# BARNESLEY DIABETES GUIDELINES
## April 2014

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**Background**

These guidelines have been developed to support the delivery of high quality care for people with diabetes in Barnsley. They originated in Nottinghamshire, incorporating national and international recommendations on standards of care and are evidence-based wherever possible. We are most grateful to Dr Kamal Chokkalingam, Consultant Endocrinologist, Nottingham University Hospitals, and Dr Is Idris, Consultant Endocrinologist, Royal Derby Hospital, for permission to modify them for use in this area.

In the event of significant new research findings or national recommendation, specific areas may be updated on an ad hoc basis. Full revision will be undertaken every two years.

**Please remember: Guidelines provide guidance**

Good clinical practice always involves weighing the advantages and disadvantages of a clinical intervention depending on individual circumstances.

**Guideline Development**

These guidelines have been approved by the Barnsley Local Diabetes Service Advisory Group, which has representation from all interested groups.

**If you have comments on the content of the guidelines, please contact:**

Dr Keith Sands  
E-mail: keith.sands@swyt.nhs.uk  
Medical Directorate, Kendray Hospital, Doncaster Road, Barnsley, S70 3RD

Professor Hugh Jones  
E-mail: hugh.jones@nhs.net  
The Robert Hague Centre for Diabetes, Barnsley Hospital, Gawber Road, Barnsley, S75 2EP

**Specialist team contact details**

**Consultants**

Prof T H Jones 01226 432147  hugh.jones@nhs.net  
Dr P Kosnarova 01226 431896  pavlakosnarova@nhs.net  
Dr Z A K Merza 01226 435366  z.merza@nhs.net  
Dr K A Sands 01226 434050  keith.sands@swyt.nhs.uk  
Dr E C Uchegbu 01226 432598  elizabeth.uchegbu@nhs.net

**Diabetes Specialist Nurses**

Sue Jones (Community DNS Team, Apollo Court) 01226 209884  sue.jones4@swyt.nhs.uk  
Natasha Kelly (Barnsley Hospital)  natashakelly@nhs.net

**Specialist Dietitians for Diabetes**

Paul Pipe-Thomas (BHNFT) 01226 431576  paul.pipe-thomas@nhs.net  
Catherine Storey (SWYPFT) 01226 438837  catherine.storey@swyt.nhs.uk
**ACKNOWLEDGEMENT of those who have contributed to the 2013/14 versions**

We are grateful to all those clinicians and patients in the Nottingham/Derby area who contributed to the development of the original guidelines. The following have made a similar contribution to the refinement of the guidelines for use in Barnsley:

<table>
<thead>
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<th>Name</th>
<th>Role/Position</th>
<th>Organisation</th>
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<tr>
<td>Lynda Alderson</td>
<td>Commercial Services Manager</td>
<td>Evidence into Practice, MSD Ltd</td>
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<tr>
<td>Natalie Bennett</td>
<td>Diabetes Lead Podiatrist</td>
<td>SWYPFT</td>
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<tr>
<td>Dr Sunil Bhimsaria</td>
<td>Consultant Paediatrician</td>
<td>Barnsley Hospital NHS Trust</td>
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<tr>
<td>Joanne Bissell</td>
<td>DSN</td>
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<tr>
<td>Helen Dixon</td>
<td>Dietetic Manager</td>
<td>BHNFT</td>
</tr>
<tr>
<td>Dr Nicholas Fardon</td>
<td>Consultant Nephrologist</td>
<td>Sheffield Kidney Institute</td>
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<tr>
<td>Denise Gibson</td>
<td>Paediatric Specialist Nurse</td>
<td>Barnsley Hospital NHS Trust</td>
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<tr>
<td>Dr Becky Hirst</td>
<td>Consultant in Palliative Medicine</td>
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<tr>
<td>Dr Ranjini Jeyasundarum</td>
<td>Specialty doctor, Contraception &amp; Sexual Health</td>
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<tr>
<td>Professor Hugh Jones</td>
<td>Consultant Endocrinologist</td>
<td>Barnsley Hospital NHS Trust</td>
</tr>
<tr>
<td>Sue Jones</td>
<td>Lead DSN, Service Manager Diabetes</td>
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<tr>
<td>Natasha Kelly</td>
<td>DSN</td>
<td>Barnsley Hospital NHS Trust</td>
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<tr>
<td>Chris Lawson</td>
<td>Head, Medicines Management</td>
<td>NHS Barnsley CCG</td>
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<tr>
<td>Glenn Nicholson</td>
<td>DSN</td>
<td>SWYPFT</td>
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<tr>
<td>Paul Pipe-Thompson</td>
<td>Specialist Dietitian</td>
<td>Barnsley Hospital NHS Trust</td>
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<td>Sarah-May Poppleton</td>
<td>Diabetes Lead Podiatrist</td>
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<tr>
<td>Dr Keith Sands</td>
<td>Assoc Medical Director, Consultant Diabetologist</td>
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<tr>
<td>Richard Staniforth</td>
<td>Lead Pharmacist, Medicines Management</td>
<td>NHS Barnsley CCG</td>
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<tr>
<td>Zoe Styring</td>
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<td>SWYPFT</td>
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<tr>
<td>Dr Elizabeth Uchegbu</td>
<td>Consultant Endocrinologist</td>
<td>Barnsley Hospital NHS Trust</td>
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<tr>
<td>Dr Rachel Vedder</td>
<td>Consultant in Palliative Medicine</td>
<td>Barnsley Hospice</td>
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<tr>
<td>Dr Rebecca Wastling</td>
<td>General Practitioner</td>
<td>Walderslade Practice, Barnsley</td>
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### Referral to Community and Specialist Services

The Barnsley Local Diabetes Service Advisory Group does not recommend referral for adults with uncomplicated newly diagnosed type 2 diabetes. Initial management (diagnosis, education, treatment and monitoring) is the responsibility of Primary Care Teams. Refer via the Community Diabetes Nursing service for structured education.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Category</th>
<th>Urgency</th>
<th>Contact Information</th>
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| **EYE**  
Sudden visual loss | Immediate (within 1 working day) | Accident & Emergency Department (may be referred on to the Eye Department, Rotherham Hospital) | Barnsley Hospital 01226 730000 |
| **FOOT**  
RISK LEVEL 6  
Foot ulceration  
Necrosis/gangrene  
Active Charcot foot | Immediate (within 1 working day) | Fax 01226 434406 (Urgent weekend/out of hours) | 01226 433173/432379 (Queries 9am – 5pm)  
Out of hours Urgent Refer to A&E |
| **RISK LEVEL 2-5**  
Podiatric pathology (eg callus, pathological nails)  
No ulceration | Immediate (within 1 working day) | Choose & Book Podiatry Department New street | 01226 433173 (Queries 9am – 5pm) |
| **METABOLIC**  
Newly diagnosed type 1 | Immediate (within 1 working day) | In working hours contact DSN at Apollo Court (01226 209884)  
Out of hours Bleep on-call Medical Registrar | |
| Protracted vomiting or ketonuria (type 1) | Immediate | Urgent admission via on-call medical team | |
| Newly diagnosed (or suspected) Child or Young person | Urgent/Immediate | Telephone referral to Paediatric Medical team the same day | |
| **PREGNANCY**  
Pregnant | Urgent | Next Diabetes Antenatal Clinic  
Refer via Community Midwife or Community Diabetes Nursing Service (01226 209884, Fax 01226 209888) | |
| Contemplating pregnancy | Elective | Pre-pregnancy clinic (Sue Jones) – DSN referral form | |
| **MANAGEMENT**  
Frequent hypoglycaemic episodes | Elective | | |
| Problems achieving glycaemic, blood pressure or lipid targets | Elective | | |
| Microalbuminuria / proteinuria / renal disease | Elective | | |
| Insulin Pump Therapy | Elective | | |
| Lipid Management | Elective | | |
| Painful neuropathy, mononeuropathy and amyotrophy | Elective | | |
| Erectile dysfunction | Elective | | |
Barnsley Community Diabetes Services

The Community Diabetes Specialist Nursing service was established in Barnsley some years ago and is based at Apollo Court Medical Centre in Dodworth. The aim of the service is to provide high quality care, education and support to patients with newly diagnosed and established diabetes to help them cope with their diagnosis, learn more about their condition and help stabilise their diabetes. It also provides help to people with established diabetes who have problems with their diabetes control, including any aspect of living with diabetes, changing and adjusting medication or coping with the side effects of treatment.

The Community Diabetes Specialist Nurses work closely with the primary care teams and it is anticipated that, in collaboration with local diabetes consultants and the Specialist Dietitians in Diabetes, they will provide clinical support and education to practices that will eventually be commissioned to provide an agreed level of service.

<table>
<thead>
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<th>Service Level</th>
<th>Level of patient care provided by a practice</th>
<th>Workforce competencies required to deliver this level of care</th>
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<tr>
<td>1</td>
<td>Prevention Identification</td>
<td>Registered health care professional (essential criteria) e.g. Registered Nurse, Registered GP or registered health care support worker</td>
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<td></td>
<td>Impaired Glucose Tolerance/Impaired Fasting Glucose</td>
<td>Experience in delivering diabetes in general practice</td>
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<td></td>
<td>Diet controlled type 2 diabetes</td>
<td>Undertake regular continuing professional development in diabetes care</td>
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<td></td>
<td>Annual review</td>
<td>Follow national and locally agreed guidelines and care pathways</td>
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<tr>
<td>2</td>
<td>Type 2 on tablets</td>
<td>Registered health care professional (essential criteria) e.g. Registered Nurse, Registered GP or registered health care support worker</td>
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<tr>
<td></td>
<td>Annual review</td>
<td>Experience in delivering diabetes in general practice</td>
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<tr>
<td></td>
<td></td>
<td>Undertake regular continuing professional development in diabetes care</td>
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<td></td>
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<td>Follow national and locally agreed guidelines and care pathways</td>
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<td>Evidence of an accredited diabetes course e.g. IFL, Bradford, Warwick</td>
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<td>Management of patients stabilised on insulin</td>
<td>Meet the criteria for level 1 and 2 plus</td>
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<td></td>
<td>Annual review</td>
<td>Ensure that levels 1 and 2 are supported through service delivery and where possible self-care is prioritised and actively encouraged</td>
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<tr>
<td></td>
<td>Type 1 and type 2 diabetes</td>
<td>Evidence of an accredited insulin management course</td>
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<td>Attends yearly updates on insulin</td>
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<td>Initiation of insulin and GLP-1 agonists</td>
<td>Meet the criteria for level 1, 2 and 3 plus</td>
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<td>Problem patients</td>
<td>Ensure that levels 1, 2 and 3 are supported through service delivery and where possible self-care is prioritised and actively encouraged</td>
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<td>Unstable diabetes</td>
<td>Have undertaken the training for providing insulin initiation in primary care and stabilisation of patients with Type 2 diabetes</td>
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<td></td>
<td>Annual review</td>
<td>Undertake at least one update session for insulin initiation per year</td>
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Care will continue to be provided in practice and at DSN clinics based in local practices with Consultant support from secondary care.
**Diabetes Structured Education (X-PERT)**
The existing structured group X-PERT education programme was updated and re-launched in July 2012 following the attendance by DSNs and specialist dieticians at national training on the programme.

The service is available to people diagnosed with type 2 diabetes (aged 18 and over). Patients may self-refer or are referred onto the programme when they are newly diagnosed (within the first 6 months of diagnosis) or if they have been identified as having a need for structured education.

**Personalised Care Planning**
The Local Diabetes Service Advisory Group, as part of a redesign of diabetes services within Barnsley, has made personalised care planning across primary, community and secondary care a priority. It is hoped to begin training in 2014.

**Evidence into Practice™**
This programme, a diabetes change management programme, was commissioned by NHS Barnsley with the aim of supporting practices and primary care clinicians to improve outcomes and enhance quality of care for patients with and at risk of diabetes.

The Evidence into Practice programme was implemented by two facilitators from MSD Ltd, who had extensive experience in running it and had no link to product promotion. At the time, it had been run in over 300 practices across the UK, demonstrating impressive results in terms of significant improvements in NICE risk factor target achievement, increases in QOF achievement, reductions in referrals to intermediate/secondary care and increases in the confidence levels of primary care clinicians in all aspects of diabetes management.

The programme commenced in October 2012 and finished in November 2013. Participating practices worked through a series of programme milestones, which included a confidence mapping exercise (beginning and end), the production of a Diabetes Care in Practice (DCiP) report and the running of tailored practice-based educational meetings bringing in local diabetes experts (one DSN and the other consultant-led). Despite starting from a relatively high base, the programme demonstrated small but significant improvements in outcomes over the twelve months and an improvement in the confidence levels of primary care teams and feedback was uniformly positive. Two network meetings were held during the course of the year, the first including presentations on a variety of topics, as well as an interactive case-based session, and the second concentrating on personalised care planning in long-term conditions.
DIABETES SPECIALIST NURSING SERVICE

Referral criteria and referral to the Diabetes Specialist Nursing service
Use of referral criteria is intended to support a more streamlined and responsive diabetes specialist nursing service so that patients with specialist and complex diabetes needs can be seen promptly and at the time and place of need.

Patients must be registered with a Barnsley GP and/or reside in the Barnsley Borough – all other patients will be classed as out-of-area referrals and will be forwarded to the appropriate area.

Patients who may benefit from referral to a Community Diabetes Specialist Nurse

- Patients with type 1 diabetes who have a problem with their diabetes control or psychosocial issues affecting their diabetes.

- Patients with newly diagnosed type 1 diabetes: contacted within the same working day by a Diabetes Specialist Nurse (DSN) and seen if necessary. If a patient presents at a weekend they will be contacted by a DSN the next working day and seen if necessary.

- Patients with type 2 diabetes on maximum oral agents requiring conversion to insulin or to other therapies such as GLP1 therapy. These patients will be assessed and conversion will take place within 4 weeks of referral on an individual basis or within a group.

- Patients on insulin with acute problems with their diabetes control causing hyperglycaemia or hypoglycaemia.

- Patients who are acutely unwell (e.g., diarrhoea/vomiting which is causing problems with their diabetes control).

- Patients newly diagnosed with type 2 diabetes or those with established type 2 diabetes needing an update, for structured group education.

- Patients with type 1 diabetes for structured education programmes.

- Patients with type 1 diabetes for carbohydrate counting.

- Specialist support and education for patients with type 1 diabetes on insulin pump therapy.

- Patients on insulin with difficult to control diabetes requiring a medication review and/or change in the type of insulin regimen (e.g., change to different mix or basal bolus regime) for intensification of their diabetes control.

- Pregnant women with type 1 diabetes, type 2 diabetes, gestational diabetes or impaired glucose tolerance.

- Specialist support for patients with diabetic foot problems.

- Patients discharged from hospital following an episode of diabetic ketoacidosis or any other significant problem causing upset in their glycaemic control.

- Patients new to insulin following acute coronary syndrome should be seen at home within 5 working days of discharge.

- Patients who require advice for fasting for hospital investigations.
THE FOLLOWING WILL NOT BE SEEN BY THE DIABETES SPECIALIST NURSES:

1. Uncomplicated patients with type 2 diabetes on diet alone or diet and tablets **unless** on near maximal oral agents.

2. Patients with type 2 diabetes who need advice on blood glucose testing.

3. Patients who are well controlled on insulin but require 3-6 month reviews.
   All the above categories should be managed in primary care.


5. Patients who display any unreasonable behaviour which is unacceptable to the provider or service staff.

**MODE OF REFERRAL**

**Crisis Intervention and Urgent Referrals**
 Patients will be contacted urgently (same working day) Monday to Friday by a DSN. Referrals should be made to the DSN office by telephone to **01226 209884** or by fax to **01226 209888** or via the emergency mobile phone (**07500 100530**) if they meet the following criteria:

- Newly diagnosed type 1 diabetes.
- Patients who are metabolically unwell with type 1 or type 2 diabetes.
- Patients on insulin with another illness (eg diarrhoea and/or vomiting or infection causing a disturbance in their diabetes control).

PLEASE NOTE THAT ONLY THESE CATEGORIES WILL BE ACCEPTED BY TELEPHONE. OTHER REFERRALS MUST BE MADE BY FAX OR POST.

**Routine Referrals**
 Routine referrals from health care professionals to the DSNs should be either via Choose and Book or in writing by post to:

**Diabetes Specialist Nurses Office**
**Apollo Court Medical Centre**
**High Street,**
**Dodworth**
**Barnsley**
**S75 3RF**

or by fax to **01226 209888**

The faxed referral should be on a Diabetes Specialist Nurse Referral form (revised January 2014). It should also contain the patient’s current medication, recent blood results and their relevant past medical history.

The referral will then be triaged by a DSN and, if it is a crisis (see referral form), will be actioned within the same working day.
## Community Diabetes Specialist Nurse Clinics

<table>
<thead>
<tr>
<th>Clinic Venue</th>
<th>Morning</th>
<th>Afternoon/evening</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monday</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apollo Court, Dodworth</td>
<td>✓</td>
<td>✓ (alternate weeks)</td>
</tr>
<tr>
<td>Cudworth LIFT</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td><strong>Tuesday</strong></td>
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<td></td>
</tr>
<tr>
<td>Goldthorpe LIFT</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Oaks Park</td>
<td>✓</td>
<td>✓ (alternate weeks)</td>
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<tr>
<td>Hoyland LIFT</td>
<td>✓</td>
<td>✓ (alternate weeks)</td>
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<tr>
<td>Thurnscoe LIFT</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td><strong>Wednesday</strong></td>
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<td></td>
</tr>
<tr>
<td>Apollo Court</td>
<td>✓ (drop in)</td>
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</tr>
<tr>
<td>Cudworth</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td><strong>Thursday</strong></td>
<td>✓</td>
<td>✓ (pm and evening)</td>
</tr>
<tr>
<td>Apollo Court, Dodworth</td>
<td></td>
<td>Fortnightly evening sessions will be available from April 2013 (wk 1 and wk 3 of the month)</td>
</tr>
<tr>
<td><strong>Friday</strong></td>
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</tr>
<tr>
<td>Ante Natal Clinic, Barnsley Hospital</td>
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<td>✓</td>
</tr>
<tr>
<td>Wombwell Chapelfields Medical Centre</td>
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<tr>
<td>Athersley Roundhouse Medical Centre</td>
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<td></td>
</tr>
<tr>
<td>Mapplewell Health Centre</td>
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<td>✓</td>
</tr>
<tr>
<td><strong>Patient self-referral</strong></td>
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</tr>
</tbody>
</table>

If a patient is under the care of a Diabetes Specialist Nurse they can self-refer to the service.

