Type 2 Diabetes

Guidelines and Management

Diabetes Day Centre, Beaumont Hospital
Foreword

These guidelines were devised by the Diabetes Day Centre in Beaumont Hospital in consultation with a number of primary care practices in the North Dublin Area.

The guidelines have a number of objectives:

Improve delivery and quality care of patients with type 2 diabetes attending both their GP and the specialist diabetes team in Beaumont Hospital

Develop integration of care between primary care and the diabetes service in Beaumont Hospital for patients with type 2 diabetes

As an educational resource for both primary care and Beaumont Hospital

It is hoped that these guidelines are the start of a process to improve communication and consultation between the hospital and primary care and that further initiatives will follow which will continue to develop integrated care for patients with type 2 diabetes

Yours Sincerely

Dr Diarmuid Smith
Consultant Endocrinologist

Professor Chris Thompson
Consultant Endocrinologist

Dr Amar Agha
Consultant Endocrinologist

Helen Twamley
CNS Diabetes Integrated Care

Clinical Nurse Specialist - Diabetes Integrated Care

Amanda Ledwith | email Amanda.ledwith@hse.ie | Tel 086 8139734

Helen Twamley | email helen.twamley@hse.ie | Tel 0860478100

These nurses can assist your practise in setting up diabetes clinics, support existing clinics or provide training and educational updates on diabetes management

HbA$_{1c}$

During 2010 a new type of measurement was introduced for measuring the average blood glucose level. This means HbA$_{1c}$ is now recorded in mmol/mol (millimols per mol) instead of percentage. Both readings are shown below.

<table>
<thead>
<tr>
<th>HbA$_{1c}$ (%)</th>
<th>4</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA$_{1c}$ (mmol/mol)</td>
<td>20</td>
<td>42</td>
<td>53</td>
<td>64</td>
<td>75</td>
<td>86</td>
</tr>
</tbody>
</table>

No diabetes | In target range | Above target range
## Diagnosis guidelines

### Guidelines for Practice Nurses

#### Diagnosis of Diabetes

- 2 FPG \( \geq 7.0 \text{ mmol/L} \) or
- OGGT 2hr glucose value \( \geq 11.1 \text{ mmol/L} \) or
- Random glucose \( \geq 11.1 \text{ mmol/L} \) with osmotic symptoms or
- HbA\(_1c\) \( \geq 6.5\% / 48 \text{ mmol/L} \) on two occasions

#### Data to be collected at diagnosis

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test/Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight/BMI</td>
<td>LFTs</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>TFTs</td>
</tr>
<tr>
<td>Waist circumference</td>
<td></td>
</tr>
<tr>
<td>HbA(_1c)</td>
<td>Urine for microalbumin (ACR)</td>
</tr>
<tr>
<td>Fasting lipid profile</td>
<td>eGFR</td>
</tr>
<tr>
<td>FBC</td>
<td>Ferritin &amp; transferrin saturation</td>
</tr>
<tr>
<td>U&amp;E</td>
<td>ECG</td>
</tr>
</tbody>
</table>

#### Diagnosis of Type 2 Diabetes

- HbA\(_1c\) \( \leq 8.0\% / 64 \text{ mmol/mol} \); Consider lifestyle modification for 3 months, especially if intake of refined carbohydrates are high.
- HbA\(_1c\) \( \geq 8.1\% / 65 \text{ mmol/mol} \); Commence oral hypoglycaemic agents.
- Optimise Blood Pressure to < 140/80 mm/Hg
- Teach blood glucose monitoring as per national guidelines and inform about maintaining targets of 4.0 - 7.0 mmol/L pre meals.
- Give information on healthy eating and exercise. Leaflets available from Diabetes Centre.
- Provide patient with Diabetes Passport.
- Carry out foot assessment and classify foot risk according to National model of footcare
- Refer for retinal screening

#### Referral to Beaumont Diabetes Service

Patients are triaged according to their HbA\(_1c\) result and are invited to attend a structured education programme for Type 2 Diabetes called DESMOND.

