Guidelines to assist General Practitioners in the Management of Type 2 Diabetes

April 2010
Foreword

The 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:

• To improve delivery and quality of care for patients with Type 2 diabetes attending both their primary care physician and the specialist diabetes team in Beaumont Hospital.

• To 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  
Professor Chris Thompson  
Dr Amar Agha  
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Consultant Endocrinologist  
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Diabetes Centre
Criteria for 2 Yearly Review

- **Type 2 Diabetes**
  - HBA1c < 7.0% (< 53 mmol/mol) either on diet or oral hypoglycaemic agents
  - No history of severe hypoglycaemia
  - Normal 12-lead ECG
  - No micro-vascular complications
    - No renal failure (Creatinine >135umol/L)
    - No retinopathy
    - No history of foot ulcer / Charcot foot / peripheral neuritis or severe peripheral arterial disease (PAD)
Criteria for Annual Review

• **Type 2 Diabetes**
  – HBA1c > 7.0% (>53 mmol/mol) either on diet or oral hypoglycaemic agents or GLP-1 injections
  – History of severe hypoglycaemia
  – Abnormal 12-lead ECG
  – Documented micro-vascular complications
    • Renal failure (Creatinine >135umol/L)
    • Microalbuminuria
    • Retinopathy
    • History of foot ulcer / Charcot foot / peripheral neuritis or severe PAD

Patients with Type 2 diabetes on insulin may need to be seen every 6 months in the clinic
Aim of the Guidelines

• Increase integration of care and improve communication between Beaumont Hospital diabetes service and primary care.

• Educational resource.

• Assist primary care in
  – Management of type 2 diabetes between annual or 2-yearly hospital clinic visits
• From July 2010, a new type of measurement is being introduced for measuring HbA1c. This will mean the HbA1c will be recorded in mmol/mol instead of %.

A guide to the new values expressed as mmol/mol

<table>
<thead>
<tr>
<th>Current DCCT aligned HbA1c (%)</th>
<th>New IFCC HbA1c (mmol/mol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td>20</td>
</tr>
<tr>
<td>5.0</td>
<td>31</td>
</tr>
<tr>
<td>6.0</td>
<td>42</td>
</tr>
<tr>
<td>6.5</td>
<td>48</td>
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<tr>
<td>7.0</td>
<td>53</td>
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<tr>
<td>7.5</td>
<td>58</td>
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<tr>
<td>8.0</td>
<td>64</td>
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<tr>
<td>9.0</td>
<td>75</td>
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<tr>
<td>10.0</td>
<td>86</td>
</tr>
</tbody>
</table>
Target HbA1c

• **On Hypoglycaemic Agents**
  – 6.5% (48 mmol/mol) – 7.0% (53 mmol/mol) with no severe hypoglycaemia

• **On Insulin therapy**
  – < 7.0% (<53 mmol/mol) with no severe hypoglycaemia

• This is a guide only, as patients individual circumstances need to be taken into consideration,
  – elderly, living alone, dementia, co-existing morbidities
Frequency of HbA1c testing

• Test HbA1c 3 months after change in dose or addition of new hypoglycaemic agent

• If patient is stable and HBA1c is in target then test every 6 months

• Do not test more than 3 monthly
Type 2 DM – BMI (18.5 - 27 kg/m²)

Asymptomatic new T2 patient, no weight loss, no ketones

Commence on Metformin 500mg bd

Titrate Metformin to maximum dose (1g bd) if HbA1c > 7.0 % (> 53 mmol/mol)

Add in Sulphonylurea once daily if HbA1c remains > 7.0 % (> 53 mmol/mol)
  (Titrate dose to maximum dose, to achieve target)
  For example: start Gliclazide MR 30mg once daily
  max dose is 120mg once daily

If HbA1c remains > 7.0 % (>53 mmol/mol) Contact Diabetes Centre
Type 2 DM – BMI ($18.5 - 27 \text{ kg/m}^2$)

Symptomatic, weight loss, ketones may be present

Commence on Sulphonylurea once daily.
Titrate dose of Sulphonylurea to maximum dose if blood glucose remains elevated

Refer to Diabetes Day Centre

$\text{HbA1c} > 7.0\%$ (> 53 mmol/mol)
- Further weight loss or ketones present suggests need for insulin therapy
- Refer to Diabetes Day Centre urgently.