Any new patients should be referred to the service by their GPs, or appropriate other health care professional.

Patients requiring urgent help with diabetes-related problems should be encouraged to attend the Drop-In Clinic at Apollo Court Medical Centre on a Wednesday morning from 09.00-12.00. An appropriate management plan can then be discussed with the patient and, if necessary, an appointment made in a DSN-led clinic.
Referral Criteria for Home Visiting

- Patients that are housebound and meet the referral criteria.
- Patients aged 75 years or greater with type 2 diabetes or pregnant ladies needing conversion to insulin therapy, who would be better managed in the home environment.
- Elderly patients (over 75s) on insulin who have an acute problem or complication of their diabetes requiring intensive short term visiting.
- Patients who have other illnesses, debilitating injuries or recent surgical procedure as well as problems with their diabetes, reduced capacity or patients in residential or care homes, making them too unwell to attend clinics.
- Visits should not be made unless patients meet the above criteria.

Patients under the care of Community Nurses (District Nurses and Community Matrons)

The Community Nurses should contact the Diabetes Specialist Nurses, if insulin dose adjustment is required or if there is a specific problem requiring assessment and a change in care.

Patients who have significant memory problems rather than physical or dexterity problems should be under the daily supervision of District Nurses not Diabetes Specialist Nurses.

If patients require a period of intensive blood glucose monitoring referral to the District Nurses is required.

Referrals to the District Nurses from Diabetes Specialist Nurses should be made via the Communications Office. If a Diabetes Specialist Nurse reviews a patient and makes a change to the type or dosage of prescribed insulin therapy this should be written on the green insulin prescription sheet and faxed immediately to the patient’s GP. The District Nurse is then responsible for collecting this prescription prior to administration.

Working Hours of Diabetes Specialist Nurses

Monday to Friday, 08.30 to 17.00.

Currently the nurses work Monday to Friday so there is no Diabetes Specialist Nurse provision for supporting urgent referrals outside of these hours.
Diagnosing Diabetes/Glucose Intolerance

Detection of people with diabetes

Routine screening of non-pregnant, asymptomatic or low risk patient is not recommended.

Recommended:
- **Follow up and regular testing** of individuals known to be at increased risk of developing diabetes.
- Opportunistic Screening of people with multiple risk factors. **A high index of suspicion is needed as many cases remain undiagnosed.**
- Women with risks for gestational diabetes should be screened at 28 weeks with an oral glucose tolerance test (OGTT) *(Box 2)*

High Risk Patient Groups
- Age over 40 years
- Family history of diabetes
- Obesity especially with central distribution
- South Asians and Afro-Caribbeans
- History of gestational diabetes
- Patients with Impaired Glucose Tolerance / Impaired fasting glycaemia
- Patients with ischaemic heart disease, claudication, hypertension or stroke
- Patients with cataract

People with multiple risk factors need advice and support to reduce their risk and information about the symptoms and signs of diabetes

Symptoms
- Polyuria
- Polydipsia
- Weight loss
- Tiredness / Lethargy
- Blurred vision
- Urinary or genital infection
- Skin infection including pruritis

Confirmation of the diagnosis requires a LABORATORY plasma glucose measurement. **Fingerprick samples** should not be used to diagnose diabetes. **Always check for ketones** – the presence of significant ketonuria or ketonaemia indicates insulin deficiency and the need for more urgent intervention.

Criteria for diagnosing diabetes mellitus

**Patient with symptoms of diabetes**
- **Laboratory** HbA1c > 48 mmol/mol (6.5%)
- Random venous plasma glucose (RPG) $\geq 11.1$ mmol/l OR
- Fasting plasma glucose $\geq 7.0$ mmol/l OR
- [2 hour plasma glucose after 75g oral glucose (OGTT) $\geq 11.1$ mmol/l (OGTT)]

**Asymptomatic patient**
Two samples, either random, fasting or after OGTT are needed to confirm the diagnosis. Samples should be taken on different days

**Most cases can be confirmed with a random glucose measurement and HbA1c. An OGTT is very rarely necessary** *(WHO Recommendation 2011)*
HbA1c in the diagnosis of diabetes
- HbA1c of 48 mmol/mol (6.5%) the cut off, but a value <48 mmol/mol does not exclude diabetes
  - Must be laboratory not finger prick sample
  - If asymptomatic, repeat HbA1c. If <48 manage as high risk (if clinically indicated) and repeat test in 6 months (or earlier if symptoms develop)

High risk
- HbA1c 42-47 mmol/mol (6.0-6.4%)
  - Provide intensive lifestyle advice
  - Warn patients to report symptoms of diabetes
  - Monitor annually
- HbA1c under 42 mmol/mol (6.0%)
  - These patients may still have a high risk of developing diabetes
  - Review individual's personal risk and treat as ‘high diabetes risk’ as clinically indicated

HbA1c is not appropriate as a diagnostic tool if
- Presentation is acute (eg type 1 diabetes suspected, all children and young people, acute illness, if medication may have affected blood glucose, pancreatic damage/surgery, pregnancy)
- There is alteration in red cell turnover (eg genetic, haematological and illness-related factors that influence HbA1c)

75g Oral Glucose Tolerance Test (OGTT)
- 12 hour fast prior to test (water only for comfort)
- Refrain from smoking/eating/drinking/exercise during the test
1. Take baseline venous sample for glucose
2. Give 75g oral anhydrous glucose equivalent to:
   - Lucozade 410ml based on a bottle of lucozade being 70 k/cals per 100 mls.
   - Appendix A: Lucozade/OGTT
3. 2 hours later take further venous plasma sample
4. Send sample to laboratory (diagnostic criteria shown above)

Other diagnostic categories:

Impaired Glucose Tolerance (IGT)
- Fasting blood glucose <7 mmol/L and 2hr blood glucose 7.8-11.1 mmol/L
- HbA1c 42-47 mmol/mol (6.0-6.4%)

Impaired Fasting Glycaemia (IFG)
- Fasting blood glucose 6.1-6.9 mmol/L

Impaired Fasting Glycaemia during Pregnancy
Glycaemic targets prior to and during pregnancy
- Fasting glucose (FBG) 3.9-5.3 mmol/L, 1hr blood glucose <7.8 mmol/L, HbA1c 42 mmol/mol (6.1%) or less
- If FBG >5.3 mmol/l and/or 1 hr blood glucose >7.8 mmol/l refer immediately to the next Thursday morning Diabetes Antenatal Clinic
Notes:

- IGT and IFG are not clinical entities but should be considered as continuum risk categories for cardiovascular disease and/or future diabetes. Assess the patient’s cardiovascular disease risk.
- Patients with IGT/IFG should be recorded and receive:
  - Follow-up and regular testing (reviewed at least annually)
  - Education and advice on risk of diabetes / diet / lifestyle modification etc (eg weight loss of 5kg and 30 minutes of moderate exercise 5 times weekly reduces progression to type 2 diabetes by almost 60%)
- Patients with HbA1c 42- 48 mmol/mol, are at risk and should receive demonstrably effective prevention strategies.

Does the newly presenting patient need insulin?

Does an adult patient need referral for insulin at diagnosis of diabetes?

Typical symptoms and a diagnostic blood sugar

YES

Is the patient ill (vomiting or semi-conscious)?

YES Admit to hospital

NO

Is there moderate/heavy ketonuria or ketonaemia?

YES Strong indication for insulin (Same day referral)

NO

Are two or more of the following present?

- Severe symptoms (nocturia x 3-4)
- Short history (weeks)
- Marked weight loss (irrespective of absolute weight)
- A first degree relative with type 1 diabetes
- A personal history of autoimmune disease

YES

Strong indication for insulin (Same day referral)

NO

Is the patient under 30 years of age?

YES

First degree relative diagnosed under 30 years of age on diet or tablets: consider monogenic diabetes – Maturity Onset Diabetes of the Young (MODY)

NO immediate need for insulin

Consider non-urgent referral

NO

No immediate need for insulin. Dietary advice based on healthy eating principles

Referral details Newly diagnosed Type 1
**Type 1 Diabetes**

If type 1 diabetes is suspected the patient should be referred to secondary care diabetes services urgently
- Most patients are young but insulin may be required at any age
- Check urine for ketones. Anything more than minimal ketosis is a strong indication for insulin
- Often associated with marked hyperglycaemia, rapid weight loss and rapid onset of severe symptoms
- Severely ill patients may show features of acidosis including deep, sighing respiration and alteration in conscious level and require **urgent hospitalisation**

Protracted vomiting or ketonuria (Type 1)
- Same day referral to secondary care diabetes services for insulin initiation

**General advice on Insulin Treatment**

**Types of Insulin**
(NB animal insulin – bovine and porcine are not routinely used)

The following are the different types of available insulin

- **Very rapid onset and short duration of activity**
  - eg *Insulin Lispro (Humalog), *Insulin Aspart (NovoRapid), *Insulin Glulisine (Apidra)
- **Short-acting**
  - eg Soluble insulin (Human Actrapid, Humulin S, Insuman Rapid)
- **Medium-acting**
  - eg Isophane insulin (Humulin I, Human Insulatard, Insuman Basal)
- **Long-acting**
  - eg *Insulin Glargine (Lantus), *Insulin Detemir (Levemir)
- **Mixtures (Biphasic insulins)**
  - eg Humulin M3, Insuman Combi 15, 25 and 50, Humalog* Mix 25 and 50, Novomix 30*. The numbers define the content of short-acting vs intermediate-acting insulin eg Humulin M3 insulin contains 30% short acting insulin and 70% medium-acting insulin

*these are human analogue insulins and NICE guidance is that they should not be used as first line therapy, only as appropriate

**What quantity of insulin should be prescribed?**
Most of the preparations are available in vial, in cartridge form or in pre-loaded devices.
Each pack of insulin contains five 3ml cartridges where each cartridge contains 300 units of insulin (a 10ml vial contains 1000 units). Therefore a patient using 20 units twice a day will use 4 cartridges per month (or 1 pack of 5 cartridges).

**Hypodermic Equipment**
Patients should be advised on the safe disposal of lancets, single use syringes and needles. Standard needle is 5mm (8, 6, 5 and 4 mm are also available).
This includes the prescribing of sharps bins and information on local sharp disposal services. Sharps bins are provided via FP10 prescription form.

**Types of Pen Devices** (see Insulin pens and needles)
- Pen devices are available on prescription.
Novo Nordisk, Lilly and Sanofi each have their own ranges. Ensure that the insulin is prescribed with the compatible device.
The Owen Mumford Autopen is compatible with CP and Lilly insulin devices (eg Hypurin insulin) and the Autopen 24 and Classic are available for use with Sanofi insulins (eg Lantus) – largely superceded by the ClikSTAR and SoloSTAR pens

- Pre-loaded devices are becoming more common and more competitively priced
- Insulin choice is often device driven; advantages / disadvantages and ease of use
- All cartridge sizes are 3ml, with the exception of the Hypurin insulin range, which are available in 1.5 and 3ml sizes

**Lancets**

These are available on prescription and are compatible with specified finger pricking devices. NB finger-pricking devices are NOT allowed on prescription.

**Insulin Pump Service for Adults**

- Supported by NICE guidance [NICE Guidance TA 151](#)
- Suitable for people with type 1 diabetes only
- Referral to pump team via secondary care diabetes services [Insulin Pump Therapy](#) for assessment by DNS

**Suitable for people with type 1 diabetes who:**

- Have attended an intensive type 1 diabetes education programme (with carbohydrate counting) [Type 1 Diabetes Structured Education](#)
- Use a basal bolus (multiple injection) insulin regimen.
- Find it impossible to maintain optimal HbA1C individualised target < 64 mmol/mol (8.5%) without disabling hypoglycaemia despite a high level of self-care of diabetes and adequate trials of analogue (short and/or long acting) insulins.
- Have no medical, communication, psychological or personal problem which would prevent insulin pump use
- Are competent and confident to use a pump effectively

**Requires:**

- Use of pager-sized insulin infusion pump 24 hours a day
- Replacement of infusion set and subcutaneous cannula every 2-3 days
- On-going support from trained insulin pump team

**Type 1 Diabetes Structured Education**

Intensive education programmes to promote empowerment and self-management for people with type 1 diabetes are currently provided only on an individual basis

The Barnsley diabetes service is in the process of setting up a modified form of

**BERTIE** – (Broomfield’s Education Resources for Training in Insulin and Eating) programme

- A series of workshops held one day a week for four consecutive weeks with up to 8 participants
- Associated with long term reduction in HbA1c, weight maintenance and improved quality of life
- Referral will be via the diabetes specialist nursing service
- All courses will facilitated by a diabetes specialist nurse and a specialist dietitian for diabetes
**Type 2 Diabetes**

Type 2 diabetes has significant morbidity and requires good, systematic care at diagnosis. It is symptomatic and progressive and diagnosis is often only made after complications have developed.

Many patients already have or are at high risk of developing microvascular and/or macrovascular complications. There is a very high mortality from coronary artery disease.

### Suggested Initial Management in Generalist (Primary) Care

- Good history to obtain cardinal features
  - (including polyuria, polydipsia, nocturia, weight loss, lethargy, cramps, pruritus vulvae/balanitis, visual disturbance)
- FBC, urea and electrolytes, liver function tests, blood glucose, HbA1c
- Urinalysis (to look specifically for ketonuria and proteinuria)
- TSH (if indicated clinically)
- Initiate diabetic education and monitoring
- Dietary measures and physical activity [Dietary Recommendations](#)
- If hyperglycaemia is sustained consider medication [Treatment of Hyperglycaemia](#)
- Referral for structured education using [DSN referral form](#)
- Referral for retinal screening

### Referral to Specialist (Secondary) Care is not usually necessary

The Barnsley Local Diabetes Service Advisory Group does NOT recommend referral of patients with uncomplicated newly diagnosed type 2 diabetes.

**Patients require intensive glycaemic control.**

The majority of patients can be controlled with dietary measures alone or in combination with an oral hypoglycaemic agent and urgent referral is not usually required (even if blood glucose high, providing the patient is well and not ketotic). Some will require insulin. If unsure refer to Diabetes Specialist Nurses.

It is expected that initial diagnosis and management, including education, dietary advice and monitoring will be undertaken within generalist care, supported by these management guidelines. Note that individualised and ongoing nutritional advice should be provided by a healthcare professional with specific expertise and competencies in nutrition (ie Specialist Dietitian for Diabetes) [NICE CG87](#).
## Monitoring and Complications

### Care plan
An individual care plan to address issues of concern by both the person with diabetes and the health professional should be negotiated, within an agreed reasonable and achievable time frame, and should be regularly reviewed.

### Annual Review
An essential part of the planned diabetes management and it is recommended that it should be undertaken within Primary Care wherever possible (Adults type 1 and type 2).

### Establish and review management plans and treatment targets for
- **Hyperglycaemia**
- **Hypertension**
- **Lipid management**
- Cardiovascular protection / Assessment
- Contraception status in child-bearing women
- Pre-conceptual advice / Erectile Dysfunction

### Lifestyle
- **Activity and Lifestyle Advice**
  - Advise to stop smoking/refer to Stop Smoking Service
- **Diet review**
  - Advise on exercise

### Clinical
- Weight / BMI / Waist Circumference
- Blood Pressure
- Symptoms of hyperglycaemia / hypoglycaemia
- Injection site status
- Assessment of self-monitoring (including ketone testing where appropriate)

### Diabetic Control
- Link: Monitoring

### Diabetic Retinopathy Screening
Annual eye screening by local programme

### Renal Monitoring
- Urine Albumin:Creatinine ratio (regardless of urine dipstick result) and eGFR
- Serum Calcium, phosphate and PTH in stage 4 and 5 CKD to identify anaemia. If Hb11g/dl check haematinics and exclude other causes.

### Foot care
- Deformity/callus
- Check dorsalis pedis and posterior tibial foot pulses
- Pinprick sensation
- Light touch -10g Seimes-Weinstein monofilament
- Foot ulcers
- Footwear
- Check risk levels (management of foot care complications)
Physical Activity and Exercise

Introduction
The benefits of engaging in regular physical activity and/or exercise are clear.

Benefits of physical activity or exercise include:
- Improved insulin sensitivity
- Lower blood glucose
- Increase HDL and lower LDL cholesterol
- Lower blood pressure
- Aids weight loss
- Provides stress relief

Physical activity can be defined as any movement of skeletal muscle, which results in energy usage (NICE, 2008 PH8). Examples include:
- Walking
- Gardening
- Housework
- Shopping

Exercise can be defined as physical activity that is planned, structured and involves repetition of muscle that is aimed to maintain or improve fitness (WHO 2010). Examples include:
- Running
- Swimming
- Gym Classes
- Sports such as football, cricket, rugby

Advice on physical activity and or should be individualised and reflect treatment goals, which could include: weight loss, reducing cardiovascular risk and benefiting glycaemic control whilst being realistic and achievable.

