeks up to 30°C</td>
<td>4 weeks up to 30°C</td>
<td>N/A</td>
</tr>
<tr>
<td>NovoMix30</td>
<td>N/A</td>
<td>4 weeks up to 30°C</td>
<td>4 weeks up to 30°C</td>
<td>N/A</td>
</tr>
</tbody>
</table>

During use, keep the container in the outer carton in order to protect from light.
5.0 Self Monitoring of Blood Glucose (SMBG)

Content of Section 6.0:
5.1 SMBG Targets
5.2 Type 1 Diabetes – SMBG
5.3 Type 2 Diabetes on Insulin – SMBG
5.4 Type 2 Diabetes on Tablets - SMBG
5.5 Type 2 Diabetes on Diet alone – SMBG
5.6 Special Situations

The clinical trial evidence that SMBG improves glycaemic control is weak, particularly in Type 2 diabetes. The reason for this is that many of these ‘negative’ studies assessed monitoring in isolation. A better approach is to consider SMBG as one component of self-management education. If the patient has been properly educated in how to use the information they obtain from their meter, then they are much more likely to derive benefit from monitoring.

5.1 SMBG Targets

- In general, patients should be encouraged to work towards a pre-prandial target of 4 to 6 mmol/L (ideal). If post-prandial monitoring is undertaken, then a 2hr target of less than 10 mmol/l is acceptable, although less than 8mmol/l is ideal.

5.2 Type 1 Diabetes – SMBG

- The frequency of monitoring typically parallels the intensity of the insulin programme.
- Many patients choose to monitor at the time they take their insulin injections. This enables them to use the information from their meter to inform changes in their insulin dose.
- Even when blood sugar control is stable, a certain amount of monitoring is important. This can be undertaken as once or twice daily monitoring or as a ‘profile’ on one or two days per week.

5.3 Type 2 Diabetes on Insulin – SMBG

- To guide dose adjustment decisions on this programme, one needs to know what the blood sugars are doing pre-meal. Post prandial blood sugars may also be useful.
- This information can be obtained from a pattern of twice daily SMBG, with the monitoring done at varying times of day or alternatively by monitoring 4 times per day on two or three days per week.
- This frequency of monitoring can be reduced (but not abandoned) when blood sugar and HbA1c targets are reached.

5.4 Type 2 Diabetes on Tablets – SMBG

- If the patient is new to oral hypoglycaemic therapy, or is undergoing dose adjustment of their tablets, then a frequency of monitoring similar to that described for Type 2 patients on insulin is appropriate.
- If their blood sugar control is stable and at goal, then up to 2-4 readings per week at varying times would be reasonable.
5.5 Type 2 Diabetes on Diet Alone – SMBG

- SMBG should be on an intermittent basis, to assess glucose excursions due to lifestyle changes, and to monitor changes during inter-current illness.

5.6 Special Situations

- Women who have gestational diabetes are encouraged to monitor pre-breakfast and post prandially and to record what they have eaten if their post-prandial reading is above 8 mmol/l.
- Women who have Type 1 diabetes and who are anticipating pregnancy need to monitor more frequently to help inform insulin dose adjustment and achieve a HbA1c in the nondiabetic range.
- Blood glucose testing strips are provided free of charge to the patient, either on the GMS scheme (Medical Card Holders) or on the long-term illness book.
6.0 Insulin Regimens and Dosage Adjustments

Content of Section 6.0:
6.1 Insulin Regimens
6.2 Over Insulinisation
6.3 Too Little Insulin
6.4 Insulin in the Elderly
6.5 Type 2 Diabetes: Insulin Therapy
6.6 Weight Gain
6.7 Starting Insulin in General Practice in Type 2 Diabetes

6.1 Insulin Regimens

Dosage Adjustment - Principles

- No one set of advice can cope with all situations.
- Never change insulin on the basis of one-off readings
- Always check monitoring technique, injection technique & injection sites
- Identify the periods of day in which the greatest problems are occurring, and look for a pattern in readings
- Are monitoring values credible?
- Review distribution of insulin doses
- Review patterns of eating, including alcohol consumption.
- Review whether poor control in one period of the day is not actually a hangover from a previous period
- Agree an adjustment of two units or 10% of the dose
- Most patients are capable of becoming skilled at self-adjustment of their regimen.

Once Daily Regimen

- Insulin is administered once daily usually in the morning but can be given whenever is convenient to the patient provided it is given at the same time every day.
- The main advantage of this regimen is the convenience of once a day injection. Can be used in combination with OHA’s in those who require assistance from a carer or health care professional to administer their injection to achieve good control of blood sugars.

Once Daily Regimen – Adjustment of dose

- If glucose is high or low before breakfast increase or decrease the long acting insulin.
- If glucose is high at other times in the day consideration should be given to twice daily regimens or basal bolus regimen.

Twice Daily Regimen

- Insulin is administered as two injections before meals, usually before breakfast and before evening meal, most commonly distributed as a two thirds: one third mixture of soluble and isophane insulin usually given as a fixed biphasic insulin e.g. Human Mixtard 30 or Humulin M3.
• Pre-mixed formulations of a rapid acting and intermediate acting insulin analogue are available, e.g. Novomix 30 and Humalog Mix 25.

**Twice Daily Regimen – Adjustment of Insulin Doses**

• If glucose is high or low before breakfast, increase or decrease the EVENING insulin.
• If glucose is high or low before lunch, increase or decrease MORNING insulin.
• If glucose is high or low before tea, increase or decrease MORNING insulin.
• If glucose is high or low before bed, increase or decrease EVENING insulin.

**Basal Bolus Regimen**

This consists of an injection (bolus) of a soluble insulin or rapid-acting insulin analogue before each of three main meals. A basal insulin supply is given as late in the evening as possible (before bedtime).
• Between 30 to 50% of the total daily insulin is provided as the basal insulin and the remainder is divided and given as bolus doses before each meal.
• This regimen consists of multiple injections.
• The main advantage of this regimen is improved flexibility, especially in coordinating insulin doses with meal size and physical exercise. It is, therefore, most suited to young patients and those undertaking shift work.

**Basal Bolus Regimen - Dosage Adjustment**

• If glucose is high or low before breakfast, increase or decrease the EVENING long acting insulin
• If glucose is high or low before lunch, increase or decrease MORNING short-acting insulin
• If glucose is high or low before tea, increase or decrease LUNCHTIME short-acting insulin
• If glucose is high or low before bed, increase or decrease TEATIME short-acting insulin

**Rapid-Acting Insulin Analogues**

• Rapid-acting analogues of insulin (e.g. Lispro or Insulin Aspart, Isulin Glulisine,) can be used in both twice-daily and basal bolus regimens
• For some patients on rapid acting insulin analogues, monitoring of post-prandial (2 hours) glucose might be required to assist with dosage adjustment.

**6.2 Over Insulinisation**

The following symptoms are suggestive of over insulinisation:
• Recurrent hypos
• Wildly swinging glucose values
• Weight gain
• Subtle features of chronic hypo:
  Headache
  Need to eat
  Personality change in elderly
6.3 Too little Insulin

The following symptoms are suggestive of too little insulin:
- Chronic hyperglycaemia or osmotic symptoms
- Weight loss
- Generally unwell
- Nocturnal osmotic symptoms (thirst, nocturia)

6.4 Insulin in the Elderly

- Age itself is not a contraindication to insulin therapy
- Targets for glycaemic control in the elderly need not be as stringent as in the younger patient
- The aims of treatment are to control hyperglycaemia with particular avoidance of hypoglycaemia.

6.5 Type 2 Diabetes: Insulin Therapy

The most common indication for insulin in these patients is worsening glycaemic control on oral agents. The decision to switch treatment to insulin can be difficult and the following factors should be taken into account:
- Age
- Other health problems e.g. complications such as visual loss
- Social circumstances e.g. patients holding heavy goods vehicle license
- Patients attitude
- Compliance with diet
- Patients weight

6.6 Weight Gain

- Weight gain is less of a risk than poor control – weight gain is a frequent problem encountered in treating those with Type 2 diabetes after starting insulin. On average, the gain is around 4 kg after 6 months insulin therapy.
- Warn patients: Patients should be warned that weight gain might occur, particularly if they fail to reduce energy intake.
- Metformin: Clinical trial evidence supports continuation of Metformin after starting insulin as a way of impacting upon the degree of weight gain.
- Combination insulin and sulphonylurea therapy: Although it has many proponents, combination insulin and sulphnylurea therapy is not as well supported by clinical trial evidence.
- Thiazolidinediones are contra indicated in conjunction with insulin according to the license in the UK and Ireland. Therefore, the decision to use combined insulin and this oral therapy should be made in conjunction with a consultant Diabetologist.

6.7 Starting Insulin in General Practice in Type 2 Diabetes

Not every practice is confident in initiating insulin in primary care. For those practices that are, the following guidelines may be helpful:
Guide to Starting Insulin In General Practice

Considerations
- Consider liaising with the diabetes specialist team.
- Liaise with a dietitian.
- Prepare yourself & the patient well in advance so it is a planned procedure.
- Before starting, the patient should have been on the maximum dose of oral agents.
- Assess the patient’s diet to ensure that no further improvement can be made by this means alone.
- Consider either a once-daily long-acting insulin or a twice-daily fixed-mixture regimen.
- Continue metformin therapy, unless unable to tolerated or contraindicated.

One Month Before Starting
- Teach the patient to measure and record blood glucose levels, if they are not already doing this.

One Week Before Starting
- Give instruction on using an insulin pen.
- Give advice on injection sites & technique.
- Prescribe the insulin.
- Give advice regarding hypo’s including signs & symptoms, prevention & treatment.
- Arrange for the patient to see a dietician.
- Encourage the patient to bring a relative with them on the ‘starting day’ for support.

On the day of starting
- Ideally start on a Monday so help is readily available for the first five days.
- Give the patient contact telephone numbers in case of emergency.
- If the day of starting is a Monday, and if stopping tablets, ask the patient to take their last tablets on Sunday evening, and give themselves their first injection on the Monday morning.
- Reinforce ‘hypo’ advice

Fixed-mixture regimen:
- Use 30/70 mixture on a twice-daily basis e.g. Novomix 30, Humulin M3, Human Mixtard 30/70.
- Typical starting doses would be 6 to 8 units in the morning and 4 to 6 units in the evening.

Daily insulin regimen
- Use long acting peak-less insulin or intermediate insulin in the morning (or whatever time is convenient provided it is given at the same time every day) e.g. Lantus, Le vemir or Insulatard, Humulin1, Insuman basal.
- Consider continuation of OHA’s (biguanide + sulphonylureas) where appropriate.
- Starting dose recommended is 10 units, titrating by 2 units every 3-4 days (see below).

Note
- Patient will need to monitor their blood sugars 3 to 4 times each day for the first few days and liaise with the GP’s surgery for any necessary dosage increases.
- Insulin doses are increased if necessary by 2 units at a time (either morning or evening) according to monitored glucose levels.
- Warn the patient that blood glucose control might initially worsen as the effects of the tablets wear off and while the insulin dose is being adjusted.
- Don’t bring the glucose level down too quickly or the patient might experience ‘hypo’ symptoms, even at high ‘ish’ glucose levels.
- Patient is ideally seen by the GP or practice nurse daily for the first five days and then gradually less often as control is improved and the patient’s confidence increases.
7.0 Hypoglycaemia

Content of Section 7:
7.1 Diabetes therapies most likely to cause hypoglycaemia
7.2 Symptoms and Signs of Hypoglycaemia
7.3 Treatment

All documented blood glucose values of less than 4.0 mmol/l can be considered a hypoglycaemic event and should not be tolerated in any patient on a regular basis. Remember: ‘Four is the floor’

7.1 Diabetes Therapies most likely to cause Hypoglycaemia

- Hypoglycaemia is a serious side effect of therapy. Check that the patient is aware of the risk of hypo’s and give advice on the signs and symptoms, prevention and treatment of hypo’s.
- It is less common in patients being treated with sulphonylurea than in those taking insulin, but can be more prolonged and more severe, particularly when associated with alcohol excess.
- Glibenclamide (Daonil) is particularly prone to causing hypoglycaemia and should not be used in the elderly.
- All patients started on sulphonylurea drugs should be warned about the possibility of hypoglycaemia, and should be asked to seek advice should it occur.

7.2 Symptoms and Signs of Hypoglycaemia

The symptoms and signs of hypoglycaemia can be variable. A high index of suspicion is often required.
- Insomnia, night sweats and/or morning headache can be symptoms of nocturnal hypoglycaemia.
- Hypoglycaemia can present as confusion in the elderly, or cause patients to be ‘off food’ or forgetful and not eating.
- Insulin-induced hypoglycaemia has been implicated in convulsions in the young and the ‘dead in bed’ syndrome.
- Confirmation by blood glucose measurement is desirable; glucose strips can be inaccurate at low blood glucose concentrations.

Adrenergic response: 
- Sweating
- Tremor
- Palpitations

Neuroglycopenic response: 
- Confusion
- Inappropriate/aggressive behaviour
- Seizures
- Coma

Essential investigations: 
- Capillary blood glucose (may be inaccurate in patients with acute illness, e.g. Respiratory distress). If in doubt confirm with laboratory blood glucose.
7.3 Treatment

Mild hypoglycaemia - treatment

- 15 grams rapid acting carbohydrate i.e.
  - 100ml Lucozade
  - 4-6 dextrose tablets or
  - 150ml ordinary coca cola (i.e. non diet) or
  - 200ml lemonade or
  - 3 teaspoons sugar

- Follow with slow-acting carbohydrate i.e.
  - Next meal if due
  - Sandwich or roll or
  - Toast or
  - Banana or apple or
  - 2 to 3 biscuits

Retest blood glucose 10 minutes later. If symptoms persist or blood glucose remains low repeat the carbohydrate exchange.

Moderate to Severe Hypoglycaemia – Treatment

Glucagon – Outside Hospital

- Used as I.V., I.M. or S.C. – adult dose 1ml
- It can take 10 to 15 minutes to act because it relies on endogenous stores of glycogen.
- Glucagon can be less effective in some patients who have depleted glycogen stores (e.g. in starvation or in excessive alcohol intake).
- Patients often experience abdominal pain/discomfort or vomiting following glucagon administration.
- 0.5mls (1/2 vial) for children under 8 years

Intravenous dextrose - Inpatient

- The emergency treatment of choice in the unconscious patient
- Give 25mls of 50% Dextrose I.V.
- A further 25mls can be given if no response within 5-6minutes.

Next Steps

- Once the patient is able to swallow, extra carbohydrate should be given (see above).
- If consciousness is not restored despite correction of hypoglycaemia, urgent referral to Accident and Emergency is indicated.
- Patients often have a high glucose for several hours after a ‘hypo’ due to a counter regulatory response.
- Discuss with the patient the reason for the hypo and the preventative measures that should be taken to prevent this happening again.
8.0 Type 1 Diabetes: Management of Intercurrent illness

Content for Section 8.0:
8.1 Ketone Testing
8.2 Sick Day Rules
8.3 General Advice for Management of Intercurrent Illness
8.4 Specific Instructions for Management of Intercurrent Illness
8.5 Indications for Hospital Admission for Intercurrent Illness (Type 1)

These are guidelines only: the specialist diabetes teams are there to advise patients individually on how to manage their diabetes in the even of illness.

8.1 Ketone Testing

Patients should be advised to test for Ketones if they are unwell with any of the following conditions:

- Fever
- Vomiting or Diarrhoea
- Abdominal pain
- Greatly increased thirst
- Greatly increased volume of urine
- Blood sugars over 15mmol/l
- Pregnancy
- Any physical or emotional stress
- If breath smells sweet/fruity

<table>
<thead>
<tr>
<th>When to test for Ketones</th>
<th>Blood glucose level</th>
<th>What to do</th>
</tr>
</thead>
<tbody>
<tr>
<td>(before meals or when haven’t eaten)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal or Moderately Elevated</td>
<td>4.0-10.0mmol/l</td>
<td>No need to do anything continue with normal blood glucose testing</td>
</tr>
<tr>
<td>High</td>
<td>10.0-16.7mmol/l</td>
<td>Check blood glucose levels every 2-4 hours until it is below 10mmol/l. If it continues to rise or you feel ill check urine or blood ketones</td>
</tr>
<tr>
<td>Very High</td>
<td>Over 16.7mmol/l</td>
<td>Check urine or blood ketones follow sick day rules. Carry on checking ketone and blood glucose levels every 2-4 hours until blood glucose is below 10mmol/l. Seek advice you’re your Diabetes Team or GP</td>
</tr>
</tbody>
</table>

Ketostix (Bayer Diagnostics Reagent strips available in a 50 strip pack) and Ketur-Test (Roche Diagnostics strips available in 50 strip pack) are commonly used to test for urinary ketones.