$\text{HbA1c} > 7.0\%$ (> 53 mmol/mol)
- Weight stable, no ketones
- Commence Metformin and titrate to maximum dose.

Contact Diabetes Day Centre if HbA1c remains > 7.0 % (> 53 mmol/mol) on maximum oral agents - will need to commence insulin therapy.
Overweight T2 DM BMI > 27 – 30 kg/m²

Commence on Metformin 500mg bd

Increase Metformin to maximum dose (1g bd) if HbA1c > 7.0% (>53 mmol/mol)

If HbA1c remains > 7.0 % (> 53 mmol/mol) will need a second glucose lowering agent

Option 1
Sulphonylurea

Option 2
DPP-4 Inhibitor

The TZD Pioglitazone could also be used in this setting

Liaise with Diabetes Centre or Community Diabetes Nurse for advice
Overweight T2DM  BMI > 27 – 30 kg/m²

Treatment Option 1 in combination with Metformin

Add Sulphonylurea

Titrate dose of Sulphonylurea to maximum dose if HbA1c remains > 7.0% (> 53 mmol/mol)

Assess patient for signs and symptoms of hypoglycaemia

Failure to achieve target Hba1c with Metformin in combination with Sulphonylurea – Contact Diabetes Centre
Overweight T2DM BMI > 27 – 30 kg/m²

Treatment **Option 2** in combination with Metformin

- **DPP-4 Inhibitor**
  - Janumet (1gm/50mg bd – Metformin + Sitagliptin) or
  - Eucreas (1gm/50mg bd – Metformin + Vildagliptin) or
  - Onglyza (Saxagliptin 5mg once daily)

Failure to achieve target Hba1c with Metformin in combination with DPP 4 Inhibitor – Add in Sulphonylurea

- Titrate dose of Sulphonylurea to maximum dose if HbA1c remains > 7.0 % (> 53 mmol/mol)

Failure to achieve target Hba1c with Metformin + DPP-4 Inhibitor in combination with Sulphonylurea – Contact Diabetes Centre
Obese T2DM \( \text{BMI} > 30 – 35 \text{kg/m}^2 \)

Commence on Metformin 500mg bd

Increase Metformin to maximum dose (1g bd) if HbA1c > 7.0 % (> 53 mmol/mol)

If HbA1c remains > 7.0 % (> 53 mmol/mol) will need a second glucose lowering agent

Option 1
Sulphonylurea

Option 2
DPP-4 Inhibitor

Option 3
GLP-1 injection

The TZD Pioglitazone could also be used in this setting
Obese T2DM  BMI > 30 - 35kg/m²

Treatment **Option 1** in combination with Metformin

- Add Sulphonylurea

  - Titrate dose of Sulphonylurea to maximum dose if HbA1c > 7.0% (> 53mmol/mol)

  - Assess patient for signs and symptoms of hypoglycaemia

Failure to achieve target Hba1c with Metformin in combination with Sulphonylurea

Contact Diabetes Centre or Community Diabetes Nurse for advice
Obese T2DM BMI > 30 - 35 kg/m²

**Treatment Option 2 in combination with Metformin**

- **DPP-4 Inhibitor**
  - Janumet (1gm/50mg bd – Metformin + Sitagliptin) or
  - Eucreas (1gm/50mg bd – Metformin + Vildagliptin) or
  - Onglyza (Saxagliptin 5mg once daily)

**Failure to achieve target Hba1c with Metformin in combination with DPP-4**
- Add in Sulphonylurea (continue DPP-4) or GLP 1 injection (stop DPP 4).
  Contact Diabetes Centre or Community Diabetes Nurse for advice
Obese T2DM BMI > 30 - 35 kg/m²

**Treatment Option 3 in combination with Metformin**

- GLP – 1 Injection

Exenatide BD Injection or Liraglutide OD Injection

**Failure to achieve target HbA1c with Metformin in combination with GLP-1 injection – Add in Sulphonylurea**

Contact Diabetes Centre or Community Diabetes Nurse for advice
Obese T2DM BMI > 35kg/m²

Commence on Metformin 500mg bd

Increase Metformin to maximum dose (1g BD) if HbA1c > 7.0 % (> 53 mmol/mol)

If HbA1c remains > 7.0 % (> 53 mmol/mol) will need a second glucose lowering agent

- **Option 1**: GLP-1 injection (preferred option)
- **Option 2**: DPP-4 Inhibitor
- **Option 3**: Sulphonylurea

The TZD Pioglitazone could also be used in this setting
Obese T2DM BMI > 35 kg/m²

Treatment **Option 1** in combination with Metformin

GLP 1 agonist (injection)

Exenatide BD Injection or Liraglutide OD Injection

Failure to achieve target Hba1c with Metformin in combination with GLP 1 agonist - Add in Sulphonylurea.