People with type 1 diabetes may need additional support from Diabetes Specialist Nurses, as different types of exercise may have different effects on blood glucose levels, to ensure safety.

Supporting agency: PSS Barnsley Health Trainers
**Adult Dietetic Services**

All people with diabetes or impaired glucose regulation (Impaired Fasting Glycaemia [IFG], Impaired Glucose Tolerance [IGT]) should receive individualised dietary advice from a dietitian at diagnosis and at appropriate intervals throughout their treatment and in conjunction with structured education (NICE 2004, NICE 2008).

**Service Provision**

In Barnsley Dietetic Services are offered by:
- South West Yorkshire Partnership NHS Foundation Trust (Primary Care)
- Barnsley Hospital NHS Foundation Trust (Secondary Care)

**Philosophy of Care**

The Specialist Dietitians for Diabetes work in partnership with people with diabetes and impaired glucose regulation to support informed dietary and lifestyle choices; thus improving glycaemic control and promoting long term health and wellbeing.

The services facilitate this by offering:
- High quality evidence-based dietary guidance and advice.
- 1:1 Appointments - facilitating individualised patient-led dietary care plans which support patient empowerment.

An appointment includes:
  - Anthropometric measurements: height, weight and waist circumference
  - Interpretation of biochemistry
  - Detailed dietary assessment
  - Care planning with dietary targets agreed
  - Dietetic report / communication with referrer
  - Follow up agreed on an individual basis

- Group Education sessions to people newly diagnosed with diabetes as part of a multidisciplinary approach to diabetes care.
- Working within a multidisciplinary team to care delivery.
- Refer to other supporting agencies such as Diabetes Specialist Nurses, Mental Health Access Team, Barnsley Change4Life and Barnsley Health Trainers.
**Introduction**
The Community Specialist Dietitians for Diabetes are based at the Cudworth Centre.

Catherine Storey  
catherine.storey@swyt.nhs.uk  
01226 438837

People under the care of their General Practitioner who will benefit from a referral include those with:

- Impaired glucose regulation (impaired fasting glycaemia and impaired glucose tolerance)
- Newly diagnosed type 1 or type 2 diabetes
- Newly diagnosed or existing type 2 diabetes requiring structured education
- Existing type 1 or type 2 diabetes requiring a dietary update
- A change in medication requiring additional dietary advice
- A deterioration in glycaemic control
- Coeliac disease and diabetes
- Cardiovascular disease and diabetes
- Issues around weight management
- Type 1 who are undertaking carbohydrate counting on multiple daily injections
- Mobility problems requiring a home visit

**Referral**
A written referral from a Practice Nurse, GP or Diabetes Specialist Nurse will be accepted. A copy of the form is available at [Appendix L](#).

Completed forms can be faxed to 01226 438888 or posted to:

**The Community Nutrition & Dietetic Service**
Cudworth Centre,  
Carlton Street,  
Cudworth,  
Barnsley.  
S72 8ST

For informal queries please contact Catherine Storey on 01226 438837.
## Clinic Locations and Frequency

<table>
<thead>
<tr>
<th>Clinic Venue</th>
<th>Morning</th>
<th>Afternoon</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monday</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roundhouse Health Centre, Athersley</td>
<td></td>
<td>✓ (monthly)</td>
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<tr>
<td>Cudworth Centre</td>
<td></td>
<td>✓ (monthly)</td>
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<tr>
<td>Grimethorpe Centre</td>
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<tr>
<td>Hoyland Centre</td>
<td>✓ (monthly)</td>
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</tr>
<tr>
<td>New Street Health Centre</td>
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<td>✓ (monthly)</td>
</tr>
<tr>
<td>Penistone – Shrewsbury Road</td>
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<tr>
<td><strong>Tuesday</strong></td>
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<td>Athersley (Roundhouse)</td>
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<tr>
<td>Darfield (Garland House)</td>
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<td>✓ (monthly)</td>
</tr>
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<td>Gold Street Surgery</td>
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</tr>
<tr>
<td>Worsbrough Centre</td>
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<td>✓ (alternate weeks)</td>
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<tr>
<td><strong>Wednesday</strong></td>
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</tr>
<tr>
<td>Oaks Park Primary Care Centre</td>
<td>✓ (monthly)</td>
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</tr>
<tr>
<td>Penistone Group Practice</td>
<td>✓ (alternate weeks)</td>
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<tr>
<td><strong>Thursday</strong></td>
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</tr>
<tr>
<td>Chapelfield Medical Centre - Wombwell</td>
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<td>✓ (monthly)</td>
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<tr>
<td>Goldthorpe Centre</td>
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<td>✓ (monthly)</td>
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<td>Hoyland Centre</td>
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<tr>
<td>6 Huddersfield Road</td>
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<td>✓ (monthly)</td>
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<tr>
<td>Thurnscoe Centre</td>
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<tr>
<td>Walderslade</td>
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<tr>
<td><strong>Friday</strong></td>
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<tr>
<td>Athersley (Roundhouse)</td>
<td>✓ (monthly)</td>
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<td>Cudworth Centre</td>
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<td>New Street Health Centre</td>
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<td>Oaks Park Primary Care Centre</td>
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</tr>
<tr>
<td>The Surgery, 48 High Street, Royston</td>
<td>✓ (monthly)</td>
<td>✓ (monthly)</td>
</tr>
</tbody>
</table>
**Education**

**Type 2 Diabetes Structured Patient Education**

Self-management is key to good diabetes care and patient education should be at the heart of any service (Diabetes UK, 2003).

Education can be delivered in groups or on an individual basis but it is important to individualise to patient needs and requirements. A useful Education checklist is attached.

There are 2 structured education programmes available to people with type 2 diabetes who are not on insulin held at various locations around Barnsley. These courses are available to people with newly diagnosed type 2 diabetes and to those with existing diabetes who would benefit from further diabetes education.

The sessions which are delivered by trained educators cover a range of useful topics such as carbohydrate awareness, weight management, making informed dietary choice, medication, monitoring and foot care. They offer the opportunity to receive advice from a Specialist Dietitian for Diabetes and Diabetes Specialist Nurse.

**X-PERT**

The X-PERT Diabetes Programme

- Supports self-management of diabetes using a patient empowerment model.
- Is a nationally-accredited, structured education programme for people with newly-diagnosed or existing type 2 diabetes and is jointly run with the diabetes specialist nurses.
- Runs over 6 weeks with a 3-month follow up.
- Has proven to be
  - clinically effective (participants demonstrate improved diabetes control and self-management skills, improved quality of life and a reduced need for medication)
  - empowering (supporting self-management; participants show improved health and well-being)

Biochemical parameters are checked before and 12 weeks after the course.

Held at:
- Roundhouse Medical Centre, Wakefield Road, Wednesday afternoon (2-5pm)

**Local Education Programme**

- Available to all people with newly-diagnosed or existing type 2 diabetes, who may not wish to attend the more intensive education offered via X-PERT
- This programme consists of two 3-hour sessions run consecutive weeks; the first led by a Diabetes Specialist Nurse and the second by a Specialist Dietitian for Diabetes.

Held at:
- Oaks Park Centre, Kendray, Friday afternoon (2-5pm)
- Thurnscoe Centre, Wednesday afternoon (2-5pm)
- Barnsley Hospital, Wednesday evening (4:30-7:30pm)

**Referral for Education**

Referral for education should be made via the Diabetes Specialist Nurse referral form.

Further information and referral forms are available via the intranet or from the Administrator, Diabetes Specialist Nursing Office, Apollo Court (01226 209884).
Nutrition and Dietetic Services for Barnsley Hospital NHS Foundation Trust

Introduction
The Specialist Dietitian for Diabetes is based in The Robert Hague Centre for Diabetes & Endocrinology at Barnsley Hospital NHS Foundation Trust.

Paul Pipe-Thomas paul.pipe-thomas@nhs.net 01226 431576

People under the care of a Consultant who will benefit from a referral include those with:
- Impaired glucose regulation (impaired fasting glycaemia and impaired glucose tolerance)
- Type 1 or type 2 diabetes during an in-patient stay
- Type 1 diabetes as they transition from Paediatric consultant care
- Newly-diagnosed with type 1 or type 2 diabetes
- Newly-diagnosed or existing type 1 diabetes requiring structured education or carbohydrate counting
- Type 1 diabetes undertaking carbohydrate counting on a multiple daily injections
- Type 1 diabetes using an insulin pump
- Type 1 or type 2 diabetes for pre-conceptual care and in the Ante-Natal Clinic
- Gestational diabetes in the Ante-Natal Clinic
- Existing type 1 or type 2 diabetes requiring a dietary update
- A change in medication requiring additional dietary advice
- A deterioration in glycaemic control
- Coeliac disease and diabetes
- Cardiovascular disease and diabetes
- Issues around weight management

Referral
A written referral from a Hospital Doctor or Diabetes Specialist Nurse is required.

For any informal queries please contact Paul Pipe-Thomas on 01226 431576.

Clinic Times

<table>
<thead>
<tr>
<th>Day</th>
<th>am</th>
<th>pm</th>
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<tbody>
<tr>
<td>Monday</td>
<td>Insulin Pump Clinic (quarterly)</td>
<td>Clinic 2:30 – 06:30pm</td>
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<td>Transition Clinic</td>
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<tr>
<td>Tuesday</td>
<td>Clinic 10:00am – 1:00pm</td>
<td>Clinic 2:00 – 6:30pm</td>
</tr>
<tr>
<td>Wednesday</td>
<td>Clinic 8:00am – 12:00pm</td>
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<tr>
<td>Thursday</td>
<td></td>
<td>Ante Natal Clinic</td>
</tr>
<tr>
<td>Friday</td>
<td>Clinic 8:00 am – 12:30pm</td>
<td>Carbohydrate Counting (monthly)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In patient cover is provided on a needs basis</td>
</tr>
</tbody>
</table>
Education

Carbohydrate Counting
A monthly carbohydrate counting education session is held on the 3rd Friday of the month from 1-4pm at the Robert Hague Centre for Diabetes and Endocrinology for people with type 1 diabetes using multiple daily injections or an insulin pump.

Type 1 Diabetes Structured Education

- **BERTIE** (Broomfield’s Education Resources for Training in Insulin and Eating) is a structured education programme for people newly-diagnosed with type 1 diabetes, which is currently being piloted in Barnsley and delivered in conjunction with the diabetes specialist nurses.

- It aims to achieve good glycaemic control through education around carbohydrate counting and insulin adjustment in everyday life. The course runs over three days.

References

Change4Life Specialist Weight Management Clinic Care Pathway

1. Clients must complete either the 12 week Change4Life group program or attend Change4Life for 6 x 1:1 sessions

2. If client is known to consultant and has been through a weight management pathway a direct referral to surgery can be made by the consultant alongside a referral to the Change4Life team to support client until surgery is scheduled.

If interested in Bariatric surgery => Bariatric information session.

If not interested in Bariatric surgery must meet the referral criteria for the Specialist Weight Management service.

Dietetic appointment(s)

1-2 dietetic appointments will be scheduled before a Consultant appointment

Aim of the appointments:
- Complete Dietary part of Obesity Questionnaire
- Assess patients understanding and readiness to change
- Complete a motivation and confidence score
- Send a letter to GP to request the following blood test prior to consultant appointment: TFT’s, LFT’s, total Cholesterol, HbA1C

Specialist MDT Clinic

Clinic will take place every 2nd and 4th Wednesday of the month

Aim of MDT discussion at end of clinic:
- To feed back outcomes of clients seen by dietetic and consultant
- Discuss clients in system i.e. awaiting surgery
- Discuss current waiting times
- Use time for clinical supervision for dietitian

Referred to surgery

- YES
- NO

Add client to bariatric client list on Change4Life shared drive and record outcome post-surgery.

Agree a plan with client and inform GP

Referral criteria
- BMI > 35 kg/m² with co-morbidities
- BMI > 40 kg/m² without co-morbidities
- Over 18 years of age

Exclusion criteria
Eating disorder (ie Binge Eating Disorder [BED] and Compulsive Overeating)

Co-morbidities:
- Type 2 diabetes
- Hypertension
- Cardiovascular disease
- Osteoarthritis
- Dyslipidaemia
- Sleep apnoea

Follow Change4Life DNA discharge procedure

September 2013
Smoking Cessation

Barnsley NHS Stop Smoking Service
Barnsley NHS Stop Smoking Service have helped many people to stop smoking successfully and are a key part of tobacco control and health inequalities policies both at local and national level.

Many smokers will need to make multiple attempts to quit before achieving long-term success and it is every health professionals responsibility to raise the subject of stopping smoking at every opportunity.

- Smokers expect to be asked about smoking as it shows health professional’s concern about their overall health
- If health professional’s don’t mention smoking at every consultation, clients are given the impression that it is not affecting their health and are less likely to make a quit attempt

The Department of Health recommend the following three A’s approach:

A – ASK and record smoking status: smoker, ex-smoker, non smoker
A – ADVISE clients of personal health benefits in quitting and deliver brief advice
A – ACT on client’s response, including referral to the Barnsley NHS Stop Smoking Service.

Referral

Barnsley NHS Stop Smoking Service
12-14 Eldon Street
Barnsley
Tel: 01226 737077

The service accepts referrals from all healthcare professionals and client self referrals

The Stop Smoking Service will:

- offer an appointment either at the Eldon Street Quit Shop, hospital clinic or at a community session (various sites available) chosen by the client.
- offer weekly support for the initial 4 weeks after the clients quit date and then fortnightly for a maximum of 12 weeks.
- take a carbon monoxide reading at every visit to verify the client’s smoke free status.
- advise on nicotine replacement therapy and other stop smoking medications.
- give weekly vouchers for nicotine replacement products for the first four weeks after quit and then fortnightly for the next eight weeks, subject to the client’s smoke free status.
- complete a client monitoring form in line with Department of Health Guidance.
Barnsley NHS Stop Smoking Service Referral Pathway

**ASK** – and record smoking status: Smoker, ex-smoker, non smoker

Is the client a current smoker?

- **NO**
  - Record in records if appropriate
  - No further action required
- **YES**
  - **ADVISE** smoker to stop
    - ‘Stopping smoking is the best thing you can do for your health. Many people have stopped smoking with help from the local stop smoking service’
    - Do you want help to quit?
      - **NO**
        - **ADVISE** the client to quit
          - Discuss smoking and its effect on the current and future health of the client
          - Give information about the local service (ie contact card or leaflet)
      - **YES**
        - **ARRANGE** - refer to the stop smoking advisor on 01226 737077
          - Record actions in client records if appropriate
          - Consider stop smoking medications
            - *(Client must consent to referral)*
Barnsley Treatment Algorithm for the Management of Type 2 Diabetes

**Initiation of lifestyle interventions**

- Refer to structured education programme:
  - X-PERT
  - Local education programme

**Metformin with active dose titration**

- Consider **gliclazide** instead of metformin if:
  - Metformin intolerant or contraindicated
  - If rapid therapeutic response required because of hyperglycaemic symptoms

**Metformin + Gliclazide**

- Consider substituting a **gliptin** for the gliclazide if there is a significant risk of hypoglycaemia (or its consequences) or if gliclazide is contraindicated/not tolerated. If a gliptin is contraindicated/not tolerated consider **SGLT2 inhibitor or pioglitazone**.
  - If BMI is >35 kg/m² and gliclazide, a gliptin, SGLT2 inhibitor and pioglitazone are contraindicated/not tolerated, consider a GLP-1 agonist.

**Insulin + Metformin + Gliclazide**

- Consider adding a **GLP-1 agonist** if the following criteria are met:
  - BMI ≥35 mg/m²
  - BMI 30-35 kg/m² and insulin unacceptable because of occupational implications or weight loss or would benefit other co-morbidities

**Add insulin, particularly if the person is markedly hyperglycaemic**

- Consider adding a **gliptin** instead of insulin if insulin is unacceptable (because of employment, social, recreational or other personal issues). If a gliptin is contraindicated/not tolerated consider adding pioglitazone.

**Insulin + Metformin + Gliclazide**

- Increase insulin dose and intensify over time
  - Consider **SGLT2 inhibitor** with insulin if SGLT2 previously very effective or if poor BG control with high insulin dose
  - Consider **GLP-1 agonist** with insulin if BMI ≥35 mg/m² and HbA1c >75 mmol/mol

**Start insulin**

- Insulin + (Metformin or Gliclazide)

1 Or other individually agreed higher target
2 See later information on GLP-1 agonist choice
3 HbA1c >59 mmol/mol associated with greater mortality with any agent other than metformin (Currie et al)
Barnsley Health Community Guidelines for the management of type 2 diabetes

The following information is to support prescribers regarding the medicines aspects of the type 2 diabetes algorithm, please refer to the BNF or Summary of Product Characteristics for further information on contraindications, precautions, adverse effects and interactions.

Treatment of hyperglycaemia
- Only prescribe one agent from each class.
- Substituting agents is unlikely to improve glucose control – swapping metformin plus gliclazide for metformin plus pioglitazone is likely to cause deterioration in glycaemic control.
- The addition of a third agent to a combination of two oral hypoglycaemic drugs taken at maximally tolerated doses may only lower the HbA1c by 5.5 mmol/mol*

Glycaemic target
- In newly diagnosed patients tight control of HbA1c (ie 48 mmol/mol and fasting glucose <6 mmol/l) is to be aspired to for most patients providing they are not having frequent hypoglycaemia.
- An individualised target should be discussed and agreed with each patient and reviewed every 2-6 months. This goal may not be appropriate or practical for some patients and clinical judgement needs to be applied.
- Lifestyle should be reviewed before every treatment escalation.
- The following factors should be taken into consideration when setting targets and choosing an appropriate agent:
  - weight,
  - cardiovascular risk factors,
  - occupation (eg HGV licence holders, train drivers, taxi drivers and machine operators where hypoglycaemia could have disastrous consequences),
  - frail elderly,
  - other medical co-morbidities (e.g. liver disease, renal impairment and arthritis),
  - visual impairment,
  - social isolation (ie home alone)
  - mental health disorders (including substance abuse).