It is important to follow the package directions for testing carefully. Having two-people time and read the strip can prevent errors due to poor vision or other factors.
Ketostix - Dip a test strip in a sample of urine. A test strip may simply be held in the urine stream. Read strip at 15 seconds. Observe colour change.

<table>
<thead>
<tr>
<th>Neg:</th>
<th>+/-</th>
<th>+</th>
<th>++</th>
<th>+++</th>
<th>++++</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 g/l</td>
<td>0.05g/L</td>
<td>0.15g/L</td>
<td>0.4g/L</td>
<td>0.8g/L</td>
<td>1.6g/L</td>
</tr>
<tr>
<td>0 mmol/L</td>
<td>0.5 mmol/L</td>
<td>1.5 mmol/L</td>
<td>4 mmol/L</td>
<td>8 mmol/L</td>
<td>16 mmol/L</td>
</tr>
</tbody>
</table>

If the test result shows a trace of ketones or small amount of ketones, the patient should be advised to:

- Drink plenty of water
- Avoid exercise
- Test your blood glucose and urine for ketones every 4 hours, particularly if blood sugars higher than 16.7 mmol/l
- If no improvement, discuss with your nurse or doctor

If the result shows a moderate or large amount of ketones, they should be advised to:

- Inform their doctor or diabetes nurse
- Drink a glass of water every 30-60 minutes

Blood testing devices are available (Abbott Diabetes Care) which test for blood ketones and measure ketone (betahydroxybuterate) concentrations in the blood. A blood ketone level of ≥0.6mmol/l indicates elevated ketones.

<table>
<thead>
<tr>
<th>Blood Ketone Level</th>
<th>What should you do</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 0.6mmol/l</td>
<td>Readings below 0.6mmol/l are within normal range/trace</td>
</tr>
<tr>
<td>Between 0.6 – 1.5mmol/l</td>
<td>When blood ketone reading is between 0.6 – 1.5mmol/l and blood glucose reading is higher than 16.7mmol/l this may indicate the development of a problem that may require medical assistance.</td>
</tr>
<tr>
<td>Above 1.5mmol/l</td>
<td>When blood ketone reading is higher than 1.5mmol/l and the blood glucose reading is higher than 16.7mmol/l there is a risk of developing diabetes ketoacidosis (DKA) take appropriate action immediately</td>
</tr>
</tbody>
</table>
**8.2 Sick Day Rules**

**Feeling Unwell?**

Illness can make you at risk for developing D.K.A. (Diabetes Ketoacidosis).

The following are some steps for you to take if you are unwell.

<table>
<thead>
<tr>
<th>Do not stop taking insulin, even if you are not eating!</th>
<th>Monitor Blood Glucose Every 2-4 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Check your blood glucose levels every 2-4 hours.</td>
<td><strong>Never Stop Taking Insulin</strong></td>
</tr>
<tr>
<td>• Take supplements of your fast acting insulin (Novorapid/Humalog/Lispro) as instructed.</td>
<td></td>
</tr>
<tr>
<td>• Check you urine ketone levels (each time you pass urine) or blood ketone levels every 2-4 hours</td>
<td></td>
</tr>
<tr>
<td>• If blood glucose remains high and ketone levels are positive you will need extra insulin. Give extra insulin requirements as directed by your diabetes care team.</td>
<td></td>
</tr>
<tr>
<td>• Maintain adequate fluid intake; drink at least 100mls of water every hour.</td>
<td></td>
</tr>
<tr>
<td>• If you are unable to eat take sips of sweetened fluids regularly eg: 7up, Coke ½ can 150mls Sugar/glucose in tea 2 Teaspoons Lucozade 1/3 cup 100mls</td>
<td></td>
</tr>
<tr>
<td>• Try to eat normally regardless of blood glucose levels. If you are not able to eat normally have foods easily tolerated eg. Ice cream, milky drinks or soup.</td>
<td></td>
</tr>
<tr>
<td>• Monitor for hypoglycaemia and treat as required.</td>
<td></td>
</tr>
</tbody>
</table>

**Contact you Diabetes Specialist Team (Mon-Fri 9-5pm), GP or A&E if:**

- Blood glucose and ketone levels continue to rise despite extra supplements of insulin
- You are vomiting and unable to take fluids for more than 4 hours
- Fever greater than 38°C lasting for longer than 24 hours
- You are unsure or unable to follow the above instructions
8.3 General Advice for Management of Intercurrent Illness

All patients with Type 1 Diabetes should have a copy of the ‘Sick Day Rules’.

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

**Aim for all ill patients:**
- Aim to bring blood sugars down to between 4 and 10.
- Aim to suppress urinary ketones to 'small, a trace or negative'.

<table>
<thead>
<tr>
<th><strong>Blood glucose monitoring:</strong></th>
<th>Increase to at least 2-4 hourly. Ensure that the glucose monitoring technique and equipment is accurate.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ketones:</strong></td>
<td>Test 2-4 hourly. Ketonuria is an early sign of decompensation. If acted upon promptly, it will often prove possible to avoid a hospital admission.</td>
</tr>
<tr>
<td><strong>Insulin doses:</strong></td>
<td>Do not be afraid to increase insulin. See table below for guidance.</td>
</tr>
<tr>
<td><strong>Fluid intake:</strong></td>
<td>Maintain an adequate fluid intake (sugar free) of 100 to 200 ml (ie approximately one glass) every hour. If not eating, sips of sweetened fluids are recommended.</td>
</tr>
<tr>
<td><strong>Intake of carbohydrate:</strong></td>
<td>Maintain a regular intake, regardless of blood glucose. NB it may be difficult to persuade some patients or relatives of this.</td>
</tr>
<tr>
<td><strong>Carbohydrate can be taken as fluids:</strong></td>
<td>At mealtimes, if the patient is unable to eat but is tolerating fluids, 10 grams of carbohydrate can be taken as follows:</td>
</tr>
<tr>
<td></td>
<td>• 50 ml / 2 fluid oz Lucozade.</td>
</tr>
<tr>
<td></td>
<td>• 100 ml / 4 fluid oz natural unsweetened fruit juice.</td>
</tr>
<tr>
<td></td>
<td>• 60 ml ordinary Ribena.</td>
</tr>
<tr>
<td></td>
<td>• 100 ml / 4 fluid oz ordinary Coke or Pepsi.</td>
</tr>
<tr>
<td></td>
<td>• 12 grams (2 heaped teaspoons) of Ovaltine.</td>
</tr>
<tr>
<td></td>
<td>• 200 ml / 1 cup of milk.</td>
</tr>
<tr>
<td></td>
<td>• 2 oz (approx. 50-60g) ice cream.</td>
</tr>
<tr>
<td></td>
<td>• 200 ml / 1 cup of tomato soup.</td>
</tr>
<tr>
<td><strong>Vomiting:</strong></td>
<td>If the patient is vomiting, consider an anti-emetic injection.</td>
</tr>
<tr>
<td><strong>Vomiting and/or diarrhoea:</strong></td>
<td>If the patient is vomiting and/or has diarrhoea, provide with rehydrating solution 'Dioralyte' or 'Rehidrat'. Instruct the patient/carer to reconstitute this as directed, and ask the patient to take an egg-cupful every 10 minutes.</td>
</tr>
</tbody>
</table>
8.4 Specific Instructions for Management of Intercurrent Illness

When ill but still able to eat
- Check blood glucose and urine or blood ketones before meals, at bedtime and during the night (usually 3am).
- Take usual meal rapid acting insulin, and basal insulin doses.
- Take insulin supplement doses before meals, as indicated in supplement table below.
- If ketones are present, add additional insulin supplements as instructed.
- May need to take additional rapid acting insulin at bedtime and 3am based on blood glucose and ketones levels.
- If taking extra insulin, always recheck blood glucose levels in 2-4 hours.
- Follow usual meal pattern and drink plenty of fluids
- If blood glucose and urine ketones have not decreased after two insulin doses, call the specialist diabetes team.

When ill and cannot eat
- Keep a close watch on blood glucose and urine ketones – checking every 2-3 hours
- Do not take usual meal-related doses of insulin, but instead take small amounts of rapid acting insulin as supplements every 2-3 hours based on blood glucose and urine ketones levels (see table below).
- Always take basal insulin dose.
- Maintain fluid intake by drinking small amounts of sweetened soft drinks every 30 minutes e.g.7-UP/coke (not diet drinks)
- If the above instructions are not effective, call the specialist diabetes team.

Supplement Doses – Fast Acting Insulin (for adults*)

N.B. The following tables are a guide only. Contact the Diabetes Team for advice on individual cases.

<table>
<thead>
<tr>
<th>Glucose Level</th>
<th>Before Breakfast</th>
<th>Before Lunch</th>
<th>Before Evening Meal</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4 to 6.6 mmol</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6.7 to 10.0 mmol</td>
<td>1 unit</td>
<td>1 unit</td>
<td>1 unit</td>
</tr>
<tr>
<td>10.1 to 13.3 mmol</td>
<td>2 units</td>
<td>2 unit</td>
<td>2 unit</td>
</tr>
<tr>
<td>13.4 – High</td>
<td>3 units</td>
<td>3 unit</td>
<td>3 unit</td>
</tr>
</tbody>
</table>

Insulin Dose Supplements for Ketones when ill
Check ketones when blood glucose is greater than 16.6 mmol/l

<table>
<thead>
<tr>
<th>Urine Ketone Level</th>
<th>Trace/small</th>
<th>Moderate</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Ketone Levels</td>
<td>0.6-1.5</td>
<td>1.5-3.0</td>
<td>&gt;3.0</td>
</tr>
<tr>
<td></td>
<td>1 unit</td>
<td>2 units</td>
<td>3 units</td>
</tr>
</tbody>
</table>

*For children, contact the specialist Paediatric team for advice.

Contact the specialist Diabetes team if the patient has:
- Raising blood glucose or urine ketones despite frequent insulin supplements
- Severe diarrhoea or vomiting lasting 24 hours or longer
- Illness with a temperature greater than 37.8C for 24-48 hours
- For specific advice regarding the management of children, contact the specialist paediatric team.
- If you have any queries/concerns.
8.5 Indications for Hospital Admission for Intercurrent Illness in Type 1 Diabetes

- Inability to swallow or keep fluids down
- Persistent vomiting
- Persistent diarrhoea
- Persistently raised glucose (greater than 28 mmol/l), despite increasing insulin
- Strongly positive ketonuria/ high blood ketone levels despite increasing insulin
- When ketoacidosis is clinically obvious (i.e. dehydration, abdominal pain, intractable vomiting, rapid or laboured respirations)

Remember the hospital diabetes team is there to advice. When in doubt, please phone them.

All patients should have clear 'contact criteria' and contact numbers, covering every hour of every day (GP/ GP out-of-hours service/Specialist Team/A&E).
# 9.0 Complications

**Content of Section 9:**
9.1 Diabetic Retinopathy  
9.2 The Diabetic Foot  
9.3 Renal Complications

## Key Interventions

- Annual eye screening is recommended for diabetic retinopathy in adults with diabetes and early laser treatment of those identified as having sight-threatening retinopathy can reduce the incidence of new visual impairment and blindness in people with diabetes.

- Treatment of people who have microalbuminuria with ACE inhibitors can reduce their rate of progression to diabetic nephropathy.

- Tight blood pressure and blood glucose control in people with diabetic nephropathy can reduce the rate of deterioration in their renal function, as well as their risk of cardiovascular disease.

- People with diabetes identified as being at increased risk of developing lower limb complications can reduce this risk by participating in a foot care programme that provides foot care education, podiatry and, where required, protective footwear.

- In people with diabetes who develop foot ulceration, prompt intervention can minimize their risk of subsequent disability and amputation.

- Administration of intensive insulin therapy to people with diabetes who sustain a heart attack can reduce their risk of death by 30%.

---

### 9.1 Diabetic Retinopathy

- Diabetic retinopathy is the commonest cause of blindness in the 30 to 65 year age group in Ireland and the UK at the present time.

- Development or progression of retinopathy can be prevented by:
  - Good glycaemic control
  - Management of hypertension
  - Smoking Cessation

- It is reasonable to aim for a target HbA1c of less than 6.5%, and a treatment target blood pressure of less than 130/80 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 effective if applied at an early stage when the patient is more likely to be asymptomatic; therefore screening for retinopathy is vital. Laser therapy is not always effective in all patients.

- Retinopathy can be present in up to a third of newly diagnosed type 2 diabetic patients.

- Some degree of retinopathy will also be present in the majority of patients who have had diabetes for more than 20 years, and a significant number, particularly if poorly controlled, will develop retinopathy at an earlier stage.
Eye Screening

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

- Check distance and reading vision for each eye with appropriate glasses
- Dilate all patients using Tropicamide 1%, approximately 20 minutes before viewing the fundus
- Instruct patients not to drive or operate machinery for at least 3 hours after dilation as vision may be blurred

As basic rule of thumb, a sudden deterioration or significant impairment in reading vision is an obvious warning sign. Patients presenting with this warning signs, or other reason for concern, should be referred to a consultant Ophthalmologist.

**Diabetic eye disease – referral criteria**

The following is a guide to timing recommendations for referral to an ophthalmologist:

- **Emergency**: on the same day
- **Urgent**: within one week
- **Prompt**: within one month
- **Routine**: within three months

These recommended time intervals are a guide and might vary depending on the demand on the Eye Clinic.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>No diabetic retinopathy</td>
<td>No diabetic retinopathy is present.</td>
<td>Re-screen at 12 months</td>
</tr>
<tr>
<td>Mild non-proliferative retinopathy</td>
<td>Scattered micro-aneurysms or haemorrhages Single exudates</td>
<td>Re-screen at 12 months</td>
</tr>
<tr>
<td>Moderate non-proliferative retinopathy</td>
<td>Haemorrhages and microaneurysms in at least one quadrant Cotton wool spots or venous beading in one quadrant only</td>
<td>Refer to Eye Dept. Ideally seen in less than three months</td>
</tr>
<tr>
<td>Mild diabetic maculopathy</td>
<td>Haemorrhage or isolated exudate within one disc diameter of fixation Uncorrectable reduced visual acuity</td>
<td>Refer to Eye Dept. Ideally seen in less than three months</td>
</tr>
<tr>
<td>Treatable diabetic maculopathy</td>
<td>Haemorrhage or confluent exudates within half a disc diameter of fixation Reduced visual acuity</td>
<td>Refer to Eye Dept. Ideally seen in less than one month</td>
</tr>
<tr>
<td>Severe non-proliferative (pre-proliferative) retinopathy</td>
<td>Intra-retinal microvascular abnormalities (IRMA) in one or more quadrants Venous beading in two or more quadrants Haemorrhages or micro-aneurysms in all four quadrants</td>
<td>Refer to Eye Dept. Ideally seen in less than one month</td>
</tr>
<tr>
<td>Proliferative retinopathy</td>
<td>Disc or retinal new vessels Pre-retinal haemorrhage</td>
<td>Refer to Eye Dept. Urgently</td>
</tr>
<tr>
<td>Advanced diabetic eye disease</td>
<td>Retinal detachment Fibrous tissue Vitreous haemorrhage Rubeosis irides</td>
<td>Refer to Eye Dept. Immediately</td>
</tr>
<tr>
<td>Previous photocoagulation</td>
<td>Previous photocoagulation scars</td>
<td>Refer to Eye Dept. (ideally in less than three months) unless patient is already under their care</td>
</tr>
</tbody>
</table>
9.2 The Diabetic Foot

The professional titles of ‘Podiatry’ and ‘Chiropody’ are interchangeable. However the term ‘podiatry’ is more commonly used worldwide therefore this document will use this title.