Here they receive education about T2DM and diet, exercise, blood glucose testing, targets and diabetes medications.

1. If your patient has a fasting plasma/blood glucose > 18.0 mmol/L or positive ketones or a foot ulcer then they will be seen as an emergency. Please fax referral to the Diabetes Day Centre.

2. Annual Review in OPD (once engaged) Patients will be placed on a waiting list for a consultant review in OPD

Diabetes management should take place in general practice 4/6 monthly

#### Triage for Desmond

- If HbA\(_1c\) < 8.0% / 64 mmol/mol - Routine DESMOND appointment
- If HbA\(_1c\) 8.0 - 9.9% / 64 - 85 mmol/mol - DESMOND in 3/12
- If HbA\(_1c\) > 10% / 86 mmol/mol - DESMOND in 2-3 /52.

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*Osmotic symptoms include polyuria, nocturia and polydypsia
Management in GP Service 4-6 monthly

- Assess knowledge of self management skills / self monitoring skills
- Optimise cardiovascular risk factors
- Carry out foot assessment as per national model of foot care
- Provide patient with a Diabetes Passport if they do not already have same, and record information in Passport
- If a change is made to medication, patients should be reviewed in GP practice with repeat bloods after 4 to 6 months
- Refer to National Retinopathy Screening Programme

Data to be collected at 4-6 monthly intervals in GP service

<table>
<thead>
<tr>
<th>Every visit</th>
<th>Weight</th>
<th>BMI</th>
<th>Waist Circumference</th>
<th>Blood Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bloods at Annual Review</td>
<td>HbA1c</td>
<td>Lipids (Fast if not on insulin)</td>
<td>U/E</td>
<td>LFTs</td>
</tr>
<tr>
<td>Bloods at review visit</td>
<td>HbA1c</td>
<td>Lipids</td>
<td>LFTs</td>
<td>U/E</td>
</tr>
</tbody>
</table>

Blood Glucose Testing

Patients on diabetes medications are encouraged to test their blood glucose. Frequency depends on the treatment they are on - liaise with DDC or Clinical Nurse Specialist (Diabetes Integrated Care) for advice. Patients should wash their hands before testing.

Glucometers should be replaced every 2 - 3 years. Patients should register the meter with manufacturing company.

If blood glucose levels are > 9.0 mmol/L consistently for 2/52, patients are advised to contact DDC or GP for a review of medication.

If health professionals use Glucometers in surgery on multiple patients, quality control testing should be carried out on a regular basis. Contact relevant company for information on this.

Notes

Patients can be referred to CODE or XPERT education programmes instead of DESMOND - see HSE website for referral details.

If patient is not suitable for group education please state this in hospital referral letter then patients can be reviewed individually in Diabetes Centre.

Diabetes Passports are available from Beaumont Diabetes Centre and Clinical Nurse Specialist (Diabetes Integrated Care).

Please advise patients to bring their passport to each diabetes hospital appointment and GP/Practice nurse appointments.

Patients with Pre diabetes – screen annually for diabetes and advise re diet and lifestyle modification. Patient Information Leaflets are available from Diabetes Centre.
**Adult presenting with Type 2 Diabetes Mellitus**

**ADULT PRESENTING WITH TYPE 2 DIABETES MELLITUS**

- **Target HbA1c ≤ 7% (53 mmol/mol)**
  - Targets and treatment should be individualised
- **Dietary advice; weight loss; increased physical activity**
  - Refer to Diabetes Day Centre, Beaumont Hospital (DDC)
  - GP Review in 3 to 4 months

**Target HbA1c achieved?**

- **No**
  - **BMI 18-25 kg/m²**
    - **Asymptomatic**
      - Symptomatic
        - Eg. Weight-loss, polydypsia, polyuria
      - **METFORMIN 500 mg twice daily (titrate to max. dose 1000 mg BD until HbA1c target achieved)**
    - **BMI 25-30 kg/m²**
      - **HBA1C TARGET NOT ACHIEVED**
        - Option 1
          - SU and titrate + Metformin
        - Option 2
          - DPP-4 + Metformin
        - Option 3
          - GLP 1 + Metformin
        - Option 4
          - SGLT2 + Metformin