*Reporting Units for HbA1c
Glycated haemoglobin (HbA1c) is the recommended method of measuring long term control of blood glucose in people with both type 1 and type 2 diabetes.

Previously the results were reported as a percentage (%). This has changed to millimoles/mole (mmol/mol) and people with diabetes will receive their HbA1c measurement in mmol/mol only. See conversion table for more detail.

<table>
<thead>
<tr>
<th>HbA1c conversion table</th>
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</thead>
<tbody>
<tr>
<td>HbA1c (new units)</td>
</tr>
<tr>
<td>(mmol/mol)</td>
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<tr>
<td>20</td>
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<tr>
<td>31</td>
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<td>42</td>
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<td>75</td>
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<td>86</td>
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</tbody>
</table>

A 0.5% difference in HbA1c is equivalent to a difference of about 5.5mmol/mol, and a 1% difference is equivalent to a difference of about 11mmol/mol.
Note that these are rounded equivalents.
Oral hypoglycaemic agents for the treatment of type 2 diabetes mellitus

**BIGUANIDES - METFORMIN**
Metformin is the only available biguanide. Decreases gluconeogenesis and increases peripheral utilisation of glucose.

<table>
<thead>
<tr>
<th>DRUG</th>
<th>NOTES</th>
<th>FORMULARY CHOICE</th>
<th>PRECAUTIONS / CONTRA-INDICATIONS / LESS DESIRABLE PATIENT GROUPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td><strong>NICE guidance (CG87):</strong> Start metformin treatment in a person who is overweight or obese (tailoring the assessment of body-weight-associated risk according to ethnic group) and whose blood glucose is inadequately controlled by lifestyle interventions (nutrition and exercise) alone. Consider metformin as an option for first-line glucose-lowering therapy for a person who is not overweight. Continue with metformin if blood glucose control remains or becomes inadequate and another oral glucose-lowering medication (usually a sulfonylurea) is added.</td>
<td>First choice</td>
<td>Actively titrate the dose of metformin (i.e. increase to the maximum tolerated dose). This must be done over several weeks to minimise risk of gastrointestinal (GI) side effects. (NICE CG87) Metformin has a cardioprotective effect. If adding metformin to gliclazide, it may be appropriate to decrease the gliclazide dose in order to titrate the metformin.</td>
</tr>
<tr>
<td>Metformin MR</td>
<td>Consider a trial of extended-absorption metformin tablets where GI tolerability prevents continuation of metformin therapy. (NICE CG87)</td>
<td>Second choice (for patients with proven GI intolerance)</td>
<td></td>
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<tr>
<td>Metformin powder sachets</td>
<td>For patients unable to swallow tablets and where crushing the standard tablet is not appropriate.</td>
<td>Second choice (for patients unable to swallow tablets)</td>
<td><strong>RENAI IMPAIRMENT</strong> (NICE CG87): Review the dose of metformin if the serum creatinine exceeds 130 micromol/litre or the estimated glomerular filtration rate (eGFR) is below 45 ml/minute/1.73m².  - Stop the metformin if the serum creatinine exceeds 150 micromol/litre or the eGFR is below 30 ml/minute/1.73m².  - Prescribe metformin with caution for those at risk of a sudden deterioration in kidney function and those at risk of eGFR falling below 45 ml/minute/1.73m². <strong>LIVER OR CARDIAC IMPAIRMENT</strong> (NICE CG87): The benefits of metformin therapy should be discussed with a person with mild to moderate liver dysfunction or cardiac impairment so that:  - due consideration can be given to the cardiovascular-protective effects of the rug  - an informed decision can be made on whether to continue or stop the metformin.</td>
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**SULFONYLUREAS - GLICLAZIDE**
Augments insulin secretion and consequently is only effective when some residual pancreatic beta-cell activity is present.

<table>
<thead>
<tr>
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</thead>
</table>
| Gliclazide | Prescribe gliclazide when a sulfonylurea is indicated.  
**NICE guidance (CG87):** Consider a sulfonylurea as an option for first-line glucose-lowering therapy if:  
the person is not overweight  
the person does not tolerate metformin (or it is contraindicated)  
or  
- a rapid response to therapy is required because of hyperglycaemic symptoms.  
Add a sulfonylurea as second-line therapy when blood glucose control remains or becomes inadequate with metformin. | First choice | Educate the person about the risk of hypoglycaemia, particularly if they have renal impairment.  
Increase dose every 4-6 weeks to achieve glycaemic target or maximal dose is reached.  
If adding metformin to gliclazide, it may be appropriate to decrease the gliclazide dose in order to titrate the metformin.  
Gliclazide can cause weight gain (a few kilograms).  
**Advice for drivers:**  
For Group 1 drivers (car/motorcycle) it may be appropriate to monitor blood glucose regularly and at times relevant to driving to enable the detection of hypoglycaemia.  
Group 2 drivers (bus/lorry) on sulfonylureas are required by law to monitor glucose level at least twice daily and at times relevant to driving.  
For more information about driving with diabetes see the Government guidance for drivers with diabetes and advice for drivers on the Diabetes UK website.  
For DVLA also has a page on guidance for professionals. |
| Gliclazide MR | Use gliclazide MR (modified release) if compliance is poor. | Second choice (where there are concerns over compliance to standard release) |
**GLINIDES**  
Augment insulin secretion – short acting and may be useful for reducing post-prandial blood sugars.

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<tr>
<th>DRUG</th>
<th>NOTES</th>
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</thead>
</table>
| Repaglinide  
(Prandin®) | Both drugs similar in action and, in many respects, their effect is identical to tolbutamide, a much cheaper agent. No trials comparing glinides and tolbutamide.  
Rapid onset of action and short duration of activity and should be administered shortly before each main meal.  
Licensed for use in type 2 diabetes as monotherapy or in combination with metformin  
Use as:  
- Second line add-on therapy to metformin for patients with irregular eating habits where HbA1c < 8.5% **or**  
- An alternative to adding a glitazone in patients failing targets on metformin/sulfonylurea treatments (or on metformin alone where standard sulfonylureas have been problematic), where HbA1c < 8.5% **or**  
- Monotherapy in lean type 2 patients where standard sulfonylureas have resulted in pre-prandial hypoglycaemia. | | Educate the person about the risk of hypoglycaemia, particularly if they have renal impairment.  
**Advice for drivers:**  
See sulfonylureas. |
| Nateglinide  
(Starlix®) | Licensed only in combination with metformin. | | |
## GLIPTINS (also known as DPP-4 inhibitors)

Inhibit dipeptidylpeptidase-4 to increase insulin secretion and lower glucagon secretion

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<tr>
<th>DRUG</th>
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</tr>
</thead>
</table>
| Sitagliptin (Januvia®▼) | Continue gliptin therapy only if there is a reduction of ≥5.5mmol/mol (0.5%) in HbA1c in 6 months. Low risk of hypoglycaemia and are weight neutral. **NICE guidance (CG87):** Consider adding a gliptin instead of a sulphonylurea as second-line therapy to first-line metformin when control of blood glucose remains or becomes inadequate (HbA1c ≥ 48mmol/mol, or other higher level agreed with the individual) if:  
  - the person is at significant risk of hypoglycaemia or its consequences (for example, older people and people in certain jobs [for example, those working at heights or with heavy machinery] or people in certain social circumstances [for example, those living alone]), or  
  - the person does not tolerate a sulphonylurea or a sulphonylurea is contraindicated. | First choice | No long term safety data available for these agents.  
  **RENAI IMPAIRMENT:**  
  Dose reduction required if GFR <50ml/min (see table on page 13)  
  Applies to all gliptins:  
  Discuss the potential benefits and risks of treatment with a gliptin with the person to enable them to make an informed decision.  
  Increased risk of pancreatitis associated with all gliptins. Patients should be informed of the characteristic symptoms of acute pancreatitis – persistent, severe abdominal pain (sometimes radiating to the back) – and encouraged to tell their healthcare provider if they have such symptoms. [Link to MHRA warning](#) |
| Linagliptin (Trajenta®▼) | Consider adding a gliptin as second-line therapy to first-line sulphonylurea monotherapy when control of blood glucose remains or becomes inadequate (HbA1c ≥ 48mmol/mol, or other higher level agreed with the individual) if:  
  - the person does not tolerate metformin, or metformin is contraindicated. Consider adding a gliptin as third-line therapy to first-line metformin and a second-line sulphonylurea when control of blood glucose remains or becomes inadequate (HbA1c ≥ 59mmol/mol or other higher level agreed with the individual) and insulin is unacceptable or inappropriate. | Second choice | Does not require dose reduction in renal impairment (see table on page 13).  
  See sitagliptin entry for MHRA warning regarding pancreatitis (applies to all gliptins). |

Barnsley Diabetes Guidelines April 2014
<table>
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<th>DRUG</th>
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</tr>
</thead>
</table>
| Pioglitazone (Actos®) | **NICE guidance (CG87):** Consider adding pioglitazone instead of a sulfonylurea as second-line therapy to first-line metformin when control of blood glucose remains or becomes inadequate (HbA1c ≥ 48mmol/mol, or other higher level agreed with the individual) if:  
  - the person is at significant risk of hypoglycaemia or its consequences (for example, older people and people in certain jobs [for example, those working at heights or with heavy machinery] or people in certain social circumstances [for example, those living alone]), or  
  - a person does not tolerate a sulfonylurea or a sulfonylurea is contraindicated.  
  Consider adding a pioglitazone as second-line therapy to first-line sulfonylurea monotherapy when control of blood glucose remains or becomes inadequate (HbA1c ≥ 48mmol/mol, or other higher level agreed with the individual) if:  
  - the person does not tolerate metformin or metformin is contraindicated.  
  Consider adding pioglitazone as third-line therapy to first-line metformin and a second-line sulfonylurea when control of blood glucose remains or becomes inadequate (HbA1c ≥ 59mmol/mol, or other higher level agreed with the individual) and insulin is unacceptable or inappropriate.  
  Consider combining pioglitazone with insulin therapy for a person:  
  - who has previously had a marked glucose-lowering response to thiazolidinedione therapy (pioglitazone), or  
  - who is on high-dose insulin therapy and whose blood glucose is inadequately controlled. | Pioglitazone is the only thiazolidinedione available | Continue pioglitazone therapy only if there is a reduction of ≥ 5.5mmol/mol (0.5%) in HbA1c in 6 months  
  Do NOT start or continue pioglitazone in people who:  
  - have heart failure (NYHA class I-IV)  
  - are at a higher risk of fracture  
  - macula oedema  
  - a history of bladder cancer or in patients with uninvestigated macroscopic or microscopic haematuria  
  **Risk of bladder cancer: MHRA safety update**  
  Cases of cardiac failure have been reported when pioglitazone was used in combination with insulin, especially in patients with risk factors for the development of cardiac failure. If the combination is used, patients should be observed for signs and symptoms of heart failure, weight gain, and oedema.  
  **Risk of cardiac failure when combined with insulin:** MHRA safety update  
  Pioglitazone can cause weight gain.  
  Discuss the potential benefits and risks of treatment with pioglitazone with the person to enable them to make an informed decision. Pioglitazone may be preferable to a gliptin if:  
  - the person has marked insulin insensitivity, or a gliptin is contraindicated, or  
  - the person has previously had a poor response to, or did not tolerate, a gliptin. |
# GLP-1 Agonists

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<th>DRUG</th>
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</thead>
<tbody>
<tr>
<td>Exenatide (Byetta®▼)</td>
<td>Twice daily subcutaneous injection&lt;br&gt;Dual / Triple therapy:&lt;br&gt;Can be used in dual or triple therapy regimens when control of blood glucose remains or becomes inadequate (HbA1c ≥ 59mmol/mol or agreed individualised target). Patients should be on maximally tolerated doses of oral hypoglycaemic agents and have a BMI;&lt;br&gt;• ≥ 35.0 kg/m² in those of European descent (with appropriate adjustment for other ethnic groups) and specific psychological or medical problems associated with high body weight, or&lt;br&gt;• &lt; 35.0 kg/m², and therapy with insulin would have significant occupational implications or weight loss would benefit other significant obesity-related comorbidities.&lt;br&gt;&lt;br&gt;In combination with insulin:&lt;br&gt;Exenatide is licensed for addition to patient currently receiving insulin +/- metformin and/or pioglitazone in adults who have not achieved adequate glycaemic control with these agents.&lt;br&gt;The local patient group indicated to receive this combination the person must fulfil the following criteria:&lt;br&gt;• BMI &gt;35 and HbA1c &gt; 75mmol/mol and currently using insulin.</td>
<td>First choice</td>
<td>DUAL THERAPY - continue exenatide only if the person has a reduction in HbA1c of ≥11mmol/mol (1%) after 6 months.&lt;br&gt;TRIPLE THERAPY - continue exenatide only if the person has a reduction in HbA1c of ≥11mmol/mol (1%) and a 3% loss of initial bodyweight after 6 months.&lt;br&gt;No long term safety data available. Exenatide is not recommended for use in patients with an eGFR &lt;30mL/min.&lt;br&gt;&lt;br&gt;Applies to ALL GLP-1 agonists:&lt;br&gt;Discuss the potential benefits and risks of treatment with a GLP-1 agonist with the person to enable them to make an informed decision.&lt;br&gt;Routine monitoring of blood glucose levels is only required if the GLP-1 agonist is given in combination with another agent likely to cause hypoglycaemia e.g. sulphonylurea.&lt;br&gt;There have been reports of necrotising and haemorrhagic pancreatitis with GLP-1 agonists, some of which were fatal. If pancreatitis is suspected, treatment with the GLP-1 agonist should be suspended immediately; if pancreatitis is diagnosed, the GLP-1 agonist should be permanently discontinued. (MHRA warning)</td>
</tr>
<tr>
<td>Exenatide prolonged release</td>
<td>Once weekly subcutaneous injection&lt;br&gt;APC advice:&lt;br&gt;Exenatide modified release can be considered if tolerability</td>
<td>Second choice</td>
<td>DUAL THERAPY - continue exenatide MR only if the person has a reduction in HbA1c of ≥11mmol/mol (1%) after 6 months.</td>
</tr>
</tbody>
</table>
and compliance remains a major issue with conventional GLP-1 agonist therapy among patients whose HbA1c remains >59 mmol/mol and BMI>35kg/m². Use as per NICE TA248. Exenatide MR is NOT licensed in combination with insulin.

**NICE TA248 – Exenatide prolonged release:**

**Dual therapy: (Met or Glic) + Exenatide MR**

Prolonged-release exenatide in dual therapy regimens (that is, in combination with metformin or a sulfonylurea) is recommended as a treatment option for people with type 2 diabetes, as described in 'Liraglutide for the treatment of type 2 diabetes mellitus' (NICE technology appraisal 203); that is, only if:

- the person is intolerant of either metformin or a sulfonylurea, or a treatment with metformin or a sulfonylurea is contraindicated, and

- the person is intolerant of thiazolidinediones and dipeptidyl peptidase-4 (DPP-4) inhibitors, or a treatment with thiazolidinediones and DPP-4 inhibitors is contraindicated.

**Triple therapy: Met + (Glic or Pio) + Exenatide MR**

Prolonged-release exenatide in triple therapy regimens (that is, in combination with metformin and a sulfonylurea, or metformin and a thiazolidinedione) is recommended as a treatment option for people with type 2 diabetes as described in 'Type 2 diabetes: the management of type 2 diabetes (NICE clinical guideline 87)'; that is, when control of blood glucose remains or becomes inadequate (HbA1c ≥ 59 mmol/mol or agreed individualised target), and the person has:

- a body mass index (BMI) ≥ 35 kg/m² in those of European family origin (with appropriate adjustment for other ethnic groups) and specific psychological or medical problems associated with high body weight or

- a BMI < 35 kg/m², and therapy with insulin would have significant occupational implications or weight loss would benefit other significant obesity-related comorbidities.

---

**TRIPLE THERAPY - continue exenatide MR only** if the person has a reduction in HbA1c of ≥11mmol/mol (1%) and a 3% loss of initial bodyweight after 6 months.

No long term safety data available.