Aims of Diabetes Foot care

- To provide all diabetic patients and/or carers with education on foot care
- To ensure that all patients receive an annual foot examination including risk stratification
- To facilitate healing of established lesions and subsequent prevention of recurrence
- To provide a service whereby patients are referred appropriately to members of a specialist team according to level of risk
- The overall aim and priority should be to prevent adverse outcomes such as infection, ischaemia, ulceration and amputation through the means outlined above.

Basic Examination of the Diabetic Foot

- **Inspection:**
  Careful inspection of both feet, including in between the toes, should be undertaken with note made of any deformity, callus, or change in the colour of the skin. Inspection of the patient’s footwear should also be undertaken.

- **Neurological Assessment:**
  Monofilament test (Cutaneous pressure perception):
  Nylon monofilaments are constructed to buckle when a 10-g force is applied. Loss of the ability to detect this pressure at one or more anatomic sites on the plantar surface of the foot has been associated with loss of large-fiber nerve function. It is recommended that four sites (1st, 3rd, and 5th metatarsal heads and plantar surface of distal hallux) be tested on each foot.

  ⇒ Apply a 10 g Semmes-Weinstein monofilament at four plantar sites on each foot.
  ⇒ With eyes closed, the patients are required to elicit a ‘yes/no’ response to monofilament pressure and correctly identify the site of contact.
  ⇒ The filament is placed against the plantar surface of the foot in a perpendicular fashion so that it buckles (c shape) with a constant force.
  ⇒ It should be held in place for 1 second and then released.

  **Tuning Fork:**
  An additional way of testing sensation is to assess vibration sensation use a tuning fork. A useful method is to let the patient appreciate the vibration on the sternum or wrist and then ask them to compare the same stimulus applied to the 1st metatarsophalangeal joint or medial or lateral malleolus.
• **Vascular Assessment**
  Assessment of Pedal Pulses: Dorsalis Pedis and Posterior Tibial.
  A second examiner should ideally confirm absence of foot pulses. If possible a doppler waveform examination or the ankle-brachial pressure index should be recorded in patients with absent pulses. Refer to vascular specialist if more detailed assessment is required.

**Criteria for referral to vascular assessment:**

<table>
<thead>
<tr>
<th>Non Urgent</th>
<th>Urgent (Critical limb ischaemia)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent foot pulses</td>
<td>ABPI ratio &lt; 0.5</td>
</tr>
<tr>
<td>ABPI ratio &lt; 0.7</td>
<td>Toe pressure &lt; 30mmHg</td>
</tr>
<tr>
<td>Toe pressures less than 40mmHg</td>
<td>TcPO2 &lt; 30mmHg</td>
</tr>
<tr>
<td>(some Podiatrists can perform toe</td>
<td></td>
</tr>
<tr>
<td>pressure assessments)</td>
<td></td>
</tr>
</tbody>
</table>

**Risk Categorization**

Patients should be categorized according to the presence of the following signs and symptoms (adapted from the Midlands Diabetes Structured Care Programme)²²:

- Normal sensation **AND**
  - Good pulses **AND**
  - No previous ulcer **AND**
  - No foot deformity **AND**
  - Normal vision

- Loss of sensation **OR**
  - Absent pulses (or previous vascular surgery) **OR**
  - Significant visual impairment **OR**
  - Physical Disability (e.g. stroke or gross obesity)

- Previous ulcer due to neuropathy or ischaemia **OR**
  - Absent pulses and neuropathy **OR**
  - Callus with risk factor (neuropathy, absent pulse, foot deformity) **OR**
  - Previous amputation

- Active foot ulceration **OR**
  - Painful neuropathy which is difficult to control. **OR**
  - Suspected or confirmed Charcot Foot

<table>
<thead>
<tr>
<th>LOW RISK</th>
<th>MODERATE RISK</th>
<th>HIGH RISK</th>
<th>ACTIVE FOOT DISEASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• No specific need for regular Podiatry input (except in exceptional circumstances)</td>
<td>Regular (4-12 weekly) general Podiatry input advised. For patients with visual impairment or physical disability, who should otherwise fit into the low risk category</td>
<td>Podiatrists with interest and expertise, either in a diabetes unit or the community. Podiatrists may want to consider orthotic referral.</td>
<td>Urgent referral to hospital based diabetes team</td>
</tr>
<tr>
<td>• Patients can undertake their own nail care after appropriate education.</td>
<td>Annual foot check</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

51
In addition, patients with any of the following sign of ischaemia or severe infection should be considered for emergency referral to the hospital surgical receiving service or diabetic foot clinic, where appropriate.

<table>
<thead>
<tr>
<th>Critical Ischaemia</th>
<th>Severe Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Rest or night pain</td>
<td>• Abscess</td>
</tr>
<tr>
<td>• Pale/ Mottled Feet</td>
<td>• Cellulitis</td>
</tr>
<tr>
<td>• Dependant rubor</td>
<td></td>
</tr>
<tr>
<td>• Ischaemic ulceration</td>
<td></td>
</tr>
<tr>
<td>• Gangrene</td>
<td></td>
</tr>
</tbody>
</table>

**Management of the Diabetic Foot**

After staging the foot, apply the principles of good foot care appropriate for that particular stage. These include A) Educational Control, B) Mechanical Control, C) Wound Control, D) Microbiological Control, E) Vascular Control, F) Metabolic Control.

**A. Educational Control**

The principles of diabetes foot care should be reinforced regularly. See appendix for advice sheet.

**B. Mechanical Control**

- Callus should be recognised as a sign of excess (weight-bearing) pressure on that part of the foot; it requires Podiatry treatment and a review of footwear for proper management.
- Effective off-weight-bearing is the mainstay of treatment.
- Casting and fitting of orthotics should only be undertaken by members of a specialist team.
- Pressure ulcers of the heels are more common in patients with diabetes and care should be taken to protect these areas during prolonged bed rest.

**C. Wound Control**

- Regular debridement of callus and slough by an experienced Podiatrist is an important part of good wound care for the neuropathic ulcer. Debridement of the neuroischaemic ulcer should be undertaken only with great caution.
- In general a moist wound environment with a protective dressing to minimise trauma and contamination facilitates healing.
- A wide range of dressings are available.

**D. Microbiological Control**

- Antibiotic therapy should ideally be guided by the results of cultures. However, empirical therapy is often required initially.
- For more severe infections consider referral for intravenous antibiotics.
- If there is evidence, either clinical (e.g., probing to bone) or radiological, of osteomyelitis then a six week course of antibiotics should be considered.

**E. Vascular Control**

- If foot pulses are absent then assessment of the ankle-brachial pressure index (ABPI) or Doppler signals may be informative as to the potential to heal a neuroischaemic ulcer.
- If a neuroischaemic ulcer fails to heal despite good wound care then referral for a vascular opinion should be considered. Rest pain is another indication for referral in this setting although frequently the presence of neuropathy means that a critically ischaemic diabetic limb may be painless.
Infection can spread with alarming rapidity in the neuroischaemic foot and careful attention should be paid to microbiological control.

F. Metabolic Control

- Good glycaemic control is essential to effect wound healing and many tablet-treated patients end up converting to insulin during a period of foot ulceration.
- The effects of off-weight bearing can lead to worsening of obesity and deterioration in metabolic control. Acknowledgement of this with the offer of a dietary review is important.
- Poor glycaemic control can also result from intercurrent infection particularly in the neuroischaemic foot.

Distinguishing Neuropathic and Ischaemic Foot Ulcers

Clinical features that distinguish neuropathic and ischaemia foot ulcers:

<table>
<thead>
<tr>
<th>Sign/Symptom</th>
<th>Neuropathic Ulcer</th>
<th>Ischaemic Ulcer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Usually Painless</td>
<td>Pain may be relieved by hanging legs down</td>
</tr>
<tr>
<td>Location</td>
<td>Commonly seen on plantar surface of foot</td>
<td>Commonly located at edges of foot or on the digits</td>
</tr>
<tr>
<td>Skin temperature</td>
<td>Warm foot</td>
<td>Cool foot</td>
</tr>
<tr>
<td>Foot pulses</td>
<td>Bounding</td>
<td>Absent or weak</td>
</tr>
<tr>
<td>Callus formation</td>
<td>Often present especially on plantar surfaces</td>
<td>Absent</td>
</tr>
</tbody>
</table>

Patients whose feet have a high risk of ulceration or gangrene need support and education about foot care. These measures can reduce amputation rates by 30-50% and early referral of patients with ulcers, along with those who have a history of ulcers, to a podiatrist is essential.

The Charcot Foot

This poorly understood entity amounts to a neuroarthropathy and occurs in patients with loss of sensation, in particular loss of proprioception. In its early phase the foot demonstrates warmth, swelling and occasionally discomfort. If the problem is not identified early, bone and joint destruction can occur with resultant deformity and increased risk of ulceration. Complete off-weight-bearing in a total contact cast is the treatment of choice in the early phase of a Charcot foot. Bisphophonates such as pamidronate are increasingly used to improve healing.

- Consider a Charcot foot in a patient known to have neuropathy who develops redness, swelling and/or discomfort associated with a skin temperature difference between the two feet.
- Confirm by foot x-ray. Isotope bone scanning may be necessary particularly in the early stages of the Charcot process when plain x-ray may be normal.
- Refer to a specialist foot department for further evaluation and treatment with total contact casting and pamidronate.
Painful Diabetic Neuropathy

- The majority of patients who have diabetic peripheral neuropathy have no symptoms in the feet.
- Some patients develop painful neuropathy. This can be localised to the area of one nerve (e.g. amyotrophy affecting the femoral nerve with pain and hyperaesthesia in the thigh) or it can be generalised.
- Attempts to improve metabolic control are important but the patient should be told that this might be associated with worsening of pain initially.
- Amitriptyline, administered at night, is usually used as first-line therapy for painful neuropathy. Gabapentin is an alternative to amitriptyline.
- Useful information for patients with diabetic neuropathy is available through The Neuropathy Trust, a charitable organization providing support and education to patients and healthcare professionals. (website: www.neuropathy-trust.org)
9.3 Renal Complications

- Diabetic nephropathy is detected clinically by the presence of microalbuminuria or proteinuria.
- The time course to nephropathy is usually 15 to 25 years following onset of diabetes.
- The course might appear shorter in type 2 patients, because diabetes might have been present but undiagnosed for several years.
- Development of renal disease is facilitated by poor glycaemic control, hypertension and smoking.
- Early detection and effective treatment can slow the progression of nephropathy; therefore, screening is vital.
- The possibility of non-diabetic renal disease should be considered if atypical features, including haematuria and absence of retinopathy, are present.

Natural Course of Diabetic Renal Disease

**Stage 1:** Normal urinary albumin excretion rate;
Normal serum creatinine.

**Stage 2:** Increased urinary albumin excretion rate (microalbuminuria);
Dipstick-negative for proteinuria;
Normal serum creatinine.

**Stage 3:** Dipstick-positive proteinuria;
Serum creatinine normal or minimally elevated.

**Stage 4:** Progressive decline in renal function;
Rising serum creatinine;
 Might have nephrotic syndrome.

**Stage 5:** End-stage renal failure

Microalbuminuria and Proteinuria

- Microalbuminuria refers to urine albumin concentrations that are below the limit of detection of routine urine dipsticks (i.e. dipstick-negative proteinuria).
- Proteinuria refers to urine albumin concentrations that are detectable by routine dipsticks (i.e. dipstick positive)
- In Type 1 diabetic patients, microalbuminuria (which initially is intermittent) is a marker of early nephropathy.
- In Type 2 diabetic patients, microalbuminuria correlates with macrovascular disease and underlying hypertension and is a marker for nephropathy.
- Microalbuminuria in Type 2 diabetes should be viewed as an additional cardiovascular risk factor. Co-existing coronary heart disease risk factors should be treated aggressively in Type 2 diabetic patients who are microalbumin positive.
- In both types of diabetes, aggressive anti-hypertensive therapy and improved diabetic control (target HbA1c less than or equal to 6.5%) can retard the progression of nephropathy.
Who should be tested for renal disease?

- All patients should have microalbuminuria testing annually if they are dipstick negative for protein.
- The albumin to creatinine ratio (ACR) is the best way of screening for microalbuminuria and can be done on a first-voided morning urine sample in a clean universal container.
- Samples should not be sent from patients who have evidence of UTI (nitrite positive) or who display dipstick positive proteinuria or haematuria.
- An elevated ACR should be confirmed on two separate occasions. Microalbuminuria = ACR >2.5 mg/mmol in men, >3.5 mg/mmol in women.

Interpretation of results

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Albumin to creatinine ratio (ACR)</th>
<th>Albumin excretion rate (AER) ug/min</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>Less than 2.5</td>
<td>Less than 20</td>
<td>Repeat testing annually</td>
</tr>
<tr>
<td>Microalbuminuria</td>
<td>Between 2.5 - 30</td>
<td>Between 20 - 200</td>
<td>Repeat test three times</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Exclude sepsis in urine</td>
</tr>
<tr>
<td>Proteinuria</td>
<td>Greater than 30</td>
<td>Greater than 200</td>
<td>Perform 24-hr collection to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>quantify</td>
</tr>
</tbody>
</table>

How to do a timed 24-hour urine collection to measure creatinine clearance

NB: Routine testing for microalbuminuria should be performing by sending spot urine samples for ACR testing. Occasionally, 24-hour urine collections may be requested, in order to confirm a diagnosis.

1. Empty the bladder at the beginning of the collection period. Discard this urine. Note the time.
2. Collect all urine passed (including overnight) during the subsequent 24 hours.
3. Exactly 24 hours after the start of the collection, empty the bladder and include this urine in the collection.
4. Take blood for creatinine during the 24-hour period.

Diabetic Renal Disease - Management

A. Improve glycaemic control:

Aim for target HbA1c of 6.5%

B. Encourage smoking cessation:

Offer support and referral to a Smoking Cessation counsellor if available. Consider Nicotine Replacement Therapy or other newer agents.

C. Drug therapy for albuminuria:
In the absence of hypertension, once albuminuria is confirmed, all patients should be started on an ACE inhibitor. This should be started at low dose and titrated up to the maximum or maximum tolerated dose* as quickly as possible. If ACE inhibitors are not tolerated, then an Angiotensin receptor blocker (ARB) should then be used instead.

U&E levels should be checked within a week of commencing an ACE or an ARB blocker. A rise of 30% in serum creatinine is acceptable on an ACE as long as it stabilizes. Potassium levels should also be watched.

Once the maximum dose of either agent is achieved, then albuminuria should be rechecked.

If the level of albuminuria is not improved, or continues to deteriorate, then the combination of an ACE I and ARB should be considered. Once again the second agent should be started at the lowest dose possible and then titrated up to the maximum or maximum tolerated dose*.

Combination therapy with an ACE I and ARB have been shown to improve proteinuria and loss of renal function in non-diabetic renal disease. Care needs to be taken to monitor potassium levels in these patients.

<table>
<thead>
<tr>
<th>CKD Stages23</th>
<th>GFR &gt;60 Stages 1 + 2 CKD</th>
<th>GFR 30 – 59 Stage 3 CKD</th>
<th>GFR &lt; 30 Stages 4 + 5 CKD</th>
</tr>
</thead>
</table>

D. Protein restriction:

In addition to drug therapy, protein restriction to moderate levels (0.8 to 1.0 g/kg/day) may be attempted in advanced disease (GFR < 30).

Severe restriction should not be attempted.

In adults, there are various methods that may be used to estimate GFR:

Cockcroft-Gault equation is often used as a method of estimating GFR (although it was developed as a method of predicting creatinine clearance) from knowledge of serum creatinine, age and weight:

- For women multiply the result of calculation by 0.85. The calculation is unreliable if the patient has unstable renal function is very obese, or is oedematous.

An alternative is the 4-variable Modification of Diet in Renal Disease (MDRD) equation (1):

- GFR (ml/min/1.73m2) = 186 x \{[serum creatinine (µmol/l)/88.4] ^-1.154\} x age (years) ^-0.203
  - x 0.742 if female and x 1.21 if African-Caribbean

For an online GFR calculator see [http://www.renal.org/eGFRcalc/GFR.pl](http://www.renal.org/eGFRcalc/GFR.pl)
E. Management of hypertension

- When hypertension is present, aggressive control should be attempted aiming for target BP of 120/70. Multiple agents will usually be required to achieve these targets.
- First line therapy should be with an ACE I and ARB in combination with a loop diuretic*.
- Further agents may need to be added and if a Ca channel blocker is used then amlodipine or felodipine are preferable because they may have an additional renoprotective action.