**HBA1C TARGET NOT ACHIEVED**

- Remains symptomatic
  - Eg. further weight loss, ketones
  - Add DPP-4 or SGLT2
- **HBA1C TARGET NOT ACHIEVED**
  - Contact Diabetes Day Centre
Hypoglycaemic Agents

Continue diet/exercise. Review 4 mths

HBA1c TARGET NOT ACHIEVED

Option 1
GLP1 + Metformin
Esp. if BMI >35 kg/m²

Option 2
DPP4 + Metformin

Option 3
SGLT2 + Metformin

Option 4
SU and titrate + Metformin

HBA1c TARGET NOT ACHIEVED

Add SGLT2 or SU and titrate

Add GLP1 (stop DPP-4) or SGLT2 or SU and titrate

Add GLP1 or DPP-4 or SU and titrate

Add GLP-1 or DPP-4 or SGLT2

HBA1c TARGET NOT ACHIEVED

Ketonuria, ketonaemia or blood glucose>18mmol/L)

Seek urgent specialist advice from DDC

BMI >30 kg/m²

METFORMIN 500 mg BD (titrate to max. dose 1000 mg BD until HbA1c target achieved)

Yes

Contact Diabetes Day Centre
Pharmacological Therapy for Type 2 Diabetes Mellitus

Metformin
First line for T2DM especially if overweight (BMI ≥ 25kg/m²)
Side effects include GI upset, Vitamin B12 deficiency
Contraindicated in renal impairment creatinine > 150 umol/L or eGFR < 30 ml/min
Use with caution in those with creatinine > 130 - 150 umol/L or eGFR < 45 ml/min - seek specialist advise.
Check B12 levels annually

Insulin Secretagogues (Sulphonylureas (SU), Prandial glucose regulators)
Sulphonylurea is the insulin secretagogue of choice: to optimise compliance use Gliclazide MR 30 mg up to 120 mg or Glimepiride 1 mg up to 6 mg once daily
Side effects include hypoglycaemia and weight gain. Education on hypoglycaemia treatment and prevention is essential
Use with caution in renal impairment

GLP 1 Agonist (GLP-1)
Use in overweight or obese individuals. May promote weight loss
Given as a S/C injection - Medications in this class include: Liraglutide OD S/C injection, start at 0.6 mg and titrate every 2 weeks to 1.8 mg per day as tolerated. Exenatide 5 mcg BD S/C injection increasing to 10 mcg BD S/C. Exenatide LAR 2 mg once weekly. Dulaglutide Monotherapy 0.75mg weekly add on therapy 1.5mg weekly
Side effects include: nausea, bloating, diarrhoea, pancreatitis (rare). Avoid in patients with history of pancreatitis and medullary thyroid cancer. In combination with sulphonylurea, may need to reduce the dose of sulphonylurea to prevent hypoglycaemia. No long-term safety data

Dipeptidyl Peptidase-4 Inhibitors (DPP-4)
Medications in this class include:
Sitagliptin 100 mg OD or 50 mg BD
Vildagliptin 50 mg BD
Saxagliptin 5 mg OD
Linagliptin 5 mg OD (can be used in renal failure)
Side effects include: nausea, dizziness, headache, sinusitis.
Higher risk of heart failure observed in high C.V. risk patients on Saxagliptin
Fixed dose combinations with Metformin available
No long term safety data

Thiazolidinediones (TZD/Pioglitazone)
TZDs can be given if Metformin poorly tolerated or in combination with Metformin, Sulphonylurea or DPP-4 inhibitor.
Start Pioglitazone 15 mg up to 45 mg once daily
Side effects include weight gain, fluid retention and anaemia.
AVOID IN HEART FAILURE, history of heart failure or active liver disease. Measure LFT at baseline then at review
May increase risk of bladder cancer
Avoid in elderly females with high fracture risk. TZD reduce bone mineral density in post menopausal women