Contact Diabetes Centre or Community Diabetes Nurse for advice
Obese T2DM **BMI > 35 kg/m²**

**Treatment Option 2 in combination with Metformin**

**DPP-4 Inhibitor**

- Janumet (1g / 50mg bd – Metformin + Sitagliptin) or
- Eucreas (1g / 50mg bd – Metformin + Vildagliptin) or
- Onglyza (Saxagliptin - 5mg once daily)

Failure to achieve target Hba1c with Metformin in combination with DPP-4
- Add in Sulphonylurea (continue DPP-4) or GLP 1 injection (stop DPP 4).
  Contact Diabetes Centre or Community Diabetes Nurse for advice
Obese T2DM  \( \text{BMI} > 35 \text{kg/m}^2 \)

**Treatment Option 3 in combination with Metformin**

1. Add Sulphonylurea
2. Titrate dose of Sulphonylurea to maximum dose if HbA1c > 7.0% (> 53 mmol/mol)
3. Assess patient for signs and symptoms of hypoglycaemia

**Failure to achieve target Hba1c with Metformin in combination with Sulphonylurea**

**Contact Diabetes Centre or Community Diabetes Nurse for advice**
Metformin

Advantages

- Effective
- Promotes weight loss
- No hypoglycaemia
- Long term data

Disadvantages

- Nausea, flatulence, diarrhoea – titrate slowly
- Cannot be used in renal impairment (i.e. Creatinine $\geq$ 130 umol/L) – risk of Lactic Acidosis
- Can cause B12 deficiency

Maximum dose is typically 1gm twice daily
Give dose with food – breakfast and evening meal
## Sulphonylurea

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| • Effective  
• Long term data | • Hypoglycaemia  
• Weight gain  
• ? Accelerate beta cell failure  
• Caution in patients with hepatic cirrhosis and renal impairment – increased risk of hypoglycaemia |

**Medications in this class include:**
- Gliclazide MR (preferred option)
- Glimepiride

**Patient must be educated on the risk and management of Hypoglycaemia**
DPP 4 Inhibitors

**Advantages**

- Weight neutral
- No increased risk of hypoglycaemia
- May preserve pancreatic beta cell function (speculation currently)

**Disadvantages**

- Side effects nausea, abdominal bloating, diarrhoea
- No long-term safety data

**Medications in this class include:**

- Sitagliptin 50mg bd (in combination with Metformin = Janumet)
- Vildagliptin 50mg bd (in combination with Metformin = Eucreas)
- Saxagliptin 5mg once daily
**Advantages**

- Weight loss
- No hypoglycaemia when used on its own
- Reduces post-prandial hyperglycaemia
- Delays gastric emptying
- May preserve pancreatic beta cell function (speculation currently)

**Disadvantages**

- Nausea, bloating, diarrhoea
- Subcutaneous injection
- Pancreatitis (rare)
- No long-term safety data
- In combination with sulphonylurea, may need to reduce the dose of sulphonylurea to prevent hypoglycaemia

**Medications in this class include:**
- Exenatide BD S/C injection
- Liraglutide OD S/C injection
PIOGLITAZONE
(Thiazolidinedione or TZD)

**Advantages**
- No hypoglycaemia
- Insulin sensitizer
- Some data suggests cardiovascular benefit
- Preserve beta cell function

**Disadvantages**
- Weight gain
- Fluid overload
- NOT TO BE USED IN HEART FAILURE
- Increased risk of bone fracture – avoid in patients with metabolic bone disease
- Drop in haemoglobin