- Part of blood pressure control should involve dietary Na restriction to less than 100 mmol/day.
- Caution: In addition, there is high risk of concomitant reno-vascular disease in these patients and, therefore, check the serum creatinine two weeks after commencing treatment. If there is a rise in creatinine, the medication should be discontinued and the patient referred to the Diabetic nephropathy clinic.

F. Cardiovascular risk factors

In all patients co-existing cardiovascular risk factors should be managed aggressively.

- Low-dose aspirin: All patients should be commenced on low-dose aspirin (or clopidogrel if aspirin is contra-indicated).
- Statin: All patients should be commenced on a statin as primary prevention for cardiovascular disease regardless of cholesterol levels. When statins are used, target treatment level should be cholesterol less than 4.5 mmol/l or a 25% reduction in cholesterol.

* Maximum tolerated dose: The main problems limiting a dosage increase in aggressive management are hypotension and hyperkalaemia. Little can be done for hypotension other than dose restriction. However hyperkalaemia should be managed through a combination of dietary restriction of potassium (less than 60 mmol/day) and addition of a loop diuretic to waste potassium.

Criteria for Referral of Patients with Raised ACR to Hospital Clinics

Albumin : Creatinine Ratio = ACR

**Persistently raised ACR:** Collect 24-hr urine, request creatinine clearance.

**Creatinine clearance normal:** Follow up 6-monthly by GP.

**Creatinine clearance less than 60 and creatinine less than 220:** Refer to Diabetes Clinic

**Creatinine clearance less than 30 and creatinine greater than 220** Refer to urgently to Specialist Diabetes Clinic
10.0 Cardiovascular Disease

Content of Section 10:
10.1 Dyslipidaemia
10.2 Hypertension

10.1 Dyslipidaemia

The full fasting lipid profile should be checked at the annual review.

- 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 cardioprotective effect as in non-diabetic individuals.
- The characteristic dyslipidaemia of Type 2 diabetes is mild hypercholesterolaemia low HDL-cholesterol and hypertriglyceridaemia.
- Triglyceride concentrations are elevated by poor diabetic control. Triglycerides can normalise with good diabetic control, attention to diet and increasing exercise. Otherwise, drug treatment might be indicated.

Management of Abnormal Lipids

Lifestyle Advice

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

Exclude (and treat) secondary causes of hypercholesterolaemia

- Hypothyroidism
- Nephrotic syndrome
- Cholestasis
- Drugs (e.g. diuretics, corticosteroids)

Drug treatment

N.B. The International Diabetes Federation recommend Statin therapy at a standard dose for all patients with Type 2 diabetes >40 yr old, unless contraindicated.  

Secondary Prevention (Patients who have existing cardiovascular disease):

- Includes diabetic patients who have angina, myocardial infarction, cerebrovascular disease and peripheral vascular disease.
• Treat with a ‘statin’ if total cholesterol is greater than 4 mmol/l.
• All patients should receive aspirin unless contraindications are present.

**Primary Prevention (Patients who do NOT have cardiovascular disease):**

• An aggressive approach to lipid lowering is recommended in all diabetic patients because of their underlying risk of developing coronary heart disease.
• The International Diabetes Federation recommend Statin therapy at a standard dose for patients with Type 2 diabetes >40 yr old.
• Type 1 and Type 2 patients who have evidence of nephropathy (microalbuminuria or proteinuria present) should be regarded as candidates for secondary prevention. Treatment with a statin is recommended if total cholesterol is greater than 4 mmol/l.
• Consider this approach also in Type 1 patients who have a family history of premature ischaemic heart disease.
• In all other patients, the absolute risk of developing coronary heart disease over 10 years can be calculated using the European Cardiology Society SCORE Risk Chart
• Treatment with a Statin is recommended when the 10-year risk of an event is greater than 15%. Consider treatment at a lower risk threshold in Type 1 patients who do not have nephropathy, because the true coronary heart disease risk might be under-estimated by the chart.
• Consider adding Aspirin in patients who display sufficient risk to warrant lipid lowering therapy especially those with microalbuminuria and well-controlled hypertension and are aged over 50 years.

**In patients with persistently raised triglyceride concentrations:**

• Check fasting sample (total-cholesterol, HDL-cholesterol and triglycerides)
• Optimise glycaemic control
• Exclude co-existing pathology e.g. alcohol-related liver disease

**Lipid lowering Drugs**

Considering measuring ALT and creatinine kinase before initiating therapy. Drug choice should be made on the balance of trial evidence, safety and cost effectiveness:

**Statins**

• First-line choice for isolated hypercholesterolaemia or combined hyperlipidaemia, providing (random) triglycerides are less than 5 mmol/l.
• Target treatment level should be cholesterol less than 4.5 mmol/l or a 25% reduction in cholesterol.
• Monitor liver function at 3 months, 6 months, then annually.
• Monitor creatinine kinase if symptomatic of myositis.
**Fibrates**

- Consider if combined hyperlipidaemia present (random triglycerides greater than 5 mmol/l) or if HDL is less than 1.0.
- Not advisable in the presence of renal impairment (serum creatinine greater than 150 µmol/l).
- Combination therapy with a statin is possible, but specialist advice should be sought.
- Consider referral to Lipid clinic

---

### Lipid Therapy

#### Summary of Thresholds and Targets for Type 1 and Type 2 Diabetes

**Secondary prevention:**

**Threshold for treatment:** Cholesterol: greater than 4.0.

**Target:** Cholesterol less than 4.5 mmol/l or a 25% reduction in cholesterol.

**LDL cholesterol < 2.5 mmol/l.**

**Primary prevention:**

**Threshold for treatment** assessed using the European Cardiology Society SCORE Risk Chart³ (Appendix A). Intervention with a statin is recommended if 10-year risk of an event is greater than 15%.

Note: Risk estimation should not be performed in patients who have existing cardiovascular disease or type 1 and type 2 patients who have nephropathy.

Statin treatment is now recommended for all people with Type 2 diabetes over 40 yr of age, unless contraindicated.²

**Target** (as above): Cholesterol less than 4.5 mmol/l or a 25% reduction in cholesterol.
10.2 Hypertension

Hypertension and 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.

Hypertension and Type 2 diabetes

- 40 to 50% of patients who have type 2 diabetes have hypertension at the time of diagnosis.
- Hypertension accelerates the decline in renal function in established nephropathy.

Management of Hypertension in Diabetes

Confirm the Diagnosis

- If hypertension is sustained or severe (greater than 200/110 mm Hg) or there is target organ damage, institute therapy within 1 to 2 weeks.
- If blood pressure is greater than 160/100 but less than 200/110, confirm over 3 to 4 weeks and start treatment.
- If blood pressure is greater than 140/90 but less than 160/100, confirm over 12 weeks and start treatment.
- All hypertensive patients should receive lifestyle advice.

Treatment

- ACE Inhibitors are first-line choice.
- Angiotensin II receptor blockers (ARBs) can be used if ACE Inhibitors produce adverse effects e.g. cough.
- ARBs can be used in combination with ACEI where necessary to control BP. Care needs to be taken to monitor potassium levels in these patients.
- Other drugs may be used, and choice should be tailored to individual patient needs. See note below*.
- Polypharmacy is likely: 30% of type 2 diabetics will require three or more drugs to achieve target blood pressure.

*Note: Updated NICE/BHS Guidelines state that beta-blockers are not a preferred initial therapy for patients with hypertension.24 No specific guidance has been given for patients with diabetes and hypertension, While awaiting specific guidance a reasonable approach would be (a) not to stop beta blockers in those patients who are already on them but (b) not to use them as first, second or third line therapy in patients with newly diagnosed hypertension.

Use of ACE Inhibitors for hypertension in diabetes

- Consider the presence of renal artery stenosis in patients with Type 2 diabetes.
- Suspect underlying Reno vascular 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 to 7 days, again after three months and thereafter annually.
• Stop the drug if significant hypotension or a significant rise in creatinine occurs (greater than 50% from baseline).
• Refer, or discuss with secondary care physician, if in doubt.

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

Combination Therapy
• Less than half of patients who have 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.
• Patients who are difficult to control may benefit from an angiotensin II antagonist (replacing the ACE inhibitor if necessary) and spironolactone.

Hypertension treatment: Summary of Thresholds and Targets for Type 1 and Type 2 Diabetes

<table>
<thead>
<tr>
<th>Threshold for treatment:</th>
<th>The threshold for anti-hypertensive therapy is BP greater than 130/80 mm Hg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target:</td>
<td>The target BP is less than 130/80 mm Hg, in the absence of nephropathy.</td>
</tr>
<tr>
<td></td>
<td>• In patients who have nephropathy or proliferative retinopathy, ACE Inhibitors are first-line therapy; a target BP of less than 120/70 mm Hg is ideal, although frequently difficult to achieve.</td>
</tr>
<tr>
<td></td>
<td>• Any decrease in BP towards target levels is beneficial.</td>
</tr>
</tbody>
</table>

Management in the Elderly (age 75 years plus)
• 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 should be relaxed: target BP less than 150/85.

Management of Isolated Systolic Hypertension
• Defined as systolic blood pressure (SBP) greater than 160 mm Hg with diastolic blood pressure (DBP) less than 90 mm Hg.
• Common in middle-aged and elderly patients with Type 2 diabetes.
• Consider long-acting calcium-channel blockers or low-dose thiazides diuretics for initial drug choice.

Referral criteria for hypertension
• Those for whom there has been a rise in serum creatinine greater than 50% from the baseline after ACE inhibitor started.
- Those in whom BP is difficult to control despite appropriate therapy or use of four drugs.
- Refer to Diabetes or Nephrology Clinic – see nephrology section.

**Prescribing advice for hypertension**
- Combination to be avoided: Beta-blocker with verapamil or diltiazem
- Combination to be used with caution: Potassium-sparing diuretic with ACE Inhibitor

**Recommended anti-hypertensive drug classes (with examples)**

<table>
<thead>
<tr>
<th>Drug Class</th>
<th>Initial Dose</th>
<th>Maintenance dose range</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE Inhibitors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Captopril</td>
<td>12.5 mg BD</td>
<td>25 to 50 mg BD.</td>
</tr>
<tr>
<td>Enalapril</td>
<td>5 mg OD</td>
<td>10 to 40 mg OD</td>
</tr>
<tr>
<td>Lisinopril</td>
<td>2.5 mg OD</td>
<td>10 to 40 mg OD</td>
</tr>
<tr>
<td>Perindopril</td>
<td>2 mg OD</td>
<td>4 to 8 mg OD</td>
</tr>
<tr>
<td>Quinapril</td>
<td>10 mg</td>
<td>20 to 40 mg OD (40 mg BD may be used).</td>
</tr>
<tr>
<td>Ramipril</td>
<td>1.25mg</td>
<td>2.5 to 10mg OD</td>
</tr>
<tr>
<td>Trandolapril</td>
<td>500mcg OD Increased at intervals of 2-4 weeks.</td>
<td>1-4mg OD</td>
</tr>
<tr>
<td>Angiotensin II receptor antagonists</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Losartan</td>
<td>50mg OC</td>
<td>50-100mg OD</td>
</tr>
<tr>
<td>Irbesartan</td>
<td>-</td>
<td>75 to 300mg</td>
</tr>
<tr>
<td>Candesartan</td>
<td>-</td>
<td>4 to 16mg</td>
</tr>
<tr>
<td>Valsartan</td>
<td>80mg OD</td>
<td>80 to 160mg OD</td>
</tr>
<tr>
<td>Telmisartan</td>
<td>20 to 40 mg OD</td>
<td>80mg OD</td>
</tr>
<tr>
<td>Telmisartan</td>
<td>increased if necessary after at least 4 weeks</td>
<td>80mg OD</td>
</tr>
<tr>
<td>Olmesartan</td>
<td>10mg OD. Increased to 20 mg OD</td>
<td>40mg. Elderly max = 20mg</td>
</tr>
<tr>
<td>Calcium-channel blockers (long-acting dihydropyridine)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amlodipine</td>
<td>5mg OD</td>
<td>5 to 10mg OD</td>
</tr>
<tr>
<td>Felodipine MR</td>
<td>5mg OD</td>
<td>5 to 10 mg OD</td>
</tr>
<tr>
<td>Nifedipine LA</td>
<td>30mg OD. Use once daily preparations</td>
<td>30 to 60 mg OD</td>
</tr>
<tr>
<td>Rate-lowering calcium-channel blocker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diltiazem</td>
<td>Use OD preparations. Check BNF for full range of available preparations</td>
<td></td>
</tr>
<tr>
<td>Verapamil</td>
<td>Use OD preparations. Check BNF for full range of available preparations</td>
<td></td>
</tr>
<tr>
<td>Thiazide diuretic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bendroflumethiazide</td>
<td>1.25mg to 2.5mg OD</td>
<td>1.25mg to 2.5mg OD. Measures to conserve K+ are not usually required, but check K+ 4 to 6 weeks after starting treatment</td>
</tr>
<tr>
<td>Potassium Sparing Diuretic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spironolactone</td>
<td>25mg OD</td>
<td>50mg OD. Check potassium one week after starting treatment</td>
</tr>
<tr>
<td>Beta blocker (cardioselective)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atenolol</td>
<td>25mg OD</td>
<td>25 to 50 mg OD</td>
</tr>
<tr>
<td>Bisoprolol</td>
<td>5mg OD</td>
<td>10 to 20 mg OD</td>
</tr>
<tr>
<td>Alpha-blocker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doxazosin XL</td>
<td>4mg</td>
<td>8mg XL</td>
</tr>
</tbody>
</table>
11.0 Childhood and Adolescence: Diabetes

Content of Section 11:
11.1 Aims of Diabetes Care in Children and Adolescents
11.2 Insulin Regimens
11.3 Monitoring
11.4 Alcohol
11.5 Sex
11.6 Drugs
11.7 School

11.1 Aims of Diabetes Care in Children and Adolescents:
- Promote physical and psychological well being.
- Ensure normal growth and development.
- Avoid hospitalisation.
- Achieve good glycaemic control to prevent long-term microvascular complications.
- Ensure adequate screening for the detection of complications.
- Support age-appropriate self management.
- Integrate the patient into the normal school, social and working life of people in their age group.

11.2 Insulin Regimens
- Most children and adolescents are initially managed with twice daily injections premixed insulin before breakfast and the evening meal.
- Multiple injection regimes are introduced if unable to achieve glycaemic control on Pre-mixed insulin regime.
  Three-injection regimes are popular with injections at:
  - Breakfast (mixed)
  - Teatime (fast)
  - Bedtime (isophane)
- Once-daily insulin regimes are not appropriate because they can neither achieve the degree of glycaemic control necessary to prevent long-term complications nor provide the flexibility to accommodate the child or adolescents hectic lifestyle.
- Most teenagers are managed on multiple injection regimens (either three or four times a day) because this allows greater freedom in the timing and quantity of meals and facilitates participation in sport and other recreational activities.

All parents and families of children and adolescents who have diabetes should have copies of the Sick Day Rules, and education regarding management of intercurrent illness is should be reinforced regularly. Contact numbers for Diabetes Team/GP/A&E Department should be given.

11.3 Monitoring
- Home blood glucose monitoring is the method of choice.
- Patients are encouraged to perform sufficient tests to be confident of their control (usually two to three per day) and to record results in a log book.
- Many teenagers dislike blood monitoring and a heavy-handed approach can lead to conflict and clinic non-attendance. Diabetes Care Teams need to encourage teenagers to test and agree an acceptable amount of blood tests together.
- Home urine testing has no role in the management of diabetes except in the measurement of urinary ketones during intercurrent illness – when it is mandatory. Most young people who have diabetes can now test blood ketones on their blood glucose meters.