Sodium Glucose like Transporters-2 (SGLT2)
Dapagliflozin 10 mgs OD. Do not use if eGFR <60 ml/min
Empagliflozin 10 mgs OD can be increased to 25 mgs OD. Do not use if eGFR <45 ml/min
Canagliflozin 100 mgs can be increased to 300 mgs OD. Reduce dose if eGFR <60 ml/min and stop if eGFRs <45ml/min.
Caution in patients with amputation risk.
Side effects include urinary tract infections, genital infections, postural hypotension. Increased urinary output which can cause volume depletion. Increased risk of ketosis. Use with caution in elderly (> 75 yrs) and patients on loop diuretics.
No long term safety data.
Treatment of Hypertension in Type 2 Diabetes Mellitus

Target BP 140/80 mm Hg

If not meeting target, add in next agent in algorithm

Consider specialist referral (three or more agents)

BP >140/90 mm Hg on 2 separate visits, or on 24hr ABPM

Lifestyle modifications

ACE Inhibitor or Angiotensin Receptor Blocker

Calcium Channel Blocker

Thiazide Diuretic

Beta Blocker (for ischaemic heart disease)

Thiazide Diuretic

Calcium Channel Blocker

Calcium Channel Blocker

Beta Blocker

Beta Blocker

Thiazide Diuretic

Alpha Blocker

Alpha Blocker

Alpha Blocker

Aldosterone Antagonist

Centrally Acting Agents

Specialist advice recommended
Principles

Targets should be individualised, e.g.
- a lower target (BP 125/75 mm Hg) may be appropriate in patients with nephropathy
- a higher target may be desirable for elderly, frail patients

Frequency of monitoring
- blood pressure should be checked at each clinic/surgery visit and recorded in Diabetes Passport
- (minimum of six monthly)

Lifestyle advice
- smoking cessation
- reduce alcohol intake
- low salt diet
- weight loss

Practice Points

Most patients will require two or more antihypertensive agents to achieve target blood pressure

Combination tablets are widely available, particularly for ACE or ARB with thiazide, or with calcium channel blocker, and may improve patient compliance

Lower doses of multiple agents may be more effective than maximum doses of single agents, and may reduce the risk of side effects

Renal function should be checked 1-2 weeks after commencement of ACE, ARB or loop diuretic due to risk of hyperkalaemia (ACE/ARB) or rising urea and creatinine (ACE/ARB/loop diuretic)

The use of ACE I and ARB combined may increase the risk of adverse outcomes and is not recommended except under specialist supervision