Starting dose is 15mg once daily, increased to 45mg a day.
Can be used in combination with Metformin or sulphonylurea or insulin or DPP-4.
<table>
<thead>
<tr>
<th>Type of insulin</th>
<th>Insulin</th>
<th>Onset of action</th>
<th>Duration of action</th>
<th>Time of Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short acting pre-meal insulin</td>
<td>Actrapid</td>
<td>30 – 60 minutes</td>
<td>5 - 8 hours</td>
<td>20 minutes pre-meals</td>
</tr>
<tr>
<td></td>
<td>Insuman Rapid</td>
<td>30 – 60 minutes</td>
<td>5 - 9 hours</td>
<td>20 minutes pre-meals</td>
</tr>
<tr>
<td></td>
<td>Humulin S</td>
<td>30 – 60 minutes</td>
<td>5 - 8 hours</td>
<td>20 minutes pre-meals</td>
</tr>
<tr>
<td>Rapid Acting</td>
<td>Aspart (NovoRapid)</td>
<td>0 – 20 minutes</td>
<td>4 - 5 hours</td>
<td>Immediately as starting to eat</td>
</tr>
<tr>
<td></td>
<td>Giulisine (Apidra)</td>
<td>0 – 20 minutes</td>
<td>4 - 5 hours</td>
<td>Immediately as starting to eat</td>
</tr>
<tr>
<td></td>
<td>Lispro (Humalog)</td>
<td>0 – 20 minutes</td>
<td>4 - 5 hours</td>
<td>Immediately as starting to eat</td>
</tr>
<tr>
<td>Long acting insulin analogue</td>
<td>Glargine (LanuS)</td>
<td>1 – 2 hours</td>
<td>Up to 24 hours</td>
<td>Once daily (Typically with evening meal or bedtime)</td>
</tr>
<tr>
<td>Intermediate Acting insulin</td>
<td>Detemir (Levemir)</td>
<td>1 – 2 hours</td>
<td>14 – 20 hours</td>
<td>Once daily (as per Glargine) Twice daily (with breakfast and at evening meal/ bedtime)</td>
</tr>
<tr>
<td>Mixed insulin Twice A Day</td>
<td>Insulatard</td>
<td>1½ – 2 hours</td>
<td>12 – 18 hours</td>
<td>Once or twice daily (as per Detemir)</td>
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<tr>
<td></td>
<td>Insuman Basal</td>
<td>45 – 60 minutes</td>
<td>12 – 18 hours</td>
<td>Once or twice daily (as per Detemir)</td>
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<td>Humulin I</td>
<td>1½ – 2 hours</td>
<td>14 – 18 hours</td>
<td>Once or twice daily (as per Detemir)</td>
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<td></td>
<td>Novomix 30 30% / 70%</td>
<td>0 – 20 minutes</td>
<td>12 – 16 hours</td>
<td>Twice day, pre breakfast &amp; main evening meal</td>
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<tr>
<td></td>
<td>Mixtard 30 30% / 70%</td>
<td>30 – 60 minutes</td>
<td>12 – 16 hours</td>
<td>Twice day, pre breakfast &amp; main evening meal</td>
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<tr>
<td></td>
<td>Humalog Mix 25% / 75%</td>
<td>0 – 20 minutes</td>
<td>12 – 16 hours</td>
<td>Twice day, pre breakfast &amp; main evening meal</td>
</tr>
<tr>
<td></td>
<td>Insuman Comb 25% / 75%</td>
<td>30 – 60 minutes</td>
<td>19 hours</td>
<td>Twice day, pre breakfast &amp; main evening meal</td>
</tr>
</tbody>
</table>
# Oral Hypoglycaemic Agents