### 11.4 Alcohol

- Most young people who have diabetes use alcohol to the same extent as others, and this can have serious consequences.
- Alcohol excess can lead to weight gain and deterioration in glycaemic control, but in the acute situation it can have more serious effects.
- Alcohol excess is the commonest identifiable cause of ketoacidosis in male teenagers.
- Alcohol consumption is also a major contributing factor towards hypoglycaemia and has been implicated in sudden unexplained nocturnal death in young people.
- A complete ban on alcohol is likely to be ignored and sensible advice regarding moderate and safe consumption should be given.
- Encourage young people who do drink to drink with a friend who knows they have diabetes and how to treat a hypoglycaemic episode.
- Advise teenagers to eat at least 30 grams of carbohydrate before going to bed on nights when having alcohol.

### 11.5 Sex

- Unplanned pregnancies still occur regularly in young diabetic females.
- Contraception and pregnancy should be routinely discussed because of the deleterious effect of poor glycaemic control on foetal development.

### 11.6 Drugs

- Illicit drug use is no more common in the adolescent diabetic but use of illicit drugs in diabetes can result in potentially serious adverse metabolic consequences.
- Ecstasy has been associated with severe dehydration and the development of ketoacidosis.

### 11.7 School

Children who have diabetes should not have to miss more school (apart from visits to the clinic) than any other child. They can undertake all normal activities and their academic and sporting achievements should not be diminished.

The class teacher should be aware of the diagnosis and should understand the following:

- The need for mid morning and afternoon snacks as appropriate.
- How to recognise and treat hypoglycaemia.
- Sport should be encouraged with the usual precautions.
- The Diabetes Federation of Ireland and many local diabetes centres provide a School Pack for teachers with advice on the care of children with diabetes in the school setting.
12.0 Women and Diabetes

Content of Section 12:
12.1 The Pregnant Woman with Diabetes
12.2 Gestational Diabetes
12.3 Contraception and Diabetes
12.4 Hormone Replacement Therapy and Diabetes

12.1 The Pregnant Woman with Diabetes

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

Pre-pregnancy Care

- Identify possibility of pregnancy annually by direct questioning of all fertile woman of child-bearing age with diabetes. Provide RELIABLE contraceptive advice where appropriate.

Pre-Pregnancy Checklist for women with diabetes mellitus

- Plan pregnancy, including Rubella Screen, this will take 3-6 months...
- Use contraception until HbA1C is normal...
- Smoking Status and Advice...
- Alcohol Status and Advice...
- Dietetics review...
- Blood glucose monitoring at least 4 times per day...
- Blood glucose targets of F<5.3, 1h PP< 7.8, 2h PP<6.7 mmol/l...
- Weight, Height, BMI...
- Review Diabetes control (HbA1C)...
- Review Renal Function (ACR, U & E)...
- Retinal Screen...
- Review Medications. Stop Statin, Fibrate, ACE, ARB...
- If BP control is necessary, use Methyldopa/Nifedipine...
- Folic acid 5mg od for at least 12 weeks...
- If taking oral hypoglycaemic agents, will need transfer to insulin...
- Discuss Hypoglycaemia and management...
- Encourage early booking to ANC...
- If GDM was present in previous pregnancy re-screen with OGTT...
- Refer to local Diabetes Service for extended pre-pregnancy service...
Pre-Pregnancy Assessment

- Refer to the Diabetes Specialist Team for assessment and pre-pregnancy education.
- See patients with their partner if possible and provide them with written information.
- Take a full medical, obstetrical and gynaecological history.
- Review current medication. Note ACE inhibitors, ARB’s, statins should be discontinued
- Prescribe folate 5 mg daily for at least 12 weeks pre-conception and during first trimester.
- Assess for presence of diabetic complications and treat blood pressure if required. (Use methyldopa, nifedipine MR, labetalol for optimization of blood pressure control of less than 130/80mmHg.)
- Monitor ACR
- Check HbA1c, rubella antibody status, thyroid biochemistry, Liver and renal function, bone profile, FBC and urinalysis.
- Organise ophthalmology appointment for baseline review
- Advise on diet and weight reduction if relevant, strongly discourage smoking and advise on alcohol.
- 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 for three months prior to pregnancy.
- Instruct partners to recognise and manage hypoglycaemia. Educate regarding the use of the glucagen kit and ensure that an in-date kit is provided.
- In women who have type 2 diabetes, initiate insulin in those receiving oral hypoglycaemic agents or in whom it is not possible to obtain good control with diet alone and exercise (because OHAs are contra-indicated in pregnancy).
- Women who are well-controlled in their diabetes and free of complications can be advised to stop contraception and to keep a record of periods. (NB Reliable contraception should not be stopped until glycaemic control is optimized)
- Other women might require additional time to optimise glycaemic control or to have investigation and treatment of complications.
- Advise patients to perform a pregnancy test if there is a lapse of five weeks between periods and contact a diabetes specialist nurse soon after obtaining a positive result.
- Discuss complications in pregnancy due to Diabetes e.g. Macrosomia, Late stillbirth, congenital abnormalities, insulin treatment in labour. Complications that may arise in the newborn e.g. hypoglycaemia, hypocalcaemia and jaundice etc., possibility the baby will require transfer to the Neonatal Unit and breastfeeding management of insulin.

Ante-Natal Care

Ante-natal care for women with diabetes should be hospital-based.

The following points apply to managing diabetes in pregnancy:

- Individualise insulin regimens and recommend 7 times daily glucose monitoring.
- Aim to maintain glucose 4 to 7 mmol/L and HbA1c Less than 6%.
- Remember insulin requirements increase progressively (by two to three times) 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, especially at night and early morning. Hypoglycaemia does not appear to have long-term adverse effects on foetal development. Ketoacidosis can cause foetal death at any stage and may occur with only slightly abnormal blood sugars. All women should test urine for ketones if their blood glucose is high, if vomiting occurs or if they are unwell. Retinopathy and nephropathy can deteriorate during pregnancy, therefore, retinal observation and albumin creatinine ratio should be performed at each trimester. Patients generally attend for ante-natal care at intervals of 2 to 4 weeks from booking up to 28 weeks, and every 2 weeks until 34 weeks and thereafter weekly until delivery.

Delivery

- The timing of delivery is individualised: in women who have good diabetic control and no complications, the pregnancy may be continued to 39 to 40 weeks.
- Caesarean section rates are higher than in non-diabetic women.
- All women with diabetes should have IV insulin for delivery. Aim for a blood glucose of 5-8mmol/l during delivery.

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 the insulin dose by 25% once lactation is established.
- Discuss contraception while the patient is still in hospital.
- All women should be seen by the diabetes pregnancy care team 6-12 weeks after delivery.
- Provide contraception advice before discharge:
  - Combined OC or depot provera should not be used in the first 6 post natal weeks.
  - Progestin only OCP can be used safely in the first 6 weeks.
  - IUD can be inserted after 4 weeks.

Benefits of Breast Feeding in Diabetes

Apart from the obvious bonding and nutritional benefits of breast-feeding, there are a number of additional benefits in diabetes:

- Breast-feeding is associated with a lower incidence of childhood and adolescent obesity.
- Non-lactating women have a higher risk of developing type 2 diabetes in the future.
- Breast-fed babies have a lower risk of developing type 1 diabetes in the future.
- Breast-feeding also appears to enhance psychomotor development.
- Exclusive breast-feeding delays ovulation for 6 months and is 98% protective.
Breast-feeding lowers maternal glucose levels and insulin requirements drop by 25%.

12.2 Gestational Diabetes (GDM)

- Gestational diabetes mellitus (GDM) affects 2 to 4% of pregnancies and is defined as carbohydrate intolerance of variable severity, with onset or first recognition in pregnancy.
- Glycosuria with normal blood glucose levels is common, due to a lowering of the renal glucose threshold.

Screening for GDM

- In woman at high risk of diabetes, obesity, population with high prevalence of diabetes, provide healthy lifestyle advice (nutrition and physical activity) from first visit. Check for hyperglycaemia (random blood sugar) and organize 75g OGTT if indicated at 24-28 weeks gestation.
- In all women measure plasma glucose at first visit after week 20 (24/28 in low risk woman): perform 75g OGTT if abnormal.
- Diagnosis of GDM is made on OGTT as follows:
  - Fasting glucose greater than 5.6mmol/l
  - 1 hour glucose greater than 10.0 mmol/l
  - 2 hour glucose greater than 7.8mmol/l

Management of GDM

- Refer to Diabetes/ Antenatal team
- Dietary advice should be given in all cases.
- Aim for DCCT aligned Hba1c less than 6.00%
- Patients should self monitor pre-meals and pre-bed and 1 to 2 hours post prandial. Introduce insulin if out of target range.
- Aim for:
  - FBS 3.5-5.5mmol/l
  - Premeal blood sugar 4.0 – 6.0mmol/l
  - 1hr Post Prandial blood sugar 4.0 - 7.8mmol/l
  - 2hr Post Prandial blood sugar 4.0 – 8.0 mmol/l
- Glucose targets are similar to patients who have established diabetes.
- In most cases, insulin can be discontinued at delivery.
- Ensure that normoglycaemia returns after delivery.
- A 75 g OGTT should be performed at around 6 to 12 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.

After GDM

- Women who have previous GDM should be made aware of the benefits of exercise and importance of weight control, to avoid the development of diabetes.
- There is evidence that the use of progestin only pills in women who have had GDM increases the risk of developing diabetes 3 fold compared to other methods.
- They should also have a GTT at 16 to 18 weeks in future pregnancies.
Contraception and Diabetes

Contraception should be discussed with all diabetic women in the childbearing age group:
- In women with no evidence of vascular disease, all forms of contraceptives can be used.
- In women with vascular complications, oestrogen containing pills should be avoided. Use progestin only or IUD.

Combined oral contraception (COC)
- Ideally, avoid oestrogen because of the increased risk of arterial disease with diabetes.
- Low-dose oestrogen preparations are permitted for use in the some diabetic women.
- Use a combination of oestrogen and a lipid-friendly progestogen e.g. Mercilon; 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.
- Necessary criteria are:
  - Ideally under 25 years of age;
  - Free of any signs of complications of diabetes;
  - Free of any risk factors for cardiovascular disease;
  - Non-smoker;
  - Not hypertensive;
  - BMI less than 30.
- However a value judgement should be made in women for whom avoidance of pregnancy is essential.
- Combined OC should not be used in the first 6 post natal weeks.

Progesterone-only hormonal contraception
- Advantages are lack of vascular side-effects or effects on lipid metabolism.
- The progesterone-only pill (POP) has to be taken more accurately and the efficacy is lower than the combined pill.
- The Injectable method, implant, and Intrauterine system, however, all give excellent efficacy.
- Irregular periods or inter-menstrual bleeding may occur.
- Depot-provera should not be used in the first 6 post natal weeks.

Intra-uterine contraceptive device
- The main advantage is the lack of metabolic effects.
- There is a possible associated hazard of pelvic infection/ salpingitis, this can be reduced by pre-insertion screening for chlamydia.

Vaginal methods of contraception
- Not recommended if it is essential to avoid pregnancy due to the high failure rate, but may be suitable in other situations.
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 to 0.5 per women years.

Emergency Contraception

- Can be used in the usual way in diabetes.

12.4 Hormone Replacement Therapy (HRT) in Diabetes

- The decision to recommend HRT for diabetic women should be made by balancing the benefit and risk in the individual
- Diabetes is not a contraindication to the use of hormone replacement therapy
Erectile failure occurs in 30% of all diabetic men and affects 55% of those aged over 60 years.

The cause is often multi-factorial. Vascular and neuropathic causes are common, but psychological factors may be partly or wholly responsible in some cases.

Drugs, especially anti-hypertensive agents and statins, as well as alcohol may also be involved.

Testosterone deficiency and hyper-prolactinaemia cause loss of libido and, where present, the possibility of an underlying pituitary tumour should be excluded.

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

**13.1 History taking in Erectile Dysfunction**

The aim is to define the precise problem i.e. distinguish between the following:

- Loss of libido, which points to psychological factors or the presence of hyperprolactinaemia or hypogonadism.
- Failure of erection (impotence).
- Premature ejaculation.
- Failure of ejaculation.
- Painful or other conditions of the penis e.g. balanitis, phimosis or Peyronie’s disease.

**13.2 What is the likely cause?**

- Differentiate between predominantly psychological and organic causes (see table below)
- 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>
<thead>
<tr>
<th>Psychogenic</th>
<th>Organic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid onset</td>
<td>Gradual onset</td>
</tr>
<tr>
<td>Inconsistent response varying with time/partner.</td>
<td>Consistent lack of erections.</td>
</tr>
<tr>
<td>Patient still gets nocturnal or early morning erections</td>
<td>Patient’s nocturnal or early morning erections have stopped.</td>
</tr>
<tr>
<td>The patient still responds to self stimulation</td>
<td>The patient finds no response to self stimulation.</td>
</tr>
<tr>
<td>The patient has had an important life event that might contribute to erectile dysfunction</td>
<td>The patient has underlying disease that might be a contributing factor</td>
</tr>
</tbody>
</table>
If the responses to most questions suggest an underlying organic cause, further investigations might be necessary:

### 13.3 Examination of patients with ED

- **General assessment:**
  - Body habitus;
  - Presence of secondary sex characteristics;
  - Gynaecomastia
- **Cardiovascular disease:**
  - Hypertension;
  - Evidence of peripheral vascular disease.
- **Neurological:**
  - Peripheral Neuropathy.
- **Physical:**
  - Appearance of external genitalia;
  - Rectal examination

### 13.4 Investigations of ED

- The presence of underlying endocrinopathy is usually rare in clinical practice and in most cases minimal laboratory tests are required.
- Useful investigations include:
  - HbA1c;
  - Testosterone: if hypogonadism is suspected. If it is found to be low, repeat test at least twice on early morning samples (diurnal variation). If a low concentration is confirmed, refer to a Urology Specialist;
  - FSH/LH;
  - Prolactin: if abnormal, refer to endocrinology;
  - PSA: if raised, examine and refer to urology

### 13.5 Management of erectile dysfunction

**General measures**
- Improve diabetic control.
- Reduce alcohol intake.
- Withdraw causative drugs where possible.
- Correct associated endocrine disease where present.
- Involve partner as appropriate.
- Psychosexual Counselling: The contribution of emotional factors should not be underestimated. Psychosexual Counselling may be useful for both organic and psychogenic ED, even if a physical intervention is planned.

**Pharmacological treatments**
- Oral preparations: Sildenafil (see below), Tadalafil, Vardenafil,
- Intra-cavernosal injection of vasoactive drugs e.g. alprostadil.
- Intra-urethral agents e.g. alprostadil.

**Vacuum Devices**
May have low patient acceptability as they limit spontaneity.
Surgical Treatment
Venous surgery is now rarely performed and arterial surgery has a limited role.

Drug treatment

<table>
<thead>
<tr>
<th>Sildenafil</th>
<th>Action: Sildenafil potentiates the action of nitric oxide (NO), producing cavernosal smooth muscle relaxation and penile erection. It is only a treatment for loss of erections and in studies has been shown to have no effect on libido or sexual desire. Efficacy: Sildenafil is effective in restoring natural erectile function in patients who have ED of psychogenic, organic and mixed causes. In men who have diabetes, studies have shown a 56% efficacy rate. Generic Name: Viagra Dose: Starting dose 5 0mg (in the elderly: 25 mg); titrate dose up to 100 mg or down to 25 mg depending upon response. Higher doses are associated with an increased incidence of side effects. Instruct patient to take the tablet approximately 1hr prior to anticipated sexual activity. The drug is usually active within 30 min but is delayed if taken with food. It is effective for up to 4 hr after dosage. Maximum dosing frequency is once per 24hr. Side effects: All side effects appear more frequently with increased doses. Headache is commonest. Other vasculogenic effects e.g. flushing and dizziness occur occasionally. Dyspepsia (in up to 5%). Proximal myalgia. Nasal congestion. Transient disturbance of colour vision has been reported in clinical trials and is reversible; it is unusual at normal clinical doses of 50 to 100 mg. Drug interactions: Sildenafil can potentiate the action of nitrates, therefore, in patients who take nitrates of any type (including sublingual GTN) concurrent use of Sildenafil is contraindicated.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tadalafil</td>
<td>This is similar to sildenafil but added contraindications include moderate heart failure, uncontrolled arrhythmias and uncontrolled hypertension. Dose: 10 to 20 mg, 30 min to 12 hours before sexual activity.</td>
</tr>
<tr>
<td>Vardenafil</td>
<td>This is also similar to sildenafil. Added side effects include: nausea, hypertension, photosensitivity, hypotonia and syncope. Dose: 10 mg, 25 to 60 mins before sexual activity.</td>
</tr>
</tbody>
</table>
The number of older individuals with diabetes can be expected to grow rapidly over the coming years. Care of an elderly patient with diabetes in the community can involve many members of the multidisciplinary community team including GP, Practice Nurse, Public Health Nurse, Podiatrist, Dietician and Carer, as well as liaison with specialist hospital services. Good communication is essential to ensure continuity of care.