See lixisenatide for information on hypoglycaemia risk and warning about **pancreatitis risk** (applies to all GLP-1 agonists).
| Lixisenatide (Lyxumia®▼) | Once daily subcutaneous injection  
APC advice: Lixisenatide can be considered if exenatide is not tolerated / not appropriate or if a once daily preparation is required.  
Dual / Triple therapy: As per exenatide (Byetta®▼)  
In combination with insulin: Licensed in combination with oral glucose-lowering medicinal products and/or basal insulin when these, together with diet and exercise, do not provide adequate glycaemic control. (See exenatide for local patient group comments)  
Manufacturer advises that lixisenatide should not be given in combination with basal insulin and a sulphonylurea due to increased risk of hypoglycaemia. There is no specific NICE guidance for lixisenatide. | Second choice  
DUAL THERAPY - continue exenatide only if the person has a reduction in HbA1c of ≥11mmol/mol (1%) after 6 months.  
TRIPLE THERAPY - continue exenatide only if the person has a reduction in HbA1c of ≥11mmol/mol (1%) and a 3% loss of initial bodyweight after 6 months.  
No long term safety data available.  
See lixisenatide for information on hypoglycaemia risk and warning about pancreatitis risk (applies to all GLP-1 agonists). |  
| Liraglutide (▼) | Once daily subcutaneous injection  
APC advice: Liraglutide should only be used if the patient has not tolerated lixisenatide, exenatide or exenatide has been shown to be ineffective (after 6 months treatment).  
Use as per NICE TA203.  
Liraglutide is NOT licensed in combination with insulin.  
NICE TA203 – Liraglutide  
**Dual therapy:** (Met or Glic) + Liraglutide Liraglutide 1.2 mg daily in dual therapy regimens (in combination with metformin or a sulphonylurea) is recommended as an option for the treatment of people with type 2 diabetes, only if:  
- the person is intolerant of either metformin or a sulphonylurea, or treatment with metformin or a sulphonylurea is contraindicated, and  
- the person is intolerant of thiazolidinediones and dipeptidyl peptidase-4 (DPP-4) inhibitors, or treatment with thiazolidinediones and DPP-4 inhibitors is  
Third choice  
Liraglutide 1.8 mg daily is not recommended for the treatment of people with type 2 diabetes.  
DUAL THERAPY - continue liraglutide only if the person has a reduction in HbA1c of ≥11mmol/mol² (1%) after 6 months.  
TRIPLE THERAPY - continue liraglutide only if the person has a reduction in HbA1c of ≥11mmol/mol² (1%) and a 3% loss of initial bodyweight after 6 months.  
No long term safety data available.  
Liraglutide is not recommended for use in patients with an eGFR <60mL/min.  
See lixisenatide for information on hypoglycaemia risk and warning about pancreatitis risk (applies to all GLP-1 agonists). |
contraindicated.

**Triple therapy: Met + (Glic or Pio) + Liraglutide**

Liraglutide 1.2 mg daily in triple therapy regimens (in combination with metformin + sulphonylurea, or metformin + thiazolidinedione) is recommended as an option for the treatment of people with type 2 diabetes, only if used as described for exenatide in NICE CG87; that is, when control of blood glucose remains or becomes inadequate (HbA1c ≥ 59mmol/mol, or agreed individualised target), and the person has BMI:

- ≥ 35 kg/m² in those of European descent (with appropriate adjustment for other ethnic groups) and specific psychological or medical problems associated with high body weight, or
- < 35 kg/m², and therapy with insulin would have significant occupational implications or weight loss would benefit other significant obesity-related comorbidities.

**Licensed in combination with:**

- Metformin or a sulphonylurea, in patients with insufficient glycaemic control despite maximal tolerated dose of monotherapy with metformin or sulphonylurea.
- Metformin and a sulphonylurea or metformin and a thiazolidinedione in patients with insufficient glycaemic control despite dual therapy.

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NHS Barnsley CCG shared care guidelines for [exenatide](https://www.nice.org.uk/guidance/cg87), [liraglutide](https://www.nice.org.uk/guidance/cg87) and [lixisenatide](https://www.nice.org.uk/guidance/cg87)
**SGLT2 Inhibitors**

**SODIUM GLUCOSE CO-TRANSPORTER 2 (SGLT2) INHIBITORS**
Reversibly inhibit sodium-glucose co-transporter-2 (SGLT2) in the renal proximal convoluted tubule to reduce glucose reabsorption and increase urinary glucose excretion.

<table>
<thead>
<tr>
<th>DRUG</th>
<th>NOTES</th>
<th>FORMULARY CHOICE</th>
<th>PRECAUTIONS / CONTRA-INDICATIONS / LESS DESIRABLE PATIENT GROUPS</th>
</tr>
</thead>
</table>
| Dapagliflozin (Forxiga®▼)  | Note that although dapagliflozin is licensed for monotherapy and in combination with other glucose-lowering agent, the APC have only approved it for use as per **NICE TA288**:  

  *Dual therapy: Met + Dapagliflozin (as per gliptins)*  
  Dapagliflozin in a dual therapy regimen in combination with metformin is recommended as an option for treating type 2 diabetes, only if it is used as described for gliptins in Type 2 diabetes: the management of type 2 diabetes (NICE clinical guideline 87).  

  *Dapagliflozin + insulin:*  
  Dapagliflozin in combination with insulin with or without other antidiabetic drugs is recommended as an option for treating type 2 diabetes.  

  *Not recommended for triple therapy:*  
  Dapagliflozin in a triple therapy regimen in combination with metformin and a sulfonylurea is not recommended for treating type 2 diabetes, except as part of a clinical trial. | This is the only SGLT2 inhibitor on the formulary. | No long term safety data available. Licensed for initiation in adults between 18 and 75 years only.  
  Due to its mechanism of action, patients taking dapagliflozin are at increased risk of urinary tract infection and will test positive for glucose in their urine.  
  Increases diuresis associated with a modest decrease in blood pressure (more pronounced in patients with very high blood glucose concentrations).  
  Not recommended for patients receiving loop diuretics or who are volume depleted (eg due to acute illness such as gastrointestinal illness).  
  While a causal relationship between dapagliflozin and bladder cancer is unlikely, as a precautionary measure, dapagliflozin is not recommended for use in patients concomitantly treated with pioglitazone. |

**OTHER ANTIDIABETIC AGENTS**

<table>
<thead>
<tr>
<th>DRUG</th>
<th>NOTES</th>
<th>FORMULARY CHOICE</th>
<th>PRECAUTIONS / CONTRA-INDICATIONS / LESS DESIRABLE PATIENT GROUPS</th>
</tr>
</thead>
</table>
| Acarbose (GlucoBay®)        | Useful in the occasional overweight patient but limited by gastrointestinal intolerance  

  **NICE guidance (CG87):**  
  Consider acarbose for a person unable to use other oral glucose-lowering medications. |                                                                  |                                                                  |
Insulin Therapy in Type 2 Diabetes

Insulin treatment
- If other measures do not keep HbA1c to < 59 mmol/mol [7.5%] (or other agreed target), discuss benefits and risk of insulin treatment.
- **Initiate with a structured programme including patient education and management plan**
  - Insulin therapy should be initiated from a choice of a number of insulin types and regimens by a practitioner with the appropriate knowledge, competencies and experience to choose the most appropriate starting regime tailored to each patient.
  - NICE guidance is that there is no evidence of a clinical benefit of analogue insulins over human insulins in type 2 diabetes. It recommends
    - Considering twice daily biphasic human insulin (pre-mix) regimens in particular where HbA1c > 75 mmol/mol. A once daily regimen may be an option when initiating this therapy.
    - insulin analogue rather than pre-mixed human insulin preparations should only be considered when:
      - immediate injection before a meal is preferred, or
      - hypoglycaemia is a problem, or
      - blood glucose levels rise markedly after meals
    - Recurrent symptomatic hypoglycaemia should prompt a re-examination of the current insulin regime, injection sites, a search for other comorbidities (such as liver or renal disease) and a review of the agreed HbA1c target. If tight control is still required, then consider a trial of analogue insulin.
    - If a patient requires once daily insulin administration because a carer or healthcare professional is needed to administer the insulin injection, and once daily NPH insulin does not provide sufficient control, then consider a trial of basal insulin analogue.
    - Monitor a person using a basal insulin regimen (NPH or a long-acting insulin analogue [insulin glargine/detemir]) for the need for mealtime insulin (or a pre-mixed insulin preparation). If blood glucose control remains inadequate (not to agreed target levels without problematic hypoglycaemia), move to a more intensive, twice/three times daily mixed insulin or mealtime plus basal insulin regimen.
    - Human insulins (such as Humulin S®, Actrapid®, Insuman Rapid®, Isophane insulin, biphasic isophane insulin) should be considered as first line therapy before moving to analogue or analogue mixtures. Insulin analogues should only be considered if one of the above criteria is met.
    - Monitor a person using pre-mixed insulin once or twice daily for the need for a further pre-prandial injection or for an eventual change to a mealtime plus basal insulin regimen, based on human or analogue insulins, if blood glucose control remains inadequate.

Oral agent combination therapy with insulin
- When starting basal insulin therapy:
  - Continue with metformin and the sulfonylurea (and acarbose, if used)
  - Review the use of gliclazide if hypoglycaemia occurs.
  - When prandial quick or rapid acting insulin injections or mixed insulins are started, gliclazide should be discontinued, or tapered and then discontinued, since it is not considered synergistic with administered insulin.
- When starting pre-mixed insulin therapy (or mealtime plus basal insulin regimens):
  - continue with metformin
  - consider combining with an SGLT2 inhibitor if:
    - an SGLT2 inhibitor has previously had a marked glucose-lowering effect, or
- Blood glucose control is inadequate with high dose insulin.

**Use of GLP1 analogues in combination with insulin**
- Exenatide and lixisenatide are licensed for addition to patients currently receiving insulin.
- The European CHMP has recommended the approval of liraglutide for use in combination with basal insulin in the treatment of adults with type 2 diabetes (March 2014).
- Insulin detemir is licensed for addition to patients currently receiving liraglutide.
- The patient group indicated to receive this combination must fulfil the following criteria;
  - Significantly overweight (BMI >35) and
  - HbA1c > 75mmol/mol (9%) and
  - Currently using insulin
- This regimen must be initiated by a specialist.
- **Continue the GLP1 in combination with insulin only if the person has a reduction in HbA1c of ≥11 mmol/mol (1.0 %) and a 3% loss of initial bodyweight in 6 months.**

**Intensifying the insulin regime**
- Monitor those using basal insulin regimens for the need for short acting insulin before meals or pre-mixed insulin.
- Monitor those using premixed insulin once or twice daily for need for further injections of short acting insulin before meals or change to mealtime plus basal regimen.

**Insulin delivery devices**
- Offer education to a person who requires insulin about using an injection device (usually a pen injector and cartridge or a disposable pen) that they and/or their carer find easy to use.
- Appropriate local arrangements should be in place for the disposal of sharps.
- Only insulin detemir (Levemir®) and Insulatard® can be used with the Innolet® device.
- If a person has a manual or visual disability and requires insulin, offer a device or adaptation that:
  - takes into account his or her individual needs
  - he or she can use successfully.

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4 CHMP: Committee for Medicinal Products for Human Use
5 A 0.5% difference in HbA1c is equivalent to a difference of about 5.5mmol/mol, and a 1% difference is equivalent to a difference of about 11mmol/mol. Note that these are rounded equivalents.
# Type 2 Diabetes and Renal Impairment – Drug Adjustment

<table>
<thead>
<tr>
<th>Drug</th>
<th>CKD stage 1 (GFR&gt;90)</th>
<th>2 (60-90)</th>
<th>3a (59-45)</th>
<th>3b (44-30)</th>
<th>4 (29-15)</th>
<th>5 (&lt; 15 or RRT)</th>
<th>Mild / Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acarbose</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✗ Contraindicated</td>
</tr>
<tr>
<td>Metformin / Metformin MR</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✗ Contraindicated in hepatic insufficiency</td>
</tr>
<tr>
<td>Gliclazide / Gliclazide MR</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✗ Contraindicated</td>
</tr>
<tr>
<td>Sitagliptin</td>
<td>100mg</td>
<td>100mg</td>
<td>50mg (GFR&lt;50ml/min)</td>
<td>50mg</td>
<td>25mg</td>
<td>25mg</td>
<td>✓</td>
<td>✗ Not studied in severe hepatic impairment</td>
</tr>
<tr>
<td>Linagliptin</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ No dose adjustment required, but clinical experience is lacking in patients with hepatic impairment</td>
</tr>
<tr>
<td>Pioglitazone</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ Contraindicated</td>
</tr>
<tr>
<td>Lixisenatide</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ Contraindicated</td>
</tr>
<tr>
<td>Exenatide</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ Contraindicated</td>
</tr>
<tr>
<td>Exenatide MR</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ Contraindicated</td>
</tr>
<tr>
<td>Liraglutide</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✗ Not recommended</td>
</tr>
<tr>
<td>Dapagliflozin</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ Starting dose 5mg, increase to 10mg if well tolerated</td>
</tr>
<tr>
<td>Insulin</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ Requirements may be altered in hepatic impairment – monitor and adjust dose accordingly</td>
</tr>
</tbody>
</table>

N.B. In patients at extremes of weight (BMI <18.5 kg/m² or >30 kg/m²) or age (>70yr), calculate renal function using Cockcroft and Gault equation (see calculator available [here](http://example.com))
DVLA Guidance

The risk of hypoglycaemia is the main hazard to safe driving and can occur with diabetes treated with insulin or tablets.

Treated with diet alone or by tablets other than those which carry a risk of inducing hypoglycaemia or by non-insulin injectable medication: No requirement to inform the DVLA about diabetes unless develop relevant disabilities (eg diabetic eye problems affecting vision), but must be under regular medical review.

Treated with tablets which carry a risk of inducing hypoglycaemia (including sulfonylureas and glinides): Group 1 ODL – car, motorcycle. No more than one episode of hypoglycaemia requiring assistance of another person in preceding 12 months, monitoring appropriately (ie sufficiently frequently to detect any tendency to hypoglycaemia, including at times relevant to driving) to minimise chance of hypoglycaemia and under regular medical review. If all these criteria are satisfied, there is no need to inform the DVLA.

Group 2 entitlement vocational – lorries, buses. Must satisfy the following:
- No episode of hypoglycaemia requiring assistance of a another person in preceding 12 months
- Full awareness of hypoglycaemia
- Regularly monitors at least x2 per day and at times relevant to driving
- Able to demonstrate an understanding of the risks of hypoglycaemia
- No other debarring complications of diabetes such as a visual field defect
- Under regular medical review

Treated with insulin temporarily. Group 1: Notify DVLA only if disabling hypoglycaemia. If under medical supervision and risk of disabling hypoglycaemia remote notification not required. (NB DVLA should be notified if insulin treatment continues for more than three months)

Group 2: If requirements for ‘Group 2 entitlement vocational – lorries, buses’ bullet points above, satisfied may apply for license.

Treated with insulin:
Group 1. A 1, 2 or 3 year license may be issued if:
- No more than one episode of hypoglycaemia requiring assistance of a another person in preceding 12 months
- Awareness of hypoglycaemia
- Appropriate blood glucose monitoring
- Not regarded as a likely source of danger to the public while driving
- Visual standards for acuity and visual field are met

Group 2. As ‘Group 2 entitlement vocational – lorries, buses’ bullet points above plus glucose meter should have a memory function and, at the annual examination by an independent Consultant Diabetologist, 3 months of blood glucose readings must be available. Additional guidance for insulin-treated drivers who wish to apply for a Group 2 (LGV/PCV) license can be found at www.dvla.gov.uk.

Drivers with insulin-treated diabetes cannot drive emergency (police, ambulance and health service) vehicles.

Drivers are advised to carry their glucose meters and test strips with them. They are advised to check blood glucose before driving (even on short journeys) and test every 2 hours on long journeys. A small starchy snack should be taken if blood glucose is 5.0mmol/L or less. If less than 4.0 mmol/L or symptoms of hypoglycaemia, the vehicle should be stopped and the driver should switch off the engine, remove the keys from the ignition and move from the driver’s seat. Affected individuals should not resume driving until 45 minutes after the blood glucose has returned to normal. An emergency supply of fast-acting carbohydrate should always be kept in the vehicle.

Impaired awareness of hypoglycaemia necessitates stopping driving. Regaining warning symptoms may result in reinstatement of a Group 1 license, but refusal or revocation of a Group 2 license is unlikely to be reversed.

Full guidance for people with diabetes is available in the DVLA’s customer service guide. The medical standards are published in the DVLA’s ‘At a glance’ guide.
Self Monitoring

Self-monitoring may prove useful to people in their overall approach to self-care.

**Type 1 and type 2 diabetes on insulin**

- Most patients in this group should be taught self-blood glucose monitoring.
- Guidance on the different meters will be available.
- Patients vary in how often they test.
- See guidance table re frequency of testing
- More frequent testing in certain circumstances may be indicated: - illness, pregnancy, changes in treatment, driving, hypo awareness.
- Testing is only part of the process of improving glucose control. Unless results are interpreted and diet or insulin adjusted glycaemic control will not improve.
- More frequent monitoring may be required during pregnancy
- Patients should be reminded to regular performance regular calibration of the meters

**Type 2 diabetes not on insulin**

Blood glucose testing may be considered in this patient group, particularly when being treated with a sulfonylurea. Please refer to the Frequency of Blood Glucose self-monitoring in Type 1 and Type 2 diabetes table.

The National Institute for Clinical Excellence (CG 87) recommends that:

‘Self-monitoring should not be considered as a stand alone intervention’ and

‘self-monitoring should be taught if the need / purpose is clear and agreed with the patient’

When considering whether testing is appropriate, the following points should be considered:

- A clear indication should be given on why, when and how to test
- A clear indication should be given on when testing is not required
- A clear reason for monitoring i.e.
  - Intention to provide the patient with information about their day to day glycaemic control to inform decision making, particularly in relation to illness, strenuous activity or when driving
  - Intention to provide the clinician with information about day to day control, enabling them to give appropriate advice
  - Aim to detect/confirm hypoglycaemia
  - Aim to confirm symptoms of hyperglycaemia and poor control

**NB** Obsessional testing occurs in some individuals and can cause anxiety and lifestyle disruption. Any individual who tests inappropriately should be supported to reflect on their monitoring habits.

**50% of self-monitored glucose measurements are inaccurate, usually due to operator error. Patients, doctors and nurses using blood glucose monitoring with or without a meter MUST RECEIVE APPROPRIATE EDUCATION**

**Blood glucose meters used should be subject to regular quality control**

Will the result change the management of the patient? If not, why do it?
Guidelines for the choice of Blood Glucose Testing Strips and Meters and Approved List of Blood Glucose Testing Meters and Strips

These guidelines are intended to be used in conjunction with NHS Barnsley Blood Glucose Self-Monitoring Guidelines and will assist healthcare professionals in selecting an appropriate blood glucose meter and testing strips for their patients.