<table>
<thead>
<tr>
<th>Name of Drug</th>
<th>Dose</th>
<th>Max Dose</th>
<th>Time of Administration</th>
<th>Side Effects</th>
<th>Precaution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biguanide</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Metformin</td>
<td>500 mg</td>
<td>1g TDS</td>
<td>Twice daily with food</td>
<td>GI upset</td>
<td>Renal impairment, Cimonic liver disease, Acute CCF, Metabolic acidosis, Lactic acidosis, Contrast studies*</td>
</tr>
<tr>
<td></td>
<td>850 mg</td>
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<td></td>
<td>1000 mg</td>
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<tr>
<td><strong>Sulphonylureas</strong></td>
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<tr>
<td>Gliclazide MR</td>
<td>30 mg</td>
<td>120 mg daily</td>
<td>Once daily with breakfast</td>
<td>Hypoglycaemia, GI upset</td>
<td>Renal impairment, Liver impairment</td>
</tr>
<tr>
<td>Gliclazide</td>
<td>80 mg</td>
<td>160 mg BD</td>
<td>Once or twice daily, with food and evening meal</td>
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<td></td>
</tr>
<tr>
<td>Amaryl</td>
<td>1mg</td>
<td>6 mg daily</td>
<td>Once daily with breakfast</td>
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<td></td>
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<tr>
<td>Amaryl</td>
<td>2 mg</td>
<td>6 mg daily</td>
<td>Once daily with breakfast</td>
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<tr>
<td>Amaryl</td>
<td>3 mg</td>
<td>6 mg daily</td>
<td>Once daily with breakfast</td>
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<td>Amaryl</td>
<td>4 mg</td>
<td>6 mg daily</td>
<td>Once daily with breakfast</td>
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<tr>
<td>Glibenclamide</td>
<td>2.5 mg</td>
<td>15 mg daily</td>
<td>Once or twice daily, with food and evening meal</td>
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<tr>
<td>Glibenclamide</td>
<td>5 mg</td>
<td>15 mg daily</td>
<td>Once or twice daily, with food and evening meal</td>
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<tr>
<td>Thiazolidinedione (TZD)</td>
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<tr>
<td>Rosiglitazone</td>
<td>2 mg</td>
<td>8 mg daily</td>
<td>Once daily</td>
<td>Fluid retention, Weight gain, Anemia</td>
<td>Renal impairment, Metabolic acidosis, Renal impairment, Severe GI disease, Gastroenteritis</td>
</tr>
<tr>
<td>Rosiglitazone</td>
<td>4 mg</td>
<td>8 mg daily</td>
<td>Once daily</td>
<td></td>
<td>Renal impairment, Metabolic acidosis, Renal impairment, Severe GI disease, Gastroenteritis</td>
</tr>
<tr>
<td>Pioglitazone</td>
<td>15 mg</td>
<td>45 mg daily</td>
<td>Once daily</td>
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<td>Renal impairment, Liver impairment</td>
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<tr>
<td>Pioglitazone</td>
<td>30 mg</td>
<td>45 mg daily</td>
<td>Once daily</td>
<td></td>
<td>Renal impairment, Liver impairment</td>
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<td>Pioglitazone</td>
<td>45 mg</td>
<td>45 mg daily</td>
<td>Once daily</td>
<td></td>
<td>Renal impairment, Liver impairment</td>
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<td>GLP-1 Analogue</td>
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<tr>
<td>Exenatide</td>
<td>5 mcg</td>
<td>10 mcg BD</td>
<td>Twice daily SC injection prior to breakfast and evening meal</td>
<td>Nausea, Dizziness, Headache</td>
<td>Liver failure, Liver failure, Severe GI disease, Gastroenteritis</td>
</tr>
<tr>
<td>Exenatide</td>
<td>10 mcg</td>
<td>20 mcg BD</td>
<td>Twice daily SC injection prior to breakfast and evening meal</td>
<td>Nausea, Dizziness, Headache</td>
<td>Liver failure, Liver failure, Severe GI disease, Gastroenteritis</td>
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<tr>
<td>Liraglutide</td>
<td>0.6 mg</td>
<td>1.8 mg</td>
<td>Once daily</td>
<td></td>
<td>Hypoglycaemia, GI upset, Cachexia</td>
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<tr>
<td>Liraglutide</td>
<td>1.0 mg</td>
<td>1.8 mg</td>
<td>Once daily</td>
<td></td>
<td>Hypoglycaemia, GI upset, Cachexia</td>
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<td>DPP-4 Inhibitor</td>