### 14.1 Goals of Care

- Treatment goals for elderly patients must be individualized, and at times the enthusiasm for tight glucose control may need to be curtailed because of safety concerns.
- Individual goals of care and targets should be established in collaboration with the patient and/or carer and the possible effects on quality of life should be taken into account in any treatment plan.
- For frail elderly patient, those with limited life expectancy, and others in whom the risks of intensive glycaemic control appear to outweigh the potential benefits, a less-stringent HbA1c target, is appropriate.

See table below.
<table>
<thead>
<tr>
<th>Aspect of care</th>
<th>Goals and recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin</td>
<td>Recommended if no other anticoagulant therapy and no contraindications* See comment below.</td>
</tr>
<tr>
<td>Smoking cessation</td>
<td>Recommended</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Target blood pressure, &lt;140/80 mm Hg if it is tolerated</td>
</tr>
<tr>
<td>Lipids</td>
<td>Goal for LDL-C, (&lt;2.59) mmol/l if feasible</td>
</tr>
<tr>
<td>Glycemic Agents</td>
<td>HbA1c of (&lt;7)% in healthy adults with good functional status</td>
</tr>
<tr>
<td></td>
<td>HbA1c of (&lt;8)% in frail elders with life expectancy of (&lt;5) yr or when risks of intensive glycemic control outweigh benefits</td>
</tr>
<tr>
<td>Glycemic monitoring</td>
<td>If HbA1c is not at goal, check every 6 months.</td>
</tr>
<tr>
<td></td>
<td>If HbA1c is stable over years, check annually</td>
</tr>
<tr>
<td></td>
<td>Create individual plan for self-monitoring of blood glucose</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>Offer referral to diabetes nurse specialist or endocrinologist</td>
</tr>
<tr>
<td></td>
<td>Provide more frequent contacts with healthcare team while therapy is being adjusted</td>
</tr>
<tr>
<td>Dilated eye examination</td>
<td>At time of diagnosis in patients with new-onset diabetes, then annually in patients at high risk for eye disease and every 2 yr in patients at lower risk</td>
</tr>
<tr>
<td>Foot care</td>
<td>Routine screening annually</td>
</tr>
<tr>
<td></td>
<td>More frequent screening in patients at high risk</td>
</tr>
<tr>
<td>Microalbuminuria</td>
<td>Check at diagnosis of diabetes and annually thereafter</td>
</tr>
<tr>
<td>Screening for</td>
<td>Screen for depression, cognitive impairment, falls, pain, urinary incontinence, polypharmacy</td>
</tr>
<tr>
<td>common geriatric</td>
<td></td>
</tr>
<tr>
<td>conditions</td>
<td></td>
</tr>
</tbody>
</table>

Recent studies found no evidence to support the use of Aspirin in the primary prevention of cardiovascular events in people with diabetes. Aspirin should however still be given for secondary prevention of cardiovascular disease in people with diabetes.26

### 14.2 Co morbidities

- Care of an older adult with diabetes cannot be restricted to glycemic control, because co morbidities including hypertension, dyslipidemia, ischemic heart disease, and cerebrovascular disease, often dominate the overall health of the patient.
- Elderly patients with diabetes are at greater risk than other older adults for several common geriatric conditions, such as polypharmacy, depression, cognitive impairment, urinary incontinence, injurious falls, and persistent pain.
- Often, functional status is declining in this population, shifting the focus of care to improving the quality of remaining life.

### 14.3 Lifestyle

- Healthy eating, weight management, and physical activity remain the most important initial steps in the management of all patients with type 2 diabetes.

### 14.4 Drug Treatment

- Avoidance of hypoglycaemia is an overriding concern
- Generally, use of the lowest effective dose and gradual titration are important.
When monotherapy fails to control the disease, addition of a second oral agent from a different drug class is advised. Typically, the glucose-lowering effect of the second agent is additive but not synergistic.

Knowledge of pharmacokinetics, side effects, and potential interactions are important for the safe implementation of drugs in the elderly.

Use of triple therapy is limited in the elderly because of the already-existing high risk of polypharmacy.

More complex programs may not be practical in the elderly and should be initiated with great caution in selected patients only.

The health professional should always bear in mind the feasibility of medication dosing and efforts should be made to keep care simple through such practices as single daily dosing of drugs (or, when this is not feasible, twice daily dosing). Aids such as tablet dispensers should be suggested.

As with blood pressure and lipid management the potential benefits must always be weighed against potential risks.

Caution:

Important consideration in the elderly:

- Metformin is often contraindicated because of renal insufficiency or heart failure.
- Sulfonylureas and other insulin secretagogues can cause hypoglycaemia.
- Insulin can also cause hypoglycaemia, as well as require good visual and motor skills and cognitive ability of the patient or a carer. Referral to the Public Health Nurse may need to be considered for certain patients.
- Thiazolidinediones should not be used in patients with congestive heart failure.
- Drugs should be started at the lowest dose and titrated up gradually until targets are reached or side effects develop.

14.5 Education

- Involvement of a carer in diabetes education and management is important, especially when a patient suffers from cognitive impairment.
- Education should include medication use, monitoring, and recognizing hypo- and hyperglycemia and sick-day rules.
- The patient and/or carer should receive education about risk factors for foot ulceration. Physical ability to provide proper foot care should be evaluated. Older adults are at higher risk for conditions that may reduce the ability to conduct proper foot checks and care (e.g., cognitive impairment, visual impairment, osteoarthritis, and other physical limitations in functioning that prevent movement). Referral to Community Podiatry should be considered for all at-risk patients.
- When a new medication is prescribed, the patient and/or carer should receive education about the purpose of the drug, how to take it, the common side effects, and important adverse reactions, with reassessment and reinforcement periodically as needed. Package inserts that accompany prescription medications are often printed in very small font, making it near impossible for elderly patient to read.
14.6 Self-Monitoring of Blood Glucose (SMBG)

The decision to implement a self monitoring schedule should be based on the goals of care, the potential for modifying therapy, and the individual’s risk for hypoglycemia.

- Regular SMBG is recommended for all patients on insulin.
- For patient who self-monitor, an appropriate monitor should be selected, bearing in mind the patient’s visual acuity, functional and cognitive ability.
- The self-monitoring technique should be routinely reviewed.
- Where possible a carer should also be trained in blood glucose monitoring.
- If the patient/carer are unable to perform blood glucose monitoring, referral to the Public Health Nurse should be considered.
- Frequency of monitoring should be increased with any modification of therapy.
15.0 Psychological Support in Diabetes

Contents of Section 15
15.1 Psychological Responses to Chronic Illness
15.2 Psychological Factors and Lifestyle
15.3 Psychological Interventions for Behaviour Change
15.4 Diabetes Counselling

(The following is based on a paper published by Dr. Brian McGuire and Dr. Jane Walsh in Diabetes Wise in March 2006).2

International guidelines for psychosocial care in diabetes indicate growing evidence that psychological care can lead to improvements in both medical and psychological outcomes. Systematic monitoring of psychological wellbeing is recommended as part of routine diabetes care.2

15.1 Psychological Responses to Chronic Illness

People with chronic health problems such as diabetes commonly present with higher rates of psychological distress than is found in the general community. A proportion of the population presenting in diabetes services will have significant levels of psychopathology, especially depression and health-related anxiety. These problems are found in both the population with chronic diabetes and in newly diagnosed patients.

Common psychological reactions to diabetes with possible behavioural indicators include:

**Depression**
Recurrence episodes of low mood and other primary indicators for depression – sleep disturbance, loss of interest and enjoyment etc, plus poor adherence to treatment, non-attendance at appointments, deterioration in medical status, apathy, expressed frustration about diabetes and related complications, expressed sense of lack of control over progression of illness.

**Anxiety/Fear/Worry**
Anxious presentation requires frequent and repeated reassurance, frequent unscheduled contacts from patient, expressed anxiety regarding illness progression and prognosis, expressed sense of lack of control over progression of illness.

**Anger / Hostility / Resentment (adjustment difficulty)**
Hostile or challenging attitude in consultations, non-attendance at appointments, poor adherence to treatment, expressed apathy or rebellious attitude towards illness and all associated with it, expressed anger regarding illness, expressed discontent with health service, expressed social embarrassment or stigma related to illness.

**Denial (newly diagnosed patients)**
Poor adherence to treatment and self-management, excessive participation in health-damaging behaviours, expressed apathy or rebellious attitude towards illness and all associated with it, expressed anger regarding illness (“why me”?).
The recommendations for good self-management include regular self-monitoring, dietary control, weight control and avoidance of obesity, regular exercise, and cessation of smoking. These, and virtually all purposeful behaviours, are inextricably linked to belief systems, thought patterns and individual perceptions. Thus there is an important role for psychological input in establishing and maintaining good self-management practices. Indeed, many practice guidelines emphasise the importance of behavioural and psychological interventions, for example, NIH Guidelines on obesity recommend that weight loss programmes incorporate behavioural treatments.

In recognition of the importance of patient-determined behaviour in diabetes outcomes, the UK National Service Framework for Diabetes Standards has referred to self-management as the “cornerstone of effective diabetes care” in order to avoid or delay the onset of diabetes-related complications. Many of the newer interventions in diabetes have been based on an empowerment, self-management approach which emerged in the 1990s, in a move away from the previous didactic educational approach. These interventions have featured a more multidisciplinary model of diabetes management with significant emphasis on self-management and associated behaviour changes. Within that clinical context, a variety of psychological interventions have been used to help people with diabetes, including:

- Supportive counselling
- Psycho education
- Motivational interviewing
- Goal setting
- Problem solving
- Cognitive restructuring and cognitive behavioural therapy
- Behavioural reinforcement
- Developing self-efficacy

Using psychological models that help explain how we respond to health problems (such as the self-regulatory model), a patient can be assisted in identifying particular underlying beliefs that may be preventing them from engaging in beneficial self-management strategies.

**Supportive counselling**

Supportive counselling involves an empathic response from the doctor, conveying a sense of understanding about the burden of diabetes for the patient. It involves basic, but undervalued, communication and interaction skills, where the focus goes beyond blood sugar readings to focus on the patient as a person. Just asking the patient in a caring way how they are coping with their illness can be of enormous benefit and can help to build a strong partnership between patient and doctor.
15.4 Diabetes counselling

If patients require particular help with a problem, there are qualified diabetes counsellors available. A list of counsellors in your locality can be obtained from the Diabetes Federation Ireland website. [www.diabetes.ie](http://www.diabetes.ie)

Psycho education
Psycho education is the provision of education about the interaction between the physical illness and the patient’s emotional response to their illness, recognising that the impact of each is reciprocal. It also involves normalising emotional responses that patients may find hard to understand, about which they may be embarrassed, and which at times may be as overwhelming as the physical illness that preceded it.

Motivational interviewing
Motivational interviewing is related to Prochaska’s stages of change model for changing health-related behaviour. It refers to a process of working with the patient to help him or her to recognise the benefits of changing certain behaviours (behaviours that are often enjoyable or reinforcing, but damaging to health) and then helping the patient to maintain change over time. With a focus on empowering the patient, its application in diabetes has been outlined recently.

Goal setting
Goal setting is used in many areas of psychology and essentially involves helping the patient to formulate realistic and achievable goals. Often described as short, medium and long-term goals, the important aspect is to make the initial goals easily achievable to provide an experience of success and then build further change in small but discrete and measurable steps. Rewards and reinforcement are used to help motivate the patient to achieve the next goal. Building up an exercise programme, reducing smoking or increasing blood monitoring are all amenable to goal setting.

Problem solving
Problem solving is also widely used in psychology and is a process whereby a patient is taught to identify in specific terms the problem or obstacle they face, to generate several potential solutions, then to evaluate the advantages and disadvantages of each, then proceeding with an action plan. Problem solving can be a very helpful strategy for patients who appear to be overwhelmed with life stresses or unable to cope with the different aspects of a complex medical condition.

Cognitive restructuring and cognitive behavioural therapy
Cognitive restructuring and cognitive behavioural therapy are effective strategies for helping patients to recognise errors and misinterpretations in their thinking. It provides patients with a highly structured framework for evaluating the evidence to support (or not) unhelpful thoughts and beliefs. It also assists patients in changing their thinking and encourages behaviour change (taking risks to show that the feared consequence usually does not occur when based on an erroneous thought or belief. A patient who says “the disease has already progressed, there’s no point in changing now” can be challenged and assisted to recognise that any health-beneficial change in behaviour is worthwhile.

Behaviour Reinforcement
Behavioural reinforcement is an integral part of virtually every aspect of our lives. We all respond to rewards (increase the rewarded behaviour) and punishments (decrease the punished behaviour). In diabetes care, patients are helped to recognise the pattern of rewards and punishments that may be an obstacle to better self-management. For
example, high fat foods taste good and are positively reinforcing in the short term so we tend to eat more. When unfit, exercise can feel unpleasant (punishing) so we may choose to avoid the discomfort. We also receive rewards and punishments from unintended sources – a caring spouse who does everything for their ill partner may be reinforcing that person’s dependence. Treatment aims to change the reinforcement contingencies so that beneficial health behaviours are externally rewarded at first and then become intrinsically rewarding.

**Self Efficacy**

Self-efficacy in relation to health is a belief that the direction or course of an illness is strongly influenced by our own actions. Support for the importance of self-efficacy to diabetes self-care adherence comes from several studies showing that higher self-efficacy is associated with higher self-rated adherence, with treatment satisfaction and glycaemic control and interventions that increase dietary self-efficacy also result in increased dietary self-care. Self-efficacy is developed through several of the process outlined earlier - through cognitive restructuring and through behavioural evidence of the importance of self-direction on health outcomes.

Unfortunately many people with diabetes do not engage in good self-management practices. Psychological models of health and illness beliefs can provide a helpful framework for exploring obstacles to self-management. A range of cognitive and behavioural interventions can facilitate patients to become more active and effective managers of their own illness.
16.0 Other useful information

Content of Section 16:
16.1 Driving and Diabetes
16.2 Travel and Diabetes
16.3 Work and Diabetes
16.4 Entitlements

16.1 Driving and Diabetes

The Driving Licensing Section (DLS of the Department of Transport)

Website: www.transport.ie
Contact:
   Driver Licensing Section,
   Government offices,
   Ballina,
   County Mayo,
   Ireland.
   Telephone: 096 24200.

It is the legal responsibility of the patient to inform the Driver Licensing Section (DLS) of a diagnosis of diabetes when it is treated with insulin or oral hypoglycaemic agents.

Applying for a driving license

When applying for a driving license, the individual applies under categories (and sub-categories). But for assessment of medical fitness to drive, vehicles are divided into two main groups.

**Group 1**
Categories A, A1, B, EB, M or W (i.e. motorcycles, cars, taxies (less than 8 seater) and tractors (with or without trailers)

**Group 2**
Categories C, C1, D, D1, EC1, ED or ED1 (i.e. trucks and buses (with or without trailer).

Each application for renewal of a **Group 1 license** (annual renewal required) must be accompanied by a medical report irrespective of the type of diabetes or the method of treatment. For many applicants, their general practitioner, who will determine how long the report is valid for, may complete the medical report. In the case of a person requiring insulin it is usually the hospital Consultant that completes the report.

Each application for renewal of a **Group 2 license** (annual renewal required) must be accompanied by a medical report completed by a Consultant Endocrinologist or Physician with an interest in diabetes. A Group 2 license will not be issued to a person on insulin treatment.  