The cornerstone of good glycaemic care is the quality of support and educational relationship between the healthcare professional and the patient. A patient who doesn’t understand why and when they should undertake blood glucose testing, will either test too frequently or fail to test when needed. A patient-centred approach is encouraged, explaining the rationale for testing in different situations, whenever an opportunity presents.

Healthcare professionals should only provide a meter to a patient if it is appropriate for them to monitor their blood glucose level. Meters will be provided free of charge from GP surgeries or diabetic clinics. It is the responsibility of the clinician providing the meter to provide guidance on appropriate testing and training and support on the on use of meter itself.

There should be no need for a patient to purchase a meter and patients should be dissuaded from doing so without consulting their specialist first. Prescribing of strips and lancets for patients who purchase a meter is not supported by the CCG.

Patients who should be testing
- People with type 1 diabetes
- Women who develop diabetes in pregnancy
- People with type 2 diabetes treated with medication which carries a risk of inducing hypoglycaemia – insulin, sulfonylureas and glinides.

Choice of meter and test strips
Meters have been identified as providing the necessary required functions, level of accuracy and have Diabetes Specialist Nurse endorsement in relation to use, availability of training and support. Meters were required to:
- have a small sample size (less than one microlitre),
- be suitable for patients on dialysis,
- meet DVLA criteria - having a memory function which records three months of blood glucose readings with no delete facility.
- require no coding
- not accept expired strips
- have evidence of meeting the International Organisation for Standardisation (ISO) performance standard for blood glucose monitoring systems for self-testing in managing diabetes mellitus (ISO 15197-2013.)

In addition those meters intended for use in non-complex patients, are expected to have test strips available at a Drug Tariff cost of less than £10 for 50 strips. Other reason for excluding meters were acceptance of date expired testing strips and experience of patients being transferred to an “upgraded” meter on contact with company’s customer services.

Approved List of Blood Glucose Testing Meters

Prices from Drug Tariff March 2014

<table>
<thead>
<tr>
<th>Meter</th>
<th>Strips</th>
<th>Pack size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 2 diabetes stable on insulin therapy or on sulfonylureas or glinides</td>
<td>GlucoRx Nexus</td>
<td>GlucoRx Nexus</td>
<td>50</td>
</tr>
<tr>
<td>Talking Blood Glucose Meter</td>
<td>GlucoRx Nexus Voice</td>
<td>GlucoRx Nexus</td>
<td>50</td>
</tr>
</tbody>
</table>

GlucoRx Nexus ranked highest through simplicity of operation, the large size, clear display screen and experience of customer support in addition to price.
More complex patients for whom greater accuracy is required

<table>
<thead>
<tr>
<th>Type 1 diabetes / Type 2 diabetes on insulin therapy with a problem with unstable glycaemic control / Women who develop diabetes in pregnancy</th>
<th>OneTouch VerioIQ</th>
<th>One Touch Verio</th>
<th>50</th>
<th>£14.99</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contour USB</td>
<td>Contour Next</td>
<td>50</td>
<td>£15.04</td>
<td></td>
</tr>
<tr>
<td>Contour XT</td>
<td>Contour Next</td>
<td>50</td>
<td>£15.04</td>
<td></td>
</tr>
</tbody>
</table>

Training and education for the patient must be from the diabetes specialist nursing team

<table>
<thead>
<tr>
<th>Blood Ketone Meter</th>
<th>GlucoMen LX Plus</th>
<th>GlucoMen LX Sensors</th>
<th>50</th>
<th>£15.39</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GlucoMen LX Ketone</td>
<td>10</td>
<td>£20.57</td>
<td></td>
</tr>
<tr>
<td>MediSense Optium Neo</td>
<td>FreeStyle Optium</td>
<td>50</td>
<td>£15.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FreeStyle Optium β Ketone</td>
<td>10</td>
<td>£20.86</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bolus Calculator Meters</th>
<th>Accu-chek Aviva Expert</th>
<th>Aviva</th>
<th>50</th>
<th>£15.59</th>
</tr>
</thead>
<tbody>
<tr>
<td>FreeStyle InsulinX</td>
<td>FreeStyle Lite</td>
<td>50</td>
<td>£15.60</td>
<td></td>
</tr>
</tbody>
</table>

Meters for more complex patients for whom greater accuracy or specialist function is required are supplied from the choices on this list on a basis of suitability and availability for the patient.

Healthcare professionals are urged to move to a consistent approach in providing products from this list. Patients should not be “switched” without their involvement and discussion. The opportunity to review strips may present at diabetes review, or recall for review before the next prescription is due. Patients should use all their current test strips before starting to use new meters and strips to avoid waste.

NHS Barnsley CCG

Review date: March 2015
# Frequency of Blood Glucose Self-monitoring in Type 1 and Type 2 diabetes

<table>
<thead>
<tr>
<th>Diabetes Type</th>
<th>Testing frequency</th>
<th>Specific Considerations</th>
<th>Approximate number of strips needed (1 box contains 50 strips)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type 1 Diabetes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All patients</td>
<td>4-8 times a day*</td>
<td>Greater risk of hypoglycaemia and hyperglycaemia</td>
<td>3-4 boxes per month</td>
</tr>
<tr>
<td>Insulin pump</td>
<td>Minimum 4 (and up to 8) times a day</td>
<td>More frequent testing indicated in certain circumstances (eg illness, undertaking type 1 education, drivers)</td>
<td></td>
</tr>
<tr>
<td><strong>In Pregnancy Diabetes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulin</td>
<td>Up to 7 times a day*</td>
<td>Including fasting state and postprandial blood glucose Up to 7 times a day under specialist advice</td>
<td>4-5 boxes per month (re-assess after delivery)</td>
</tr>
<tr>
<td>Diet</td>
<td>Up to 3 times a day*</td>
<td>Including fasting state and postprandial blood glucose</td>
<td>2 boxes per month</td>
</tr>
<tr>
<td>Gestational on diet alone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Type 2 Diabetes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-injection insulin therapy</td>
<td>Up to 4 times a day*</td>
<td>Greater risk of hypoglycaemia and hyperglycaemia</td>
<td>3-4 boxes per month</td>
</tr>
<tr>
<td>(more than 2 times per day)</td>
<td>(Usually pre-, but sometimes post-prandial)</td>
<td>Vary according to individual need</td>
<td></td>
</tr>
<tr>
<td><strong>Type 2 Diabetes</strong></td>
<td></td>
<td>Frequency may vary for each individual</td>
<td></td>
</tr>
<tr>
<td>Insulin therapy and oral anti-diabetic agents</td>
<td></td>
<td>Vary testing times to identify hypoglycaemia Vary testing times to include preprandial, postprandial and pre-bedtime Vary according to individual need</td>
<td></td>
</tr>
<tr>
<td>Plus either</td>
<td></td>
<td>At least once a day</td>
<td>2 boxes per month</td>
</tr>
<tr>
<td>• If on daily insulin and stable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Or</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• If on twice-daily Insulin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Or</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Unstable glycaemic control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Or</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• If on twice-daily Insulin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Or</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Unstable glycaemic control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 2 Diabetes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Diet and exercise</td>
<td>Not routinely required*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| • Oral hypoglycaemic (except sulfonylurea or glinide) and/or sc GLP-1 agonists | HbA1c main outcome measure
Testing may be appropriate in certain circumstances ie newly diagnosed, where need and purpose is clear and agreed with patient. This should be supported by educational support. See NICE guidelines [here](#). Drivers may also need to test more frequently.

<table>
<thead>
<tr>
<th>Type 2 Diabetes</th>
<th></th>
</tr>
</thead>
</table>
| • Sulfonylurea (alone or in combination with ANY other anti-diabetic agents) | • About 3 times a week for non driver
• At least 3 times a week for driver* |

Hypoglycaemia is common so vary testing times during the day to identify hypoglycaemia
Drivers may require more frequent testing

1 box every 3 months

- This guidance reflects recommended best practice. Concurrent illness or medication (eg steroids, chemotherapy) may increase the frequency of testing
- It may be appropriate to test less frequently in stable patients
- Blood glucose meters can be supplied by the DSNs or from the practice nurse from the approved list, if appropriate for the patient. After discussion, a letter will be sent to the patient’s GP with a suggested testing regime and requirement for testing strips.
- Patients will be encouraged to utilise the relevant meter help line in the event of problems with the meter (errors, battery replacement or requests for quality control solution)
- Continual updating of meters is not encouraged unless there is a problem with the existing meter
- Blood ketone meters: All patients with type 1 diabetes should possess a meter to test for ketones when they are unwell

*Please refer to the DVLA ‘At a glance’ guide to the current medical standards of fitness to drive, Chapter 3 Diabetes Mellitus. Available to download [here](#)
## Insulin Pens and Needles

### REUSABLE PENS – REQUIRE 3ml CARTRIDGES

<table>
<thead>
<tr>
<th>PEN</th>
<th>Compatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SAVvio PEN</strong></td>
<td>Humalog®, Humalog® Mix25, Humalog® Mix50, Humulin I®, Humulin S®, Humulin M3®</td>
</tr>
<tr>
<td><strong>HUMAPEN® LUXURA HD (½ units)</strong></td>
<td>Humalog®, Humalog® Mix25, Humalog® Mix50, Humulin I®, Humulin S®, Humulin M3®</td>
</tr>
<tr>
<td><strong>NOVOPEN® 4</strong></td>
<td>Novomix® 30, NovoRapid®, Levemir®, Insulatard®</td>
</tr>
<tr>
<td><strong>NOVOPEN® ECHO (½ units)</strong></td>
<td>NovoRapid®</td>
</tr>
<tr>
<td><strong>ClikSTAR®</strong></td>
<td>Lantus®, Apidra®, Insuman® Basal, Insuman® Comb 15, Insuman® Comb 25, Insuman® Comb 50</td>
</tr>
</tbody>
</table>
### 3ml DISPOSABLE PENS

<table>
<thead>
<tr>
<th>Kwik Pen</th>
<th>Flex Pen</th>
<th>Solostar</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="" /></td>
<td><img src="image" alt="" /></td>
<td><img src="image" alt="" /></td>
</tr>
<tr>
<td>Humalog®</td>
<td>Novomix® 30</td>
<td>Lantus®</td>
</tr>
<tr>
<td>Humalog® Mix25</td>
<td>NovoRapid®</td>
<td>Apidra®</td>
</tr>
<tr>
<td>Humalog® Mix50</td>
<td>Levemir®</td>
<td>Insuman® Basal</td>
</tr>
<tr>
<td>Humulin® I</td>
<td>Insulatard®</td>
<td>Insuman® Comb 15</td>
</tr>
<tr>
<td>Humulin® M3</td>
<td></td>
<td>Insuman® Comb 25</td>
</tr>
</tbody>
</table>

Insulin choice is often device driven and should, where possible be patient-centred.

A comparison has been undertaken of insulin pen needles:

**GlucoRx FinePoint** Insulin Pen Needles and **B.Braun Omnican** Fine Insulin Pen Needles were found to offer a full range of sizes/gauges of appropriate quality and are equally acceptable to patients. These needles may be prescribed to be used on all the pen devices listed above. The size of the needle should be advised by a diabetes specialist nurse.

For further advice regarding the above and other specialist devices, including memory pens and needleless systems, please contact the Diabetes Specialist Nursing Team (01226 209884).

Natasha Kelly DSN/Joanne Bissell DSN. April 2014  
Review April 2015
Diabetes and Sick day Rules

Key points:
- Intercurrent illness is likely to cause deterioration in blood glucose control and, in those with type 1 diabetes, increases the risk of diabetic ketoacidosis.
- All patients with diabetes, whether type 1 or type 2 should be familiar with the ‘Sick Day Rules’.
- Patients with type 1 diabetes should be provided with blood ketone test strips (eg Freestyle Optium β) to test their blood for ketones during illness.
- These strips are designed for use with the Optium and Optium Xceed meters.
- Checking the blood glucose level and for ketones in the urine is an important part of the assessment of any patient with diabetes who is unwell.
- Blood glucose levels are likely to be higher than normal even if the patient is not eating, is vomiting or has diarrhoea.

Seek medical or diabetes specialist nurse advice if:
- Vomiting and unable to keep down fluids.
- Hyperglycaemia (blood glucose level above 17.0 mmol/l) + ketones in urine (trace to small amount) or blood ketones 1.5 mmol/l or higher (consider hospital admission if blood ketones >2.0mmol/L).
- Unsure of what to do.

Admit to hospital if:
- Persistent vomiting.
- Not able to tolerate oral fluids.
- Dehydrated (or risk of dehydration).
- Hyperglycaemia (blood glucose level above 17.0 mmol/l) + ketones in urine (moderate to large amount) or blood ketones 3.0 mmol/l or above.
- Suspected diabetic ketoacidosis.
Hypoglycaemia Management in adults (aged 16 or older)

Hypoglycaemia is the commonest side effect of insulin and sulfonylureas in the treatment of diabetes and presents a major barrier to satisfactory long term glycaemic control. Hypoglycaemia should be considered in the differential diagnosis in any person with diabetes presenting acutely unwell or with altered consciousness or behaviour and seizures.

Definition
A hypoglycaemic episode occurs when any blood glucose level falls below 4mmol/L in a patient with diabetes. This is classified into mild if the episode is treated by the person alone and severe if the assistance of a third party is required for treatment.

Risk factors for hypoglycaemia
- Too much insulin or inappropriately high doses of oral hypoglycaemic agents (sulphonylureas)
- Hot weather
- Exercise
- Alcohol
- Patients with very tight glycaemic control
- Severe or frequent hypoglycaemia history
- Frequent nocturnal hypoglycaemia or unrecognized nocturnal hypoglycaemia
- Longstanding diabetes
- Early Pregnancy and breast feeding
- Poor insulin administration technique
- Impaired hypoglycaemia awareness
- Impaired renal function and renal dialysis
- Severe Hepatic Dysfunction
- A prior episode of hypoglycaemia which has been inadequately treated
- Patients with terminal illness
- Patients with lipohypertrophy

Possible Causes of Hypoglycaemia in hospitals
- Inappropriate use of stat doses or PRN doses of quick acting insulin
- Discontinuation of long term steroid therapy or reduction in steroid treatment
- Recovery from acute illness
- A mismatch between diabetes medications and timing and/or content of meals/feeds
- Change in size of meals
- Incorrect insulin dose prescribed/administered
- Insufficient blood glucose monitoring
- Poor compliance at home
- Nil by mouth or reduced oral intake or missed meals
- No bedtime snack

Clinical Features of Hypoglycaemia
Adrenergic: Pallor, tachycardia, sweating, tremor

Neuroglycopenic: Poor concentration, hunger, double vision, irritability, lips and tongue tingling, confusion, aggressive behaviour, poor judgement, altered personality, altered speech, altered consciousness, seizures, coma.

Management
Treatment of acute hypoglycaemia should be carried out without delay. Please refer to algorithm.
Management of Hypoglycaemia

Blood glucose (BG) < 4mmol/l

- Patient conscious, orientated and able to swallow
- 10-20g or oral fast acting carbohydrate
  Examples:
  - 115 mls Lucozade
  - 5-7 dextrose tablets
  - 150-200mls fruit juice or non-diet fizzy drink
  - 5-6 jelly babies
- Check ABCDE
- Call for help
- Either 1.5 - 2 tubes of Glucogel (Hypostop) squeezed into mouth or between teeth (but may not be effective)
- Or Glucagon 1mg IM
- Check ABCDE
- Call for help
- Either Glucagon 1mg IM
- Or IV dextrose (50 mls of 10% dextrose initially and repeat at 5 minute intervals to max of 250mls)
- Check blood sugar after 10-15 minutes
- BG > 4 mmol/l
  - Conscious and able to swallow
  - Repeat oral glucose
  - Seek help
- BG < 4 mmol/l
  - Unconscious/oral route not possible
  - Glucagon 1mg IM if not had or further 10% IV dextrose (100 ml/hr)
  - Eat snack or meal with long acting carbohydrate
  - 10-20g carbohydrate (2 x digestive biscuits, yoghurt, slice of toast, cereal or give normal meal with carbohydrates if due
  - Determine cause
  - Hypoglycaemia education
  - Refer to DSN for assessment and review of glycaemic control (if deemed necessary)
  - Ensure regular blood glucose monitoring for 24-48 hours
  - Measures to avoid future episodes

Notes:
1. If a severe hypoglycaemic episode occurs when insulin/tablets doses are due the tablet should be omitted, treat the hypoglycaemic episode, give the patient a meal and then give insulin/tablet. Seek help urgently if hypoglycaemia is not responding to treatment.
2. Hypoglycaemia can be prolonged with large doses of insulin or with sulfonylurea therapy. Therefore, need for regular blood glucose monitoring after a hypoglycaemia episode has occurred.
3. Glucagon may be less effective in sulfonylurea therapy and with repeated doses. Glucagon should not be used in a person with liver disease.

NB Link with Yorkshire Ambulance flow chart
Hypertension Management in Diabetes

Cardiovascular disease is the major cause of morbidity and mortality in people with diabetes.

Hypertension is associated with an increased risk of many complications of diabetes, including cardiovascular disease, and the findings from the UKPDS trial indicate that any reduction in a person’s average blood pressure reduces the risk of complications (from Type 2 Diabetes).