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<td>Sitagliptin</td>
<td>100 mg</td>
<td>100 mg daily</td>
<td>Once daily</td>
<td>Nausea, Dizziness, Headache</td>
<td>Renal impairment, Liver impairment</td>
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<td>Sitagliptin</td>
<td>2.5 mg</td>
<td>5 mg daily</td>
<td>Once daily</td>
<td>Nausea, Dizziness, Headache</td>
<td>Renal impairment, Liver impairment</td>
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<td>Vildagliptin</td>
<td>50 mg</td>
<td>50 mg BD</td>
<td>Twice daily</td>
<td>Nausea, Dizziness, Headache</td>
<td>Renal impairment, Liver impairment</td>
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<tr>
<td>Vildagliptin</td>
<td>50 mg</td>
<td>50 mg BD</td>
<td>Twice daily</td>
<td>Nausea, Dizziness, Headache</td>
<td>Renal impairment, Liver impairment</td>
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<td>Prandial glucose regulator</td>
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<tr>
<td>Repaglinide</td>
<td>0.5 mg</td>
<td>16 mg daily</td>
<td>Before each meal</td>
<td>Hypoglycaemia, GI upset</td>
<td>Renal impairment, Liver impairment</td>
</tr>
<tr>
<td>Repaglinide</td>
<td>1 mg</td>
<td>16 mg daily</td>
<td>Before each meal</td>
<td>Hypoglycaemia, GI upset</td>
<td>Renal impairment, Liver impairment</td>
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<tr>
<td>Nateglinide</td>
<td>60 mg</td>
<td>180 mg TDS</td>
<td>Once daily</td>
<td></td>
<td>Renal impairment, Liver impairment</td>
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<tr>
<td>Nateglinide</td>
<td>120 mg</td>
<td>180 mg TDS</td>
<td>Once daily</td>
<td></td>
<td>Renal impairment, Liver impairment</td>
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<td>Nateglinide</td>
<td>180 mg</td>
<td>180 mg TDS</td>
<td>Once daily</td>
<td></td>
<td>Renal impairment, Liver impairment</td>
</tr>
<tr>
<td>Alpha-Glucosidase Inhibitor</td>
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<td></td>
<td></td>
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<tr>
<td>Acarbose</td>
<td>50 mg</td>
<td>200 mg TDS</td>
<td>1 - 3 times daily with food</td>
<td>GI upset</td>
<td>Little effect on reducing blood glucose levels</td>
</tr>
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<td>Acarbose</td>
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<tr>
<td>Combination tablets</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Sitagliptin &amp; Metformin (Janumet)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitagliptin &amp; Metformin (Janumet)</td>
<td>50 mg</td>
<td>50 mg / 1000 mg BD</td>
<td>1 tablet twice daily with breakfast and evening meal</td>
<td>See individual agents above</td>
<td>See individual agents above</td>
</tr>
<tr>
<td>Vildagliptin &amp; Metformin (Eucreas)</td>
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</tr>
<tr>
<td>Vildagliptin &amp; Metformin (Eucreas)</td>
<td>50 mg</td>
<td>50 mg / 1000 mg BD</td>
<td>1 tablet twice daily with breakfast and evening meal</td>
<td>See individual agents above</td>
<td>See individual agents above</td>
</tr>
<tr>
<td>Pioglitazone &amp; Metformin (Compalet)</td>
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</tr>
<tr>
<td>Pioglitazone &amp; Metformin (Compalet)</td>
<td>15 mg</td>
<td>15 mg / 450 mg BD</td>
<td>1 tablet twice daily with breakfast and evening meal</td>
<td>See individual agents above</td>
<td>See individual agents above</td>
</tr>
<tr>
<td>Rosiglitazone &amp; Metformin (Avandamet)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Rosiglitazone &amp; Metformin (Avandamet)</td>
<td>1mg</td>
<td>4 mg / 1000 mg BD</td>
<td>1 tablet twice daily with breakfast and evening meal</td>
<td>See individual agents above</td>
<td>See individual agents above</td>
</tr>
<tr>
<td>Rosiglitazone &amp; Metformin (Avandamet)</td>
<td>2mg</td>
<td>4 mg / 1000 mg BD</td>
<td>1 tablet twice daily with breakfast and evening meal</td>
<td>See individual agents above</td>
<td>See individual agents above</td>
</tr>
<tr>
<td>Rosiglitazone &amp; Metformin (Avandamet)</td>
<td>3mg</td>
<td>4 mg / 1000 mg BD</td>
<td>1 tablet twice daily with breakfast and evening meal</td>
<td>See individual agents above</td>
<td>See individual agents above</td>
</tr>
</tbody>
</table>