Persons on insulin therapy may not hold a commercial airline pilot license.
Regulations for driving overseas

See Appendix

Hypoglycaemia and driving

- The main potential danger of diabetes and driving is the possibility of hypoglycaemia. In order to avoid hypoglycaemia patients should be advised to:
- Always carry fast acting carbohydrate food in the car e.g. glucose tablets.
- Not drive for more than two hours without eating a snack.
- Check blood sugars before and during the journey.
- Carry identification.

If symptoms of hypoglycaemia do occur, patients should be advised to:

- Stop driving as soon as it is safe to do so.
- Immediately take glucose drink/tablet.
- Remove the ignition key and move into the passenger seat to avoid any suggestion that the patient is in charge of the car.

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

Patients should be advised to abstain completely from alcohol when driving.

Visual standards: Driving and Diabetes

- Visual standards relating to driving are those applied generally.

The patient should:
- Be able to read a number plate (7.9 cm) at a distance of 20.5 meters
- Have a visual field of at least 120 degrees in the horizontal axis and at least 20 degrees in the vertical axis. This approximates to an equivalent Snellen Chart corrected acuity of 6/12.

If in doubt, refer specifically to the Ophthalmology Clinic for formal assessment.

Car insurance and diabetes

Diabetes must be disclosed either at the start of a new policy or at the time of diagnosis. Change in treatment or the development of new complications should be disclosed at each renewal. Failure to notify the insurer can invalidate cover in the event of a claim. Not all insurance companies will load their policies in the same way and there is no single insurance scheme that will be the cheapest in every case. Contact the Diabetes Federation of Ireland for further advice.
16.2 Travel and Diabetes

See diabetes-travel.co.uk website http://www.diabetes-travel.co.uk (or http://www.scottish-internet.co.uk/clients/diabetestravel/)

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

**Insulin and traveling**

- Patients should find out what types and strengths of insulin are available in the area in which they will be travelling (refer to Diabetes UK or Pharmaceutical Company).
- Insulin’s used in Ireland and many other countries are of the strength U-100. In some countries, insulin may come as U-40 or U-80 strengths. These insulin’s are not interchangeable. If they are to be used, the appropriate syringes are required.
- Insulin should be kept out of direct sunlight and kept cool.
- Insulin should never be allowed to freeze; therefore, when travelling by air, insulin should always be carried in the cabin luggage.
- Insulin might be absorbed faster in warmer climates, so regular monitoring is important.

**Preparing for travel**

Advise the patient to take the following with them when travelling:

- Twice as much insulin, syringes or pens, needles, tablets and testing equipment as necessary.
- A diabetes identity card or jewellery.
- Carbohydrate- quick-acting (e.g. Lucozade, glucose sweets) and slow acting carbohydrate snacks eg. (biscuits, fruit) in the hand luggage to cover any travelling delays.
- A letter, from either your GP or Diabetes Centre, with a contact telephone number and address confirming the need to carry needles and syringes.
- Glucagon injection.
- Ketone testing strips.

**Storage of Insulin**

- Do not put luggage into the ‘hold’ of the plane. (Insulin could freeze here and therefore be rendered ineffective for use).
- Carry all equipment (Insulin, meters, snacks) as hand luggage.
- Keep out of direct sunlight.
- Use containers available e.g. Frio bags, cool-bags, flasks.

**Climate Control**

- Insulin may be absorbed faster in warmer climates so regular blood glucose monitoring is important.
- Insulin requirements may need to be reduced.
- Some blood glucose test strips may **over read** in very hot weather.
- Some blood glucose test strips may **under read** in very cold weather.
Vaccinations

- Patients should be advised to find out what vaccinations are required for the proposed destination.
- Occasionally these can cause sickness or flu-like symptoms and it is best to have them performed one month in advance of travelling.

Advice: Coping with Illness

- If sickness or diarrhoea develops, insulin or tablets should never be stopped even if solid foods cannot be tolerated.
- Carbohydrate intake should be maintained in the form of regular sugary drinks.
- Monitor blood glucose levels frequently.
- Urine should be tested for ketonuria as an early sign of decompensation.
- If sickness or diarrhoea persists medical advice should be sought.
- Specific rules for Sick-Day Management can be provided by your G.P or Hospital Diabetes Care Team.

Insurance for traveling

- Free or reduced cost, emergency treatment is available in other EU countries. The European Health Insurance Card has now replaced the E111. The EHIC application form is available from your local Community Care Office, local Health Office, Health Centre, or online at [www.EHIC.ie](http://www.EHIC.ie)
- Travel insurance is vital. Patients should inform the insurance company of the presence of diabetes and ensure that the insurance package provides adequate cover.

Long-haul flights

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

Identification and Customs

Require identification as a diabetic – letter available from your G.P. or Diabetes Care Team.

16.3 Work and Diabetes

Restricted jobs

At present treatment with insulin precludes entry into the following professions: The Gardai, fire and ambulance services, armed forces, train drivers, airline pilots/air traffic control and bus drivers.

See appendix for patient advice leaflet
16.4 Entitlements

All persons with diabetes are entitled to receive their diabetes medicines, pens/syringes, lancets and blood glucose monitoring strips free of charge through the HSE. This is done through the
- Long Term Illness (LTI) Scheme, or
- Medical Card Scheme

Some persons with diabetes may also be entitled to apply for other welfare allowances, some of which are detailed below. Applications should be made through the local Community Welfare Service (CWS).

Long Term Illness Scheme

- Diabetes Mellitus is covered under the LTI scheme. This means that all persons with diabetes mellitus who are not already medical card holders, are entitled to all medication, including lancets, needles/syringes and blood glucose testing strips etc. for diabetes and for the related conditions hypertension and dyslipidaemia. If a person with diabetes has a medical card but an allowable item is not covered on the GMS, then a restricted LTI book can be applied for to cover non-GMS item(s) only.
- To apply for registration on the LTI scheme, an application form (available from community pharmacies or local community services offices) must be completed by the client and the client’s doctor and submitted to the LTI Section of the relevant HSE Community Services Department. The patient will then be sent an LTI book and should present this at their local pharmacy, along with relevant prescription(s).
- See your guide to local diabetes services for the contact details of your local LTI Section, HSE Community Services.

Medical Card Scheme

Medical Card Holders are entitled to free GP and hospital care, free medication, pens/syringes, lancets and glucose monitoring strips.
- The Community Welfare Service carries out the financial assessment of medical card applicants to determine entitlement. Income guidelines to assess eligibility for medical cards are agreed annually by Health Service Executive Chief Officer. Persons whose incomes are below the income guidelines are granted a medical card or GP visit card.
- Applicants whose weekly incomes are derived solely from Social Welfare or Health Service Executive payments which are in excess of the Financial Guidelines (either at first application or on renewal) will be granted medical cards.
- A person aged 16 to 25 years including a student, who is deemed to be financially dependant on his/her parents is entitled to a medical card if the parents hold a medical card. A person who is deemed to be financially independent of his/her parents will have their eligibility based on their own income.
- All persons aged 70 years and over are entitled to apply for a medical card under a separate scheme (and separate means test). This medical card covers the applicant only.

Hardship

Persons whose incomes are above the income guidelines may be granted a medical card or GP visit card on hardship grounds where the application is made due to
exceptional medical or social circumstances. The medical condition(s) in question may be suffered by the applicant and/or one or more than one member of his/her family. The evidence required when carrying out such assessments on hardship grounds includes the following:

- Details of the medical condition including frequency of GP visits
- Medication costs
- Any loss of earnings associated with the illness
- Details of the cost incurred in travel to access services e.g. doctor, hospital etc.

**Other welfare allowances**

Below are details of allowances for which some persons with diabetes may be eligible to apply. This list is not exhaustive. For a full list of welfare allowances, contact your local Community Welfare Service.

- **Blind Welfare Allowance**
  To obtain benefits/allowances for the blind or visually impaired, a person must be registered with the National Council for the Blind of Ireland. To register with the council, an Ophthalmic Assessment Report must be completed and submitted by an Ophthalmologist. Blind Welfare Allowance is a means tested supplementary allowance paid to eligible persons who are certified as being blind or visually impaired in addition to an existing DSFA type payment. The allowance is paid to eligible persons from 18 years of age not in employment.

- **Domiciliary Care Allowance**
  Domiciliary Care Allowance is an allowance paid in respect of children from birth to the age of 16 who have a severe disability requiring continual or continuous care and attention, which is substantially in excess of that normally required by a child of the same age. Only the means of the child are taken into account. The means of the parents are not considered.

- **Mobility Allowance**
  Mobility Allowance is payable, subject to a means test, to people aged from 16 to 66 years who are unable to walk or use public transport and is intended to enable them to benefit from a change in surroundings, for example, by financing the occasional taxi journey. Persons receiving the allowance prior to their 66th birthday can continue to receive payment after reaching 66 years.

- **Motorised Transport Grant**
  A payment towards the purchase of a car and/or adaptations to a car being purchased by a person with a severe disability who is 17 years or older and up to 65 years of age, where such a car is essential for him/her to obtain or retain employment. The grant may be made to a self-employed person or to a person who has not already taken up employment but would be able to do so if transport difficulties were overcome. The grant may also be payable to a person living in an isolated area, to improve the quality of life. Persons with a disability who are incapable of driving or who have been medically advised not to drive, and who have to be driven to and from work may qualify for payment.

- **Supplementary Welfare Allowance (SWA)**
  The SWA scheme is quite unique in the overall welfare system as it is the only scheme where entitlement is based not on one or other contingency or indeed contribution conditions, but on the needs of the customer. SWA is a means tested payment and the
amount payable is based on the assessment of NEEDS and MEANS. Types of payments include:

*Basic Supplementary Welfare Allowance:* If an individual has no income or their income is below the SWA rate, he/she may be entitled to claim a payment, which will bring their income up to the appropriate SWA rate.

*Supplement Payments:* The SWA scheme provides for a variety of supplements for people on low income who are already in receipt of a DSFA or similar payment. These are designed to meet ongoing additional basic needs (e.g. rent, mortgage, diet, heating), which cannot be met from weekly income.

*Exceptional Need Payments:* An Exceptional Need Payment is a single payment to help meet essential, once-off expenditure, which a person could not reasonably be expected to meet out of his own resources. ENP’s are payable at the discretion of the SCWO to prevent hardship by catering for an essential, once-off, exceptional situation having regard to all the circumstances of the case. Examples of the types of exceptional need provided include beds and bedding, clothing for admission to/disch arge from hospital, travel to visit relatives in hospital, funerals etc.

**NB More Information**

The list above is not exhaustive. For a full list of welfare allowances, contact your local Community Welfare Service. See your Guide to Local Diabetes Services for contact details.
References

4. Scottish Intercollegiate Guidelines network www.sign.ac.uk
5. Irish College of General Practitioners (ICGP). A Practical guide to Type 2 Diabetes Care 2008. www.icgp.ie
22. Adapted from Midlands Structure Care Programme. Cited in 'A practical Guide to Integrated Type 2 Diabetes Care' Dr Velma Harkins. 2008 Department of Health & Children Publication. Irish Endocrine Society and Irish College of general Practitioners.


30. Driving and Diabetes information cited: Diabetes Federation of Ireland. [http://www.diabetesireland.ie/WebSite/Pages/TipsAndArticles/tips/driving_and_diabetes.aspx](http://www.diabetesireland.ie/WebSite/Pages/TipsAndArticles/tips/driving_and_diabetes.aspx)
### Appendices

<table>
<thead>
<tr>
<th>A. Score Risk Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Audit of Diabetes Care in General Practice</td>
</tr>
<tr>
<td>C. Sample Diabetes Review Template</td>
</tr>
<tr>
<td>D. Health Eating Advice for People with Diabetes</td>
</tr>
<tr>
<td>E. Foot Care Advice for People with Diabetes</td>
</tr>
<tr>
<td>F. Stages of Change Model (Transtheoretical Model)</td>
</tr>
<tr>
<td>G. Cost –Effective Prescribing</td>
</tr>
<tr>
<td>H. Driving &amp; Diabetes (European Regulations)</td>
</tr>
<tr>
<td>I. Diabetes and Your Work Leaflet</td>
</tr>
</tbody>
</table>
Monitoring the quality of care
Quality assurance is an integral feature of modern structured diabetes care. A protocol for monitoring the quality of care should include the following:

- Data gathering using an agreed national dataset.
- The dataset below has been recommended by the HSE Diabetes Expert Advisory Group.
- Indicators to reflect outcome as well as process of care.
- Analysis and comparison with pre-determined standards of diabetic care.
- Development of an action plan.
- Review: Annual audits recommended.

<table>
<thead>
<tr>
<th>A. Demographic Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Process &amp; Outcome of Care Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
</tr>
<tr>
<td>15</td>
</tr>
<tr>
<td>16</td>
</tr>
<tr>
<td>17</td>
</tr>
<tr>
<td>18</td>
</tr>
<tr>
<td>19</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>21</td>
</tr>
<tr>
<td>22</td>
</tr>
<tr>
<td>23</td>
</tr>
<tr>
<td>24</td>
</tr>
<tr>
<td>25</td>
</tr>
<tr>
<td>26</td>
</tr>
<tr>
<td>27</td>
</tr>
<tr>
<td>28</td>
</tr>
<tr>
<td>29</td>
</tr>
<tr>
<td>30</td>
</tr>
<tr>
<td>31</td>
</tr>
<tr>
<td>32</td>
</tr>
<tr>
<td>33</td>
</tr>
<tr>
<td>34</td>
</tr>
<tr>
<td>35</td>
</tr>
<tr>
<td>36</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>37</td>
</tr>
<tr>
<td>38</td>
</tr>
<tr>
<td>39</td>
</tr>
</tbody>
</table>

### C. Medication

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>*Hypoglycaemic Agents</td>
<td>Yes / No / Not tolerated / Refused</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Biguanide / Thiazolone / Sulphonurea / DPP4 / Alph Glu Inhib / Pran Glu Reg / Phenyl Deriv</td>
</tr>
<tr>
<td>41</td>
<td>*On Insulin</td>
<td>Yes / No / Refused</td>
</tr>
<tr>
<td>42</td>
<td>Lipid Lowering Agents</td>
<td>Yes / No / Not tolerated / Refused</td>
</tr>
<tr>
<td>43</td>
<td>Anti Hypertensive meds</td>
<td>Yes / No / Not tolerated / Refused</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACE / ARB / Beta-blocker / Ca.Ch. / Diuretic / Other</td>
</tr>
<tr>
<td>44</td>
<td>Anti-Platelet Agents</td>
<td>Yes / No / Not tolerated / Refused</td>
</tr>
<tr>
<td>45</td>
<td>On Warfarin</td>
<td>Yes / No</td>
</tr>
</tbody>
</table>

### D. Complications

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>Macrovascular Complications</td>
<td>MI / CVA / Angina / PVD / CCF / TIA / AF / Carotid Stenosis / CABG / Stent / Renal artery Stenosis / Amputation</td>
</tr>
<tr>
<td>47</td>
<td>Microvascular Complications</td>
<td>Retinopathy / Nephropathy / Foot Neuropathy / Erectile Dysfunction / Peripheral neuropathy / Carpal tunnel syndrome / Cranial nerve palsy / Autonomic neuropathy (postural hypotension) / Other Neuropathy</td>
</tr>
<tr>
<td>48</td>
<td>Eye Disease</td>
<td>Retinopathy Result: 0=Not known / 1=No Retinopathy / 2=Background Retinopathy / 3=Pre-Proliferative / 4=Proliferative / 5=Advanced Diabetic Eye Disease / 6= Maculopathy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Laser therapy: Yes / No / Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cataract: Yes / No / Unknown</td>
</tr>
<tr>
<td>49</td>
<td>Renal Impairment</td>
<td>E - GFR: Not recorded / normal / mild CKD / Mod CKD / Severe CKD / End Stage CKD on Dialysis OR &lt;15</td>
</tr>
<tr>
<td>50</td>
<td>Annual ECG</td>
<td>Yes / No / unknown</td>
</tr>
<tr>
<td>51</td>
<td>Severe Hypoglycaemia Requiring help from another or hospitalisation-</td>
<td>Yes / No / Unknown</td>
</tr>
<tr>
<td>52</td>
<td>Hypoglycaemic Awareness</td>
<td>Yes / No / Unknown</td>
</tr>
<tr>
<td>53</td>
<td>Planning a Pregnancy</td>
<td>Yes / No / Not Applicable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If Yes, Pre Pregnancy Checklist? Yes / No</td>
</tr>
</tbody>
</table>
Appendix C: Sample Diabetes Review Template