**Recommended Blood Pressure Targets**

<table>
<thead>
<tr>
<th>Type of Complication</th>
<th>Target (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No microvascular complications</td>
<td>140 / 80</td>
</tr>
<tr>
<td>Microvascular complications (Proteinuria, Retinopathy, Microalbuminuria)</td>
<td>130 / 80</td>
</tr>
<tr>
<td>Proteinuria&gt;1g</td>
<td>125 / 75</td>
</tr>
</tbody>
</table>

**General Comments on Hypertension Management in Type 2 Diabetes**

- The UKPDS trial showed clear benefit of lowering blood pressure to 142/84 mmHg in middle-aged patients with type 2 diabetes and hypertension
- To achieve this approximately one third of patients required one anti-hypertensive agent, one third needed two and one third needed three or more agents
- A target of 140/80 or less may be difficult, impossible or unnecessary to achieve in certain patients (eg the elderly). **Individual targets should be established for each patient**
- Systolic hypertension is common in diabetes and the recommended targets may be difficult to attain. Aim to lower the systolic pressure by 20mmHg in the first instance and then review.
- Aim to minimise ALL vascular risk factors, especially in patients with established end-organ damage.
- Offer lifestyle management advice re smoking, weight loss, physical activity etc

**How to measure blood pressure**

**British Hypertension Society recommendations;**

- Patient should be seated and relaxed for 5 minutes with the arm supported.
- Ensure no tight clothing constricts the arm
- The rubber bladder should encircle between three quarters and the whole arm.
- The cuff must be level with the heart.
- The alternative adult cuff (12.5 – 13.0 x 35) is recommended for use in all adults
- For arm circumference over 42cm large bladders may be required.

<table>
<thead>
<tr>
<th>Cuff sizes</th>
<th>Width (cm)</th>
<th>Length (cm)</th>
<th>arm arc (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>12.0 – 13.0</td>
<td>23</td>
<td>up to 33</td>
</tr>
<tr>
<td>Alternative adult</td>
<td>12.5 – 13.0</td>
<td>35</td>
<td>up to 42</td>
</tr>
</tbody>
</table>

**Blood pressure measurements should be taken on a minimum of three separate occasions and averaged**

Electronic monitors should only be used if there is published evidence of accuracy. If used upper arm automated machines are preferable and all machines should be appropriately calibrated. More information available at the [British Hypertension Society](http://www.bhsoc.org) website.
**Blood Pressure Management Algorithm** (see APC-approved hypertension guidelines)

**Targets**
- If microvascular complications (proteinuria, retinopathy, microalbuminuria) present aim for ≤130/80
- If nephropathy (eg proteinuria >1g/day) is present aim for ≤125/75
- Others, set a target <140/80 mmHg

**If on antihypertensive therapy at diagnosis of diabetes**
- Review BP control and medication use.
- Make changes only if BP is poorly controlled or current medications are inappropriate because of microvascular complications or metabolic problems.

**If the person’s BP reaches and consistently remains at the target**
- Monitor every 4-6 months and check for possible adverse effects of antihypertensive therapy (including those from unnecessarily low blood pressure).

Measure BP annually if not hypertensive or with renal disease.
If BP > target, repeat measurement within:
- 1 month if >150/90 mmHg
- 2 months if >140/80 mmHg
- 2 months if >130/80 mmHg and kidney, eye or cerebrovascular damage

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**Antihypertensive medications can increase the likelihood of side effects such as orthostatic hypotension in a person with autonomic neuropathy.**

A2RB: angiotensin II receptor blocker; AER: albumin excretion rate; BP: blood pressure; CCB: calcium-channel blocker
Lipid management in Diabetes (see APC advice)

To improve the lipid profile:
- Reduce the risk of cardiovascular disease
- Reduce the risk of pancreatitis in patients with severe hypertriglyceridaemia

NICE recommended targets
Total Cholesterol < 4 mmol/l or LDL-C <2 mmol/l (NICE CG66 and CG67 May 2008)

Lifestyle
The importance of expert dietary advice, weight reduction, limiting alcohol consumption, exercise and smoking cessation should be emphasised and continually monitored.

Treatment

Patients 40 years or older
Consider a person to be at high premature cardiovascular risk if he or she is
- Overweight, tailoring this with an assessment of body weight and waist circumference
- Has associated risk according to ethnic group
- Is hypertensive (>140/80 mmHg in the absence or presence of antihypertensive therapy)
- Has microalbuminuria
- Smokes
- Has a high-risk lipid profile
- Has a history of cardiovascular disease
- Has a family history of premature cardiovascular disease

If the person is considered not to be at high cardiovascular risk, estimate cardiovascular risk annually.

Patients less than 40 years old
With CVD risk factors:
- Multiple features of the metabolic syndrome
- Presence of conventional risk factors
- Microalbuminuria / Nephropathy
- Retinopathy
- At-risk ethnic group
- Strong family history of premature CVD

Initiate therapy with generic simvastatin 40mg
If potential drug interaction or intolerance, use lower dose of simvastatin or generic atorvastatin

Targets
TC <4mmol/l (audit level <5 mmol/l) Or LDL-C <2mmol/l (audit level <3mmol/l)

Not met - intensify statin therapy (using a statin of low acquisition cost) consider adding other agents such as fibrate or ezetimibe

Elevated Triglycerides (fasting lipid profile)
Assess and manage secondary causes of high triglycerides:
- Poor blood glucose
- Hypothyroidism
- Renal impairment
- Liver inflammation particularly from alcohol.

- If Triglyceride remain >4.5 mmol/l initiate fibrate (first choice fenofibrate) either before or in addition to statin.
- Nicotinic acid or derivatives: Do not use routinely. May be considered if intolerance to statins or fenofibrate.
- Omega-3-fish oils: Do not use in primary prevention of CVD (unless as part of specialist treatment of hypertriglyceridaemia).

Samples
- There is no post prandial rise in total and LDL-cholesterol
- A non-fasting sample is suitable for initial screening only.
- A fasting sample should be obtained if triglyceride is significantly raised.

Referral to specialist care should be considered:
- If control remain poor
- Severe mixed hyperlipidaemia, with triglycerides >4.5 mmol/l
- When combination therapy is necessary
- If there is concern about liver function tests and the advisability of starting a statin
- If there is a family history of premature cardiovascular disease and familial hypercholesterolaemia
- If there is drug intolerance
**Anti-platelet therapy**

**General advice**
- Aspirin is not licensed for the primary prevention of vascular events in people with diabetes and there is no evidence that it is beneficial in this circumstance. If aspirin is used in primary prevention, the balance of benefits and risks should be considered for each individual, particularly the presence of risk factors for vascular disease and the risk of gastrointestinal bleeding.
- Patients on existing low-dose aspirin for primary prevention of vascular events should be reviewed and the benefits and risks of the treatment discussed with them.
- Aspirin, 75mg od, should be given routinely and continued long term in patients with diabetes and established coronary heart disease, transient cerebral ischaemia or stroke or peripheral vascular disease.
- It may also be considered in people with diabetes at very high vascular risk (eg 2 or more risk factors – hypertension, smoking, dyslipidaemia).
- In addition to long-term aspirin, clopidogrel 75mg od should be continued for 3 months in people with diabetes who sustain a non-ST elevation acute coronary syndrome and for up to 4 weeks in those who sustain an ST elevation acute coronary syndrome.

**First line**
Soluble aspirin 75mg daily

**Second line**
For patients who are unable to tolerate soluble aspirin or have a history of ulceration add in either lansoprazole 15mg od or omeprazole 20mg od and continue either soluble or enteric coated aspirin.

**Third line**
If aspirin is still poorly tolerated or contraindicated or there are compliance issues favouring monotherapy, consider clopidogrel 75mg od.

**References**

- NICE: CG66 Type 2 diabetes: full guideline. 2008
- MHRA. Drug Safety Update: Volume 3 Issue 3, October 2009
Renal Monitoring

Microalbuminuria:
- Excess albumin in the urine but not detectable using protein dipstick.
- The earliest indicator of renal disease (nephropathy).
- Is predictive of total mortality, cardiovascular mortality and cardiovascular morbidity.

Proteinuria (or macroalbuminuria):
- Is an important finding in patients with type 1 and type 2 diabetes.
- Represents progression of urine albumin excretion from microalbuminuria.
- Is associated with a high probability of progressive renal impairment due to diabetic nephropathy and an increased risk of macrovascular disease.
- An albumin:creatinine ratio >30mg/mmol is overt proteinuria.

Renal monitoring for patients with diabetes
- Annual urine dipstick test for protein (Boehringer 5L or AlbuStix test strips).
- If urine dipstick negative for protein measure urinary albumin creatinine ratio (ACR).
- Annual serum creatinine and estimation of GFR.

Microalbuminuria laboratory screening
10ml early morning ‘first pass’ urine sample in a 'Universal' specimen container.
Clinical chemistry form for albumin/creatinine ratio (‘ACR’ in mg/mmol).

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Interpretation</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2.5</td>
<td>&lt;3.5</td>
<td>Normal</td>
<td>Repeat in 1 year</td>
</tr>
<tr>
<td>≥2.5</td>
<td>≥3.5</td>
<td>Possible microalbuminuria</td>
<td>Repeat test at the next two clinic appointment and within 3-4 months, and microalbuminuria is confirmed if at least one out of two or more results is also abnormal</td>
</tr>
</tbody>
</table>

Renal Management for Patients with Diabetes

Routine management
- Maintain good blood glucose control.
- Maintain good blood pressure control see algorithm on next page.
- Stop smoking.
- Advice on salt, exercise.
- Immunize against influenza and pneumococcus.
- Drug reviews.

Persistently raised ACR or proteinuria
- Maintain good blood glucose control (HbA1c < 53 mmol/mol [7.0%] if possible).
- Maintain good blood pressure control (target < 130/80 mmHg for microalbuminuria, <125/75 if proteinuria >1g – ACR >100mg/mmol).
- Start ACE inhibitor or ARB.
- Check eGFR +7-10 days after starting/dose change.
- Use combination anti-hypertensive therapy to reach target.
- Manage CV risk factors aggressively.

Referral is advised:
- To investigate for non-diabetic renal disease – suspect if: Heavy proteinuria/nephrotic syndrome with short duration diabetes +/- little or no retinopathy +/- haematuria/microscopic haematuria.
- Raised creatinine with little or no proteinuria.
- Rise in creatinine >20% or fall in estimated GFR >15% following initiation of ACE/ARB (possible renovascular disease).
- Possible systemic illness (eg vasculitis/myeloma).
- Acute renal failure.

For management of:
- Persistent fluid retention.
- Hypertension.
- Secondary hyperparathyroidism.
- Rapidly decline GFR >4% per year irrespective of CKD stage.
- GFR <30mls/min (CKD stage 4).
- Hb<10g/dl in absence of any other cause for anaemia apart from chronic kidney disease.
Renal Disease Screening Algorithm

Screen newly diagnosed patients for proteinuria

Positive Result

Screen for microalbuminuria after 3 months of improved glycaemic control

Screening method Morning urine specimen for albumin: creatinine ratio (ACR)

Result

Yes

Establish the cause
Exclude other causes of a positive result e.g. urinary tract infection, severe hyperglycaemia, cardiac failure, contamination with blood, and other renal disease
MSU with microscopy for casts should be performed to aid diagnosis (the presence of red cell and other casts may indicate other renal pathology)
Ultrasound of the renal tracts may also be appropriate in some cases
Incipient nephropathy is diagnosed if 2 out of 3 tests are positive and other causes excluded

No

Screen annually

Management
Optimise glycaemic control
Check serum creatinine. If normal then check annually.
Referral if GFR <30mls/min or a progressive fall in GFR (fall >5ml/min for 2 successive years even if the absolute GFR is >30mls/min)
Optimise blood pressure control. Target is 130/80 for microalbuminuria and 125/75 for proteinuria >1g
Drugs of choice ACE-I or ARB, followed by long acting calcium channel blockers (avoiding short acting dihydropyridine calcium channel blockers such as nifedipine)
Manage the other cardiovascular risk factors aggressively
**Diabetic Retinopathy**

- The commonest cause of blindness in adults of working age in the UK
- Asymptomatic in the early stages when treatment is most effective
- More common and more severe with increasing duration of diabetes
- Smoking, renal disease and uncontrolled hypertension are the biggest risk factors
- Screening for diabetic eye disease has been shown to prevent loss of sight
- Laser therapy will reduce the risk of visual loss in more than 70% of patients with proliferative retinopathy
- Laser therapy will salvage vision in 50-60% of patients with maculopathy.

**Suggested Management in Primary Care**

- Ensure good diabetic control, give lifestyle advice (i.e. smoking) and control hypertension
- All patients age 12 and over should be referred for screening for diabetic retinopathy on diagnosis and annually thereafter (irrespective of where their routine care is managed).

The Barnsley Retinopathy Screening Department is based in the Diabetes Centre at Barnsley Hospital. It is open between 08:00 and 17.00, Monday to Friday, and weekend and evening clinics are also available. In addition, sessions take place at locations throughout the community and, wherever possible, screening will be arranged as close as possible to a patient’s home.

The Clinical Lead for the Diabetes Eye Screening Service is Mr Abulsattar Ibraheim, Consultant Ophthalmologist, based at Rotherham NHS Foundation Trust.

Contact details are: Diabetic Eye Screening Service, c/o Diabetes Centre, Barnsley Hospital NHS Trust, Gawber Road, Barnsley, S75 2EP.

**Telephone:** 01226 434577/434576

**Website:** [http://www.barnsleyhospital.nhs.uk/services/retinal-screening/](http://www.barnsleyhospital.nhs.uk/services/retinal-screening/)

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**Referral Guidelines to Secondary Care**

*The following circumstances require urgent referral:*

- Sudden deterioration of vision in one eye
- New vessels *(within 14 days).*

*The following require early referral *(within a few weeks):*

- Pre-proliferative retinopathy (severe background + cotton wool spots)
- Exudates near to the macula.
### Painful Neuropathy  
*(see APC-approved algorithm)*

#### Definition

The presence of positive symptoms and/or signs of peripheral nerve dysfunction in people with diabetes after exclusion of other causes. Typical positive symptoms include burning, pricking pain, electric shock-like feelings, tightness and hypersensitivity to touch.

#### Special Points

- Vastly underdiagnosed and a potential source of debilitation in a person with diabetes
- Occurs in both type 1 and type 2 diabetes and more common with increased duration of diabetes. Often co-exists with other microangiopathy.
- Small fibre neuropathy is a more common variant and responds poorly to treatment. In large fibre neuropathy; proprioception, vibration strength, tendon reflexes and muscle strength may be affected
- Even if successful, treatment may not relieve pain for many months or longer

#### Suggested Management in Primary Care

- Exclusion of other causes of pain (eg fasciitis, nerve entrapment, arthritis etc)
- Aim for good glycaemic and blood pressure control, angiopathy and foot screening
- Offer choice of tricyclic antidepressant (eg amitriptyline, with dose titration from 10mg nocte to a maximal tolerable dose – contraindicated in patients with prostatism, glaucoma, dysrhythmias or serious heart disease) duloxetine, gabapentin or pregabalin.
- Build on existing effective therapy and titrate doses upward slowly to minimise side-effects, warning patients that improvement may not occur until a higher dose is achieved.
  - Gabapentin: start at 300mg bd and titrate gradually to a maximum tolerated dose (600mg tds is often required before benefit is achieved).
  - Pregabalin: 75mg, 150mg and 300mg bd.
- Short-term tramadol may tried, but other treatments should be avoided unless under specialist advice.
- Monotherapy generally results in 30-50% reduction of pain at best and multi-drug treatment may be indicated in patients with intractable pain.
- NICE recommends obtaining and documenting informed consent for drugs unlicensed for the treatment of painful neuropathy (ie amitriptyline).

http://pathways.nice.org.uk/pathways/neuropathic-pain


#### Referral Guidelines to Secondary Care

Patients should be referred to the hospital to see a diabetologist if:

1) Intractable pain (despite amitriptyline or duloxetine and/or gabapentin or pregabalin)
2) Concerns about alternative diagnosis where electrodiagnostic investigation may be indicated.
3) Associated with significant glycaemic control or vascular complications of diabetes where secondary input is necessary.

4) **The following circumstances require urgent referral:**
   - If the painful foot is also noted to be either hot or swollen or both.
   - Associated with a non-healing neuropathic ulcers
Management of Foot Complications in Diabetes

### KEY POINTS

1. **INTEGRATED CARE**
   - Management of the foot in diabetes requires closely integrated care which crosses conventional professional boundaries.

2. **PREVENTION OF ACTIVE FOOT DISEASE**
   - All people with diabetes should have their feet examined annually to detect those at risk. Those at increased risk are those with peripheral arterial disease, neuropathy, or deformity. Those at greatest risk are those who have had a previous foot problem, and those with end stage renal failure.
   - Those at increased risk should remain under surveillance by a specialist with attempts made to reduce onset of new disease – by regular examination, podiatry, education and provision of orthoses (when appropriate).

### Appendix F: Foot care pathway

3. **MANAGEMENT OF NEW (OR DETERIORATING) ULCER, OR THE HOT RED SWOLLEN FOOT INCLUDING NECROSIS/GANGRENE AND ACTIVE CHARCOT FOOT**
   - All newly occurring disease whether in the community or hospital should be referred to the Diabetes Centre (or A&E out of hours) within one working day.

### Telephone or fax referrals to Barnsley Hospital:

   Fax 01226 434406 (Queries 433173 or 432379)

4. **MANAGEMENT OF THE PERSON WHOSE FOOT DISEASE HAS HEALED**
   - The risk of a new problem is 40% within 12 months
   - The overall mortality of people with foot disease is 50% at 5 years. Strenuous steps should be taken to minimise cardiovascular risk.