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* Contrast studies – Metformin should be stopped on day of contrast study if normal kidney function (48 hours before if abnormal kidney function is Creatinine > 150 OR EGF < 60mL/min) and only restarted 48 hours after study.*

If repeat U&E post contrast remains normal or unchanged.
Hypertension in T2DM

• Target Blood Pressure is <130/80 mmHg

• Blood Pressure should be checked every 3 months

• Patients often require 3 to 4 anti-hypertensive agents to reach their target blood pressure
Hypertension in T2DM (1)

Target Blood Pressure < 130/80 mmHg

FIRST LINE AGENT
ACE Inhibitor or ARB (first line agent)
(If creatinine >130umol/l check U&E 2-4 weeks after starting therapy)

↓

Fail to achieve target – Add in SECOND LINE AGENT
ACE Inhibitor or ARB
  + Calcium channel blocker (Amlodipine/Lercandipine/Diltiazem)
or
  + Diuretic: low dose Thiazide: 12.5 to 25mg Hydrochlorothiazide
    or Indapamide: 1.5mg once daily
    or Frusemide: 20 to 40mg once daily
Hypertension in T2DM (2)

Target Blood Pressure < 130/80 mmHg

Optimise combination of 1st and 2nd line agents to achieve target BP
(*Thiazides/Indapamide should only be used in low dose)

Fail to achieve target – Add in THIRD LINE AGENT
• If on ACE I or ARB + calcium channel blocker
  then add in diuretic (as before)

• If on ACE I or ARB + diuretic
  then add in calcium channel blocker
Hypertension in T2DM (3)

Add in beta-blocker or aldosterone antagonist as 4\textsuperscript{th} or 5\textsuperscript{th} line agent

\textbf{Rules of thumb}
- Beta blocker should be used as first line if patient has symptomatic angina
- If serum creatinine > 130umol/l – use aldosterone antagonists with caution
- Careful monitoring of U&E required when on aldosterone antagonists
  - If BP responds dramatically to aldosterone antagonists consider renal artery stenosis

\[\downarrow\]

Add in alpha – blockers as 6\textsuperscript{th} line agent
(Can be prescribed earlier if contraindications to other therapies)
Lipids in T2DM

• Check fasting lipids 3 months after starting therapy or after change in dose

• Once on stable dose check fasting lipid profile every 6 months
Lipid-Lowering (1)

no previous vascular event

Targets: LDL cholesterol < 2.6mmol/L
HDL > 1.0mmol/l in men, >1.1mmol/L in women
Triglycerides <1.7mmol/L

LDL cholesterol above target
Start statin: Atorvastatin 10mg* od or
Rosuvastatin 10mg* od or
Simvastatin 10mg* od or
Pravastatin 10mg od

Give at bed-time
Precaution: Renal failure
Liver failure (LFT > 3 times the upper limit of normal-caution)
Previous hx of myositis (avoid statins)
Previous reaction to statin therapy
Teratogenic
*Caution with Warfarin

*Caution with Warfarin
Lipid Lowering (2)

no previous vascular event

Repeat fasting lipid profile 3 months after starting therapy.
Once stable check lipid profile 6 monthly
If patient has a history of renal or liver dysfunction monitor CK and LFT

**LDL cholesterol remains above target**
Increase statin dose: Atorvastatin to max dose of 80mg od
Rosuvastatin to max dose of 40mg od
Simvastatin to max dose of 80mg od
Pravastatin to max dose of 40mg od

**Fail to achieve LDL cholesterol despite max dose**
Try different statin agent (e.g. Atorvastatin more potent than Pravastatin)

**Reaction to Statin therapy**
Documented myositis: avoid statins
Acute deterioration in liver function: avoid statin
Non-specific symptoms: trial of another statin preparation
Lipid Lowering (3)
(no previous vascular event)

Baseline LDL cholesterol < 2.6 mmol/L on no treatment

If more than one CV risk factor other than diabetes.
Start low dose statin

Aim for reduction of > 30% from baseline LDL cholesterol
Lipid-Lowering in patients who have had a previous vascular event.

All patients should be on a statin no matter what their LDL cholesterol is

Target LDL cholesterol < 1.8mmol/L

Adjust therapy as per previous slide to achieve target LDL <1.8mmol/L
Anti-Platelet Agent

- Patients with a previous vascular event – should be on an anti-platelet agent
  - Aspirin 75mg daily
  - or
  - Clopidogrel 75 mg daily

- Patients with no history of a previous vascular event but have one or more of the following – should be on an anti-platelet agent
  - Microalbuminuria
  - Smoker
  - Asymptomatic carotid artery disease (stenosis >30%)
  - Atrial fibrillation (consider Warfarin)
  - Peripheral arterial disease
  - Angina
  - Abnormal 12-lead ECG

Patients with no history of a previous vascular event – do not necessarily need to be on an anti-platelet agent

The usual contraindications to Aspirin and Clopidogrel therapy apply
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
• These protocols are also available on http://www.beaumont.ie/diabetescentre
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