### Demographics

<table>
<thead>
<tr>
<th>Name:</th>
<th>Medical Card:</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address:</td>
<td>Long Term Illness Card:</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>DOB:</td>
<td>Attends Hospital Diabetes Clinic:</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

### Diabetes History

**Type of Diabetes:**
- Type 1: [ ]
- Type 2: [ ]
- Gestational [ ]
- Other [ ] Specify: __________________________________________

**Complications previously diagnosed:**
- Cardiovascular disease [ ]
- Peripheral Vascular Disease [ ]
- Peripheral neuropathy [ ]
- Diabetic Nephropathy [ ]
- Diabetic retinopathy [ ]
- Cerebrovascular disease [ ]

**Diabetes Treatment:**
- Oral Hypoglycaemics [ ] Name ____________________________
- Insulin [ ]
- Combined [ ]
- Diet Only [ ]

### Social History

**Smoking history**
- Never smoked [ ] Current smoker [ ] Past smoker [ ]

**Alcohol intake**
- Units per week: [ ] 1 unit = ½ pint or 1 glass of wine.
- 1.5 units = single spirit measure

**Marital Status**
- Single [ ] Partnered [ ] Married [ ] Divorced [ ] Widowed [ ]

**Mobility**
- Good [ ] Poor [ ] Wheelchair [ ] Housebound [ ]

**Occupation:**
- Details: __________________________________________________

### Medication

<table>
<thead>
<tr>
<th>ACE Inhibitor</th>
<th>Angiotensin receptor Blocker</th>
<th>Anti-fibrotic Agent</th>
<th>Statin Therapy</th>
<th>Others, list:</th>
</tr>
</thead>
<tbody>
<tr>
<td>............ Name</td>
<td>............ Name</td>
<td>............ Name</td>
<td>............ Name</td>
<td>............ Name</td>
</tr>
<tr>
<td>Dose</td>
<td>Dose</td>
<td>Dose</td>
<td>Dose</td>
<td>Dose</td>
</tr>
</tbody>
</table>
## Clinical Assessment

<table>
<thead>
<tr>
<th>Weight:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waist measurement:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Blood Pressure:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Foot Inspection:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vision and eye screening:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Review of Risk Factors:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lifestyle Advice:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

## Laboratory Tests

<table>
<thead>
<tr>
<th>Glycaemic Control:</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Renal Function:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creatinine &amp; electrolytes</td>
</tr>
<tr>
<td>Urinalysis</td>
</tr>
<tr>
<td>ACR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lipids:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liver function tests:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

## Self-Monitoring

<table>
<thead>
<tr>
<th>Review results &amp; agree individualised goals</th>
</tr>
</thead>
</table>

## Drug Therapy

<table>
<thead>
<tr>
<th>Review diabetes, statin, antihypertensive and aspirin therapies, and all medication</th>
</tr>
</thead>
</table>

## Dietary Review

<table>
<thead>
<tr>
<th>Refer to dietitian / education programme if appropriate</th>
</tr>
</thead>
</table>

## Education

|--------------------------------------------------------------------------------|

## Other information

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
Appendix D

Leaflet: Healthy Eating for Diabetes

If you have Diabetes, a healthy diet is a vital part of your treatment:

✓ Eat regular meals

✓ Avoid sugary foods – chocolates, cakes, honey, jam, marmalade, sweets, ordinary minerals, sweet biscuits
   Artificial sweeteners – Hermesetas, Canderel – may be used as a replacement for sugar in the diet

✓ Include starchy foods with each meal – cereal, bread, potatoes, rice or pasta – and choose wholegrain or high-fibre varieties. Try to eat the same amount of starchy foods at your meals each day.

✓ Aim to have 5 or more portions of fruit and vegetables daily.
   1 portion = 1 whole fruit e.g. 1 apple or 1 serving of vegetables
   Spread your fruit throughout the day

✓ Try to reduce the amount of fat in your diet:
   Choose low-fat milk, spread, cheese and yoghurt.
   Avoid frying – grill, bake, steam or poach instead.
   Trim all visible fat from meat.
   Avoid fatty foods – crisps, chips, cakes and pastries.

✓ Cut down on salt in cooking and at the table

✓ Try to eat oily fish 2-4 times a week. For example salmon, herring, mackerel, sardines kippers. They can be fresh, frozen or tinned

✓ Drink plenty of fluids – water, diet minerals and sugar-free squashes are allowed freely

✓ Alcohol should only be taken in moderation, especially if you are trying to lose weight. 1 unit = 1 small glass of wine or ½ pint of beer
   Maximum of 3 units /day for men and 2 units / day for women
   Never drink on an empty stomach.

✓ Specialist diabetic products are unnecessary and are often high in fat and expensive.

   Exercise is an essential part of your healthy lifestyle:

✓ It helps your body’s own insulin to work better, keeping your blood glucose levels stable
✓ It helps your heart function better, reducing the risk of heart disease
✓ It helps you achieve weight loss, if you are overweight

A referral to a dietitian should be made by your doctor.
Do not walk barefoot.

Wash feet daily with soap and water that is warm not hot. Test the water with your elbow.

Dry carefully with a soft towel, especially between the toes.

People with Diabetes can get dry skin on their feet and legs, especially in the winter. Daily use of an emollient cream or moisturiser daily will help prevent cracks, especially around the heels.

Inspect feet daily for skin cracks or blisters. If you cannot reach your feet use a hand mirror to make sure your feet are all right, or ask someone else to have a look.

Check inside shoes for any objects or roughness on the inside before putting them on.

Check shoes are not too tight or too loose, take special care with new shoes – wear for short periods initially.

Toe nails should be cut straight across and filed smooth – if you find it difficult to reach your toenails ask a relative or carer to file them for you get the Podiatrist to cut them.

Do not sit too close to fires or radiators and do not use hot water bottles in bed.

Change socks and stockings daily they should be loose fitting, - ideally cotton in summer and a wool mix in winter.

Do not use corn plasters or corn paints.

Visit the Podiatrist/Podiatrist regularly.

Do not rely on the fact that your feet "feel all right" if there is sensory loss you will be unaware of injury. Thus a daily foot inspection is very important to detect any changes such as bleeding, blisters, swelling, infection redness, brown staining in callus. If any of these are detected seek an appointment with your local Podiatrist or GP.
Appendix F:

The Stages of Change Model (Transtheoretical Model)

Pre-contemplation (not thinking about change yet)
Aim: Help realization of the need to lose weight
• Show empathy and understanding
• Explore their understanding of the problems of being overweight
• Provide information and feedback to raise awareness
• Build up their self esteem

Contemplation (thinking about change)
Aim: to tip the balance in favour of change
• Rank positive and negative aspects of losing weight
• Think about past successes and interests (e.g. activities enjoyed in the past)
• List pros and cons of changing food intake and physical activity levels
• Discuss concerns about change
• Develop a support network (e.g. get friends/family involved, join slimming club)
• Record current food and activity habits. Self monitoring helps identify which habits could be changed, using a food and activity diary

Preparation (preparing for action)
Aim: Help determine a suitable plan of action
• Draw attention to problems and difficulties that can be sorted out in advance
• Explore needs and concerns
• Set small SMART goals (specific, measurable, achievable, realistic, timed)
• Ensure it is the persons choice, not yours
• Plan rewards for successful changes (e.g. cinema, massage)
• Identify coping strategies and sources of support
• Continue self-monitoring

Action (taking action)
Aim: encourage action to being about a particular change
• Identify costs, benefits, rewards
• Set targets and evaluate progress
• Develop an action plan
• Develop strategies for coping with temptation and return to old behaviour
• Adopt a ‘one day at a time’ approach
• Practice ways of responding to unwanted social pressures (e.g. when going out)
• Get support from others in the same boat
• Continue self-monitoring
• Reward and reinforce desired behaviours

Maintenance (maintaining a good thing for life)
Aim: consolidate changes achieved
• Continue to apply all relevant strategies
• Coping strategies – identify what triggers lead to a lapse – make plans in advance.
• Review progress to date (this will increase self-confidence).

Relapse prevention
Aim: Help patients renew their commitment to and confidence to change
• Plan ways to cope with lapses and prevent them becoming relapses. The following can be suggested to prevent a relapse:
  • Stop: go away from the situation and think about what has happened
  • Say: it is not a catastrophe. One error does not mean the end of the world
  • Learn: what was going on before the lapse? Think about why it happened
  • Plan: how could this be avoided next time?
  • Be positive: has anything really changed. Review personal goals and motivation.
  • Ask: can anything be done to redress the balance e.g. extra exercise another day to replace a missed session
Appendix G:

Cost Effective Prescribing

The HSE recommend that all drugs should be prescribed generically, and preferably the least expensive generics should be used, when available. Drugs for Diabetes, Hypertension and Dyslipidaemia, which are currently available generically are as follows: (Note: Brand leaders are in Brackets)

<table>
<thead>
<tr>
<th><strong>ACE-Inhibitors</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quinapril</strong> Quinapro, (Accupro)</td>
</tr>
<tr>
<td><strong>Captopril</strong> Capril, Tensopril, Aceomel, Geroten, Captor, (Capoten)</td>
</tr>
<tr>
<td><strong>Captopril/Hydrochlorothiazide</strong> Captor -HCT, (Half – Capozide, Capozide)</td>
</tr>
<tr>
<td><strong>Enalapril</strong> Enap, (Innovace)</td>
</tr>
<tr>
<td><strong>Lisinopril</strong> Byzestra, Zestan, Zesger, Lisopress, Lispril, (Carace, Zestril)</td>
</tr>
<tr>
<td><strong>Lisinopril/Hydrochlorothiazide</strong> Lispril HCT, Zesger Plus, Carace Plus, (Zestoreic)</td>
</tr>
<tr>
<td><strong>Ramipril</strong> Bytrite, Ramic, Ramilo, (Tritace)</td>
</tr>
<tr>
<td><strong>Trandolapril</strong> Odrik, Gopten</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Calcium Channel Blockers</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amlodipine</strong> Amlode, Amlid, Myostin, (Istin)</td>
</tr>
<tr>
<td><strong>Nifedipine</strong> Nifed, (Adalot)</td>
</tr>
<tr>
<td><strong>Verapamil</strong> Verisop, Isoptin, (Veramil)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Aspirin</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aspirin E.C. 75mg</strong> Caprin, (Nuseals Aspirin)</td>
</tr>
<tr>
<td><strong>Aspirin Dispersible 75mg</strong> Aspirin dispersible (Cox) 75mg, (Lowasa)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Beta-Blockers</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Atenolol</strong> Atecor, Trantalol, Atenomel, Amolin, Ateni, (Tenormin)</td>
</tr>
<tr>
<td><strong>Bisoprolol</strong> Bisocor, Emcolol, Soprol, Bisopine, Cardicor, (Emcor)</td>
</tr>
<tr>
<td><strong>Celiprolol</strong> Seliprol, (Selectol).</td>
</tr>
<tr>
<td><strong>Co-Tenidone</strong> Atecor CT, Atenetic, (Tenoret 50, Tenoretic)</td>
</tr>
<tr>
<td><strong>Metoprolol:</strong> Metocor, Metop, (Betaloc)</td>
</tr>
<tr>
<td><strong>Sotalol:</strong> Sotoger, (Sotacor)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sulphonylureas</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gliclazide (80mg only):</strong> Diaclide, Diabrezide (Diamicron).</td>
</tr>
<tr>
<td><strong>Glibenclamide:</strong> Glibenclamide (Gerard), (Daonil).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Biguanides</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metformin:</strong> Gerformin, (Glucophage)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Statins</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pravastatin</strong> Cholstat, Bystat, Pravitin, Pravat, Pravame, (Lipostat).</td>
</tr>
<tr>
<td><strong>Simvastatin</strong> Simvastatin (IVAX), Simator, Simzor, Simtan, Ritechol, Sivatin, (Zocor).</td>
</tr>
</tbody>
</table>
## Appendix H:
### Diabetes & Driving – European Regulations

<table>
<thead>
<tr>
<th>Country - Source of information</th>
<th>Driver Group</th>
<th>Type 2 Diet alone</th>
<th>Type 2 Diet &amp; tablets</th>
<th>Type 1 / 2 Insulin treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium Presentation of Paul van Crombrugge</td>
<td>2</td>
<td>Diet, metformin, glitazones: certification of GP regular follow up compliance limitation 5/3 years</td>
<td>Other OHD, insulin: certification of specialist regular follow up compliance, education limitation 3/5 years</td>
<td></td>
</tr>
<tr>
<td>Denmark Trafikministeriets bekendtgørelse om kørekort 2000 trafikministeriets cirkulaere 2000</td>
<td>1</td>
<td>Certification of GP limitation 5 years appropriate review</td>
<td>Certification of GP limitation 5 years no hypo in last 2 years</td>
<td>Certif. of medic. Officer limitation 2 years no hypo in last 2 years</td>
</tr>
<tr>
<td>Germany &quot;Begutachtungs-Leitlinien zur Kraftfahrereignung&quot; BASt 2000</td>
<td>2</td>
<td>Exceptional cases no hypo for 3 month 3 yearly review GP</td>
<td></td>
<td>Very exceptional cases certification of specialist 2 yearly review</td>
</tr>
<tr>
<td>Great Britain For medical practitioners &quot;At a glance&quot; DVLA 9-2004</td>
<td>1</td>
<td>No restriction if satisfactory control and hypo awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Not notifiable if no complications</td>
<td>Licence until 70 if no complication</td>
<td>1,2, or 3 year licence awareness of hypos, visual standards</td>
<td></td>
</tr>
<tr>
<td>Spain Annex IV. National regulations for drivers (Royal Decree-law 772/97 modified by royal decree-law 1598/04)</td>
<td>1</td>
<td>No restriction. It is not allowed DM with severe metabolic problems that required hospital attendance.</td>
<td>Conditional Licence with medical (GP) certificate* mandatory</td>
<td>Specialized report* is mandatory. Renewal every 4 years.</td>
</tr>
<tr>
<td>2</td>
<td>Specialized report* is mandatory. Renewal every 3 years.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Netherlands Regeling eisen 2000</td>
<td>1</td>
<td>No restriction if satisfactory control and free of complications Limitation 5 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Exceptional cases certif. of specialist satisfactory control free of complications self-monitoring. Compliance. Limitation 3 years</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix I:
Work and Diabetes: Patient Advice Leaflet

When choosing a job
Diabetes may be misunderstood and feared by some employers. If you are the right person for the job, it is important that you can show that diabetes will not affect your work. Always tell your colleagues you have diabetes and explain that it will have no impact on your performance when well controlled. Explain hypoglycaemia and what needs to be done in an emergency.

Restricted jobs
At present treatment with insulin precludes entry into the following professions: The Gardai, fire and ambulance services, armed forces, train drivers, airline pilots/air traffic control and bus drivers.
Diabetes is not a disability. People who feel they have been discriminated against should consult the Diabetes Federation of Ireland and their solicitor.

Enjoy a successful career
Apart from any legal restrictions concerning jobs in your country, you should be able to choose work that you enjoy and do well. People with diabetes can be found working in many fields. There is no reason why you cannot enjoy a successful career, just because you have diabetes. However, before you choose a job, think about how control of your diabetes will fit into the demands of that job.

Irregular working hours
Regular working hours make it easier to control your blood sugar. This does not mean that you cannot choose a job with irregular working hours or shift work but you will have to plan more carefully. When will you eat? When will you exercise? Will you be able to tailor your diabetes treatment to your working hours? You may have to test your blood sugar more often and increase the number of insulin injections you take each day. If you are working at a job with irregular hours, discuss your treatment plan with your diabetes care team.

Your work place
Think about your work place. Is there somewhere for you to keep supplies and to test your blood sugar when necessary? Will you be able to have a snack if you need one? Is there a co-worker who is willing to learn to recognise signs of hypoglycaemia and to help you if necessary? Many work places already fit this description. You may be able to help your employer adapt to your situation.

Source: Diabetes Federation of Ireland