Low dose thiazide diuretics should only be used

Drug Description Table

<table>
<thead>
<tr>
<th>Drug</th>
<th>Generic names</th>
<th>Indications</th>
<th>Contraindications</th>
<th>Side-effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ace Inhibitors</strong></td>
<td><strong>Benzapril, Captopril, Cilazapril, Enalapril, Lisinopril, Perindopril, Quinapril, Ramipril, Trandolapril</strong></td>
<td><strong>Hypertension, Heart Failure, Secondary Prevention, Diabetic Nephropathy</strong></td>
<td><strong>Pregnancy, Renal Artery Stenosis</strong></td>
<td><strong>First Dose Hypotension, Angiodema, Cough, Hyperkalaemia</strong></td>
</tr>
<tr>
<td><strong>Angiotensin Receptor Blockers</strong></td>
<td><strong>Candesartan, Eprosartan, Irbesartan, Losartan Olmesartan, Telmisartan, Valsartan</strong></td>
<td><strong>Hypertension, Heart Failure, Secondary Prevention, Diabetic Nephropathy</strong></td>
<td><strong>Pregnancy, Severe Hepatic Impairment, Renal Artery Stenosis</strong></td>
<td><strong>First Dose Hypotension, Angiodema, Cough, Hyperkalaemia</strong></td>
</tr>
<tr>
<td><strong>Calcium Channel Blockers</strong></td>
<td><strong>Dihydropyridine-Amlodipine, Felodipine, Lercanidipine Nifedipine Non-Dihydropyridine - Diltiazem, Verapamil</strong></td>
<td><strong>Hypertension, Stable Angina</strong></td>
<td><strong>Aortic Stenosis, Acute Heart Failure</strong></td>
<td><strong>Ankle Oedema</strong></td>
</tr>
<tr>
<td><strong>Thiazide and related diuretics</strong></td>
<td><strong>Bendroflumethiazide, Hydrochlorothiazide, Indapamide, Chlortalidone</strong></td>
<td><strong>Hypertension</strong></td>
<td><strong>Severe Renal or Hepatic Failure</strong></td>
<td><strong>Hypokalaemia Hyponatraemia, Gout. Use with caution in elderly patients</strong></td>
</tr>
<tr>
<td><strong>Alpha Blockers</strong></td>
<td><strong>Doxazosin, Prazosin</strong></td>
<td><strong>Hypertension, Benign Prostatic Hyperplasia</strong></td>
<td><strong>Orthostatic Hypotension</strong></td>
<td><strong>Postural Hypotension</strong></td>
</tr>
<tr>
<td><strong>Beta Blockers</strong></td>
<td><strong>Atenolol, Bisoprolol, Carvedilol, Metoprolol, Nebivolol, Sotalol</strong></td>
<td><strong>Hypertension, Angina, Arrhythmias, Secondary Prevention</strong></td>
<td><strong>Bradycardia, Acute Heart Failure, Heart Block, Untreated Phaeochromocytoma</strong></td>
<td><strong>Fatigue, Erectile Dysfunction, Heart Block</strong></td>
</tr>
</tbody>
</table>
Dyslipidaemia in Type 2 Diabetes

Previous vascular event?

- No
  - Age < 40 yrs
    - Poor CV risk profile
      - Consider statin
  - Age > 40 yrs
    - Start statin and titrate to reach target

- Yes
  - Lipid targets not achieved
    - Add Ezetimibe 10 mg once daily
    - Lipid targets not achieved
    - Seek expert opinion

Lipid targets not achieved

- Increase above agents to maximum dose
  - Atorvastatin 80 mg or Simvastatin 40 mg daily
  - Lipid targets not achieved
  - Switch to alternative statin eg Rosuvastatin 40 mg once daily
  - Lipid targets not achieved
  - Add Ezetimibe 10 mg once daily
  - Lipid targets not achieved
  - Seek expert opinion

If symptomatic on statin therapy, stop statin and then re-challenge with alternative statin at low dose and titrate slowly.

If intolerant of statin, try alternative lipid lowering agent - seek expert advice.

Patients with target HbA1c and fasting hypertriglyceridaemia > 5.0 mmol/L, consider addition of fibrate, seek specialist opinion.
Antiplatelet therapy in Type 2 Diabetes

Previous vascular event?

No

Male > 50 yrs; Female > 60 yrs plus one other risk factor
One or more of:
- Microalbuminuria
- Smoker
- Asymptomatic carotid artery disease (stenosis > 30%)
- Atrial fibrillation (if not on Warfarin)
- Peripheral arterial disease
- Angina

Start low dose daily aspirin 75-150 mg OD
Contraindications to antiplatelets apply
If Aspirin allergy / intolerance, give Clopidogrel 75 mg OD
Combination therapy reasonable for up to 12 months after acute coronary syndrome

Yes
Microalbuminuria in Type 2 Diabetes

The diagnosis of microalbuminuria is based on 2 positive results within a 6 month period.

*ACR should be measured on a first pass specimen. If abnormal, the measurement should be repeated to confirm diagnosis. ACE I / ARB are contraindicated in pregnancy. Premenopausal women should be counselled appropriately. Check U&E prior to, and within 2 weeks following initiation of ACE I / ARB. Expect up to a 15% decrease in eGFR when commencing ACE I / ARB.
Diabetes Day Centre, Beaumont Hospital

www.beaumont.ie/diabetescentre

Diabetes Centre
Telephone: (01) 809 2744 / 5
Fax: (01) 809 3370

Opening Hours
Monday to Friday: 8.00am to 4.00pm.

Urgent referrals
Please fax referral letter to Diabetes Centre

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