### INTEGRATED CARE

Disease of the foot is complex and multifactorial, with different people having different dominant problems. Each person with foot disease must have access to professionals with skills and resources necessary to assess and correctly manage any infection, peripheral arterial disease and any requirement for off-loading arising from neuropathy. It is for this reason that most foot disease requires the input of a number of professionals with the necessary complementary skills who work either together or in close communication with each other. Management of the foot in diabetes requires closely integrated care which crosses conventional professional boundaries. This care is shared between:

- **Generalist Practitioner or Practice Nurse** with the skills necessary to identify the foot at increased risk.
- **Community Podiatrist** - A Health Professions Council registered podiatrist working primarily in a community setting.
- **Diabetes Specialist Podiatrist** – A highly specialised podiatrist with a relevant post, and graduate qualification in the podiatric care of patients with diabetes.
- **Multidisciplinary Footcare Team (MDT)** – A team of highly expert diabetes specialist physicians, podiatrists, orthotists and nurses who together have the necessary skills to assess and manage diabetic foot disease. The team must have ready access to input from vascular and orthopaedic surgeons, plaster casting, microbiological support, appropriate imaging and in-patient beds. Because of the multiple skills and resources required, the MDT will usually be located in secondary care.
**ROLES AND RESPONSIBILITIES**

The appropriately trained generalist practitioner will be responsible for providing at least annual foot screening, education and information for all 'low risk' patients. Patients found to be at increased risk should be referred to the Podiatry service. All newly occurring disease of the foot should by referred by phone or fax to the expert MDT.

The Community Podiatry service will be responsible for providing assessment and appropriate foot care, including education and information, to all patients identified as being at ‘increased or high risk’. They will be responsible for ensuring appropriate ongoing monitoring, with a focus on prevention and early intervention. They will refer on to the Multidisciplinary Footcare team in a timely manner if ‘risk’ increases. They will also refer any newly occurring disease to the expert MDT by phone or fax.

The Diabetes Specialist Podiatrist will be responsible for providing expert diabetes podiatric input to the Multidisciplinary Footcare Team, usually based in acute organisations. They will also be responsible for setting and maintaining clinical standards and providing expert advice and support to podiatric colleagues.

The Multidisciplinary Footcare Team will be responsible for providing care for all foot care emergencies and coordinating the care of those at ‘high risk’ who are referred to them.

**PREVENTION OF ACTIVE FOOT DISEASE**

**Classification of risk**

People with diabetes should have their degree of foot risk classified, and their routine surveillance adjusted on the result.

**Risk Level 1** Normal sensation, palpable pulses and no other risk factors
- Those at low risk require basic footcare education, including action to be taken if they develop an active foot problem.

**Risk Level 2** Normal sensation, palpable pulses, but one other risk factor present (eg callus, limited joint mobility or foot deformity)
- Those at increased risk require assessment by a podiatrist who will formulate a management plan dependent on individual needs, and including ongoing regular expert review and education.

**Risk Level 3** Impaired sensation and/or evidence of peripheral arterial disease palpable pulses, but no other risk factors
- As for Risk level 2 plus additional emphasis on early expert assessment of new disease

**Risk Level 4** Impaired sensation and/or evidence of peripheral arterial disease palpable pulses and additional risk factor(s) present (eg callus, limited joint mobility or foot deformity) but no previous ulceration or amputation
- As for Risk level 2 plus additional emphasis on early expert assessment of new disease

**Risk Level 5** Impaired sensation and/or evidence of peripheral arterial disease palpable pulses and additional risk factor(s) present (eg callus, limited joint mobility or foot deformity) and previous ulceration or amputation
- As for Risk level 2 plus additional emphasis on early expert assessment of new disease

**ACTIVE FOOT DISEASE**

**Risk Level 6** Presence of active ulceration, spreading infection, critical ischaemia, gangrene or unexplained hot, swollen foot with or without the presence of pain
- All patients with active foot disease must be referred to the MDT within one working day (NICE 2004) or as an emergency. For contact details please go to: Referral to Community and Specialist Services

Barnsley Diabetes Guidelines January 2014
Diabetes in Pregnancy (NICE)

Key Priorities Pre Conceptual Care
- Women with diabetes who are planning to become pregnant should establish good glycaemic control before conception. Continuing this throughout pregnancy will reduce the risk of miscarriage, congenital malformation, stillbirth and neonatal death. It is important to explain that risks can be reduced but not eliminated.
- The importance of avoiding unplanned pregnancy should be an essential component of diabetes education from adolescence for women with diabetes.

Pre Pregnancy
All women with diabetes who are known to be planning a pregnancy should be referred to Sue Jones, Lead DSN, for pre-conception care (Wednesday afternoon clinic. Apollo Court Medical Centre 01226 209884) and to Paul Pipe-Thomas, Specialist Dietitian for Diabetes

Information and Advice
- Use of ‘Planning a family diabetes notes’, produced by the Birmingham Perinatal Institute
- Encourage the woman’s partner or a family member to attend pre conception appointments
- Give advice on risks of diabetes in pregnancy and how to reduce them with good glycaemic control. Aim towards HbA1c <43 mmol/mol (6.1%) if safe
- Advise women with HbA1c >86 mmol/mol (10%) to avoid pregnancy
- Discuss diet, body weight and exercise including weight loss with women with BMI >27kg/m² and refer to dietitian
- Discuss hypoglycaemia and hypoglycaemia awareness
- Retinal and renal assessment
- When to stop contraception and smoking cessation support
- Offer folic acid 5mg/day 3 months before a planned pregnancy and continue up to 12 weeks gestation

Review medication (Box 1) and self monitoring routine (Self monitoring of blood glucose will be frequent-ideal parameters 4-5.9mmols/l pre-meal, <7.8mmols/l 1 hour after meals and 6-7mmols/l before bedtime).

Box 1

Safety of medications before and during pregnancy
- Metformin may be used before and during pregnancy.
- Data from clinical trials and other sources do not suggest that the rapid-acting insulin analogues (aspart and lispro) adversely affect pregnancy or the health of the fetus or newborn baby.
- Isophane (NPH) insulin is the first-choice long-acting insulin during pregnancy, but detemir may be used where hypoglycaemia is problematic.

Before or as soon as pregnancy is confirmed:
- Stop oral hypoglycaemic agents, apart from metformin. If on a sulfonylurea ‘dovetail’ reduction to prevent hypoglycaemia
- Stop angiotensin-converting enzyme inhibitors and angiotensin-II receptor antagonists and consider alternative antihypertensives (eg labetolol)
- Stop statins (ideally 3 months before a planned pregnancy)

A confirmed pregnancy should be immediately referred to Consultant led care (Mr Raychaudhuri or Dr Khanem via community midwife or lead DSN). Inform women they will have frequent on-going input from the Joint Diabetes/Obstetric Teams

Pre-existing Diabetes and Pregnancy
- If it is safely achievable, women with diabetes should aim to keep pre-meal blood glucose between 3.5 and 5.9 mmol/litre and 1-hour postprandial blood glucose <7.8 mmol/L during pregnancy.
• HbA1c should not be used routinely for assessing diabetes control during the second and third trimesters.
• During pregnancy, women who are suspected of having diabetic ketoacidosis should be admitted immediately to Barnsley Hospital where they can receive both medical and obstetric care.

Gestational Diabetes
• 2-5% of all pregnancies are complicated by gestational diabetes – diabetes arising in pregnancy (usually in the second or third trimester)
• Women with risks for gestational diabetes should be screened at 28 weeks (Box 2) with an oral glucose tolerance test (OGTT)

**Box 2**
**Risk factors for screening**
• BMI above 30 kg/m2.
• Previous macrosomic baby weighing 4.5 kg or above.
• Previous gestational diabetes.
• First-degree relative with diabetes.
• Family origin with a high prevalence of diabetes
  o South Asian (specifically women whose country of family origin is India, Pakistan or Bangladesh)
  o Black Caribbean
  o Middle Eastern (specifically women whose country of family origin is Saudi Arabia, United Arab Emirates, Iraq, Jordan, Syria, Oman, Qatar, Kuwait, Lebanon or Egypt).

The consultant obstetrician may consider undertaking an OGTT in individual situations eg
• Current pregnancy measuring above 97th Centile
• *Polyhydramnios*
• Recurrent glycosuria (on 2 occasions within 7 days)
• Pre-existing endocrine disorders
• Polycystic ovarian disease

**75g Oral Glucose Tolerance Test (OGTT)**

Obtain laboratory results within 24-48hrs

*Pregnancy Impaired fasting glycaemia (IFG)*

- Fasting blood glucose ≥ 5.3mmols/l
- 1hr blood glucose ≥ 7.8mmols/l

Refer immediately to Lead DSN at next Thursday morning new patient Diabetes Antenatal Clinic (as above, 01226 209884). Further advice can be sought from Specialist Midwife for Diabetes, Pauline Dixon, on 07909930604

Women with previous gestational diabetes who have had an impaired fasting glucose test between pregnancies can be referred directly to Consultant-led care. They should plan their pregnancy and are managed in subsequent pregnancies as having gestational diabetes from booking. All other women with previous gestational diabetes should be screened with OGTT 16-18 weeks gestation followed by OGTT at 28 weeks if first test normal

**Information and advice before screening and testing**

Adviser that:
• There is a small risk of birth complications (Box3) if gestational diabetes is not controlled
• Gestational diabetes will respond to changes in diet and exercise in most women
• Oral hypoglycaemic agents (mainly metformin) and/or insulin injections may be needed if diet and exercise do not control blood glucose levels
• After diagnosis women they will have frequent ongoing input from the Diabetes Antenatal Clinic Team
• Self monitoring of blood glucose will be frequent – ideal parameters 3.5-5.9mmols/L pre-meal, <7.8mmols/l 1 hour after meals and 6-7mmols/l before bedtime.

Do not use HbA1c for routine monitoring of diabetes control in the second and third trimesters

<table>
<thead>
<tr>
<th>Box 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Risks of gestational diabetes</strong></td>
</tr>
<tr>
<td>• Fetal macrosomia</td>
</tr>
<tr>
<td>• Birth trauma (to mother and baby)</td>
</tr>
<tr>
<td>• Induction of labour or caesarean section</td>
</tr>
<tr>
<td>• Transient neonatal morbidity</td>
</tr>
<tr>
<td>• Neonatal hypoglycaemia</td>
</tr>
<tr>
<td>• Perinatal death</td>
</tr>
<tr>
<td>• Obesity and/or diabetes developing later in the baby’s life.</td>
</tr>
</tbody>
</table>

**Post-Partum Management**

• Women with pre-existing diabetes are referred back to routine care
• Women with diabetes who breastfeed continue to avoid drugs for complications that were discontinued in pregnancy (metformin safe with breastfeeding)

**Gestational diabetes advice**

• A 75g OGTT should be performed 6 weeks post-partum (patients managed on diet alone during pregnancy will be offered a fasting venous blood glucose at 6 weeks post-partum and then advised on annual fasting glucose by GP)
• Lifestyle advice and contraception advice offered
• Discuss symptoms of hyperglycaemia
• Annual fasting blood sugar taken
• Counselling on subsequent pregnancy and gestational diabetes

**Reference**

CG63 Diabetes in pregnancy: NICE guideline (reissued July 2008)
**Contraception**

Contraception must be discussed at annual review and DSN assessments with all women of childbearing age. Condom use is encouraged to help prevent sexually transmitted infection.

There are no contraceptive methods specifically contraindicated in women with diabetes; however, methods with proven high degrees of effectiveness are preferable.

It is advisable to plan ahead for pregnancy and contraception is a key factor in the planning process.

<table>
<thead>
<tr>
<th>Type of contraception</th>
<th>Advantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined Hormonal Contraceptives (CHC)</td>
<td>Generally safe in younger patients with type 1 Diabetes. Alternative methods should be considered in patients with 2 or more risk factors (i.e. diabetes plus other e.g. vascular disease, neuropathy and retinopathy).</td>
</tr>
<tr>
<td>Progestogen only pill (POP)</td>
<td>Safe and effective if reliable in taking medication. Pill needs to be taken at same time every day (unprotected if more&gt;12 hrs overdue with Cerazette, &gt;3 hrs with remainder). Useful for patients with risk factors</td>
</tr>
<tr>
<td>Injectable progestogen (Depo)</td>
<td>Suitable for patients with diabetes (except those with risk factors [ie diabetes plus other eg vascular disease, neuropathy and retinopathy]). Injection administered every 12 weeks. Non-contraceptive effects (eg bleeding disturbance) can last for up to 18 months, but contraception only lasts for maximum of 14 weeks after last injection. May also affect dose of diabetes medications.</td>
</tr>
<tr>
<td>Nexplanon (Implant)</td>
<td>Small, flexible rod, which is inserted under the skin on the inside of the upper arm. A small amount of progestogen is released each day. It lasts for 3 years, and is more effective than sterilisation. Suitable for women with diabetes.</td>
</tr>
<tr>
<td>Intrauterine device (progesterone) (IUS, Mirena) and IUD (copper)</td>
<td>IUS/IUDs are safe to use in women with diabetes. The IUS is helpful for women suffering from menorrhagia</td>
</tr>
<tr>
<td>Diaphragm/condom</td>
<td>These methods provide a lower degree of effectiveness Emergency contraception may be required if the methods have not been used consistently or the method has failed (e.g. condom split).</td>
</tr>
<tr>
<td>Sterilisation</td>
<td>This may be appropriate for the male partner, if the female partner has diabetes as surgery poses potential risks for people with diabetes. Male sterilisation (vasectomy) is very effective, female sterilisation is not as effective. Sterilisation or IUCD methods of choice if over 35 years and family complete.</td>
</tr>
</tbody>
</table>

**UK Medical Eligibility Criteria for Contraceptive Methods 2009**

<table>
<thead>
<tr>
<th>Category</th>
<th>COC</th>
<th>POP</th>
<th>Depo</th>
<th>Implant</th>
<th>IUS</th>
<th>IUD</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of gestational disease</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Type 2 Diabetes, non vascular disease</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Type 1 Diabetes, non vascular disease</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Nephropathy/retinopathy/neuropathy</td>
<td>3/4</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Other vascular disease</td>
<td>3/4</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**Category 1** – a condition for which there is no restriction for the use of the contraceptive method  
**Category 2** – a condition where the advantages of using the method generally outweigh the theoretical or prove risks  
**Category 3** – a condition where the theoretical or proven risks usually outweigh the advantages of using the method  
**Category 4** - a condition which represents an unacceptable health risk if the contraceptive method is
used.
Hormone Replacement Therapy in Diabetes

Hormone replacement therapy (HRT) can be offered to women with diabetes. Individual patients should check with their diabetes care team.

Blood glucose levels may need more careful monitoring on commencement of HRT and dosage of insulin and/or tablets may require adjustment.
Erectile Dysfunction in Diabetes

- ED - inability to obtain and/or maintain an erection good enough for satisfactory intercourse
- Affects 40% of men aged 40-70 years
- More prevalent in men with diabetes, tends to occur at an earlier age and incidence increases with disease duration and co-existence of peripheral neuropathy
- Address lifestyle issues (alcohol, smoking, obesity, stress etc)
- Examine for any obvious abnormality (genital malformation, penile acute inflammatory conditions) Carry out digital rectal examination when indicated
- Baseline investigations – lipids, thyroid function, liver function, testosterone, sex hormone binding globulin (SHBG), prolactin and urine dip-stick.
- The use of questionnaires can help with the diagnosis and monitoring of ED. Such questionnaires are the International Index of Erectile Function (IIEF) and the Sexual Health Inventory for Men (SHIM)

### Full Sexual History
- Perform baseline investigations as above
- Check testosterone, SHBG, prolactin. PSA should be checked in those patients over 40 years
- Take a full sexual history and examination

### Psychogenic Cause?
- Sudden onset
- Early collapse of erection
- Good quality spontaneous /self stimulation/waking erections
- Relationship problems
- Major life events
- Consider psychosexual referral
- Consider short trial of PDE5

### Organic Cause?
- Gradual onset
- Normal libido
- Risk factors
- Ops/radiotherapy or trauma to pelvis/scrotum
- Current medication
- Smoking
- Alcohol
- Consider Referral to Endocrine Opinion if testosterone, prolactin or PSA abnormal
- Consider Referral to Cardiologist and/or ED Services
- Cardiovascular status grading
- Low Risk
- High and Intermediate Risk

### Cardiovascular Status and ED Management

#### Low Risk
- Discuss treatment options
  - Arrange a trial of PDE5 inhibitors (eg sildenafil)
  - Vacuum device
  - Trans-urethral alprostadil (MUSE)
  - Intracavernosal injection of alprostadil
  - If failure refer to ED service

#### High and Intermediate Risk
- Discuss treatment options
  - Arrange a trial of PDE5 inhibitors (eg sildenafil)
  - Vacuum device
  - Trans-urethral alprostadil (MUSE)
  - Intracavernosal injection of alprostadil
  - If failure refer to ED service

### References:
Male Hypogonadism in Diabetes

Definition
Male hypogonadism is a clinical syndrome of symptoms, with or without physical signs, in conjunction with biochemical evidence of testosterone deficiency.

- Classically, hypogonadism occurs due either to primary testicular failure or to a disruption in the hypothalamic-pituitary-testicular pathway.
- The term late-onset hypogonadism (LOH) is now widely used for testosterone deficiency associated with ageing; however, this term should only be used once other causes of hypogonadism have been excluded.

Classification
Primary hypogonadism (primary testicular failure) may occur as a result of congenital (eg Klinefelter’s syndrome) or acquired causes (eg testicular trauma or radiation).

Secondary hypogonadism (secondary testicular failure) is due to congenital or acquired failure of the hypothalamus and/or pituitary.

Symptoms

<table>
<thead>
<tr>
<th>Reduced or loss of libido</th>
<th>Change in body composition (less lean body mass and increased visceral fat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced quality and frequency of erections</td>
<td>Loss of muscle mass (sarcopaena)</td>
</tr>
<tr>
<td>Fatigue, reduced physical strength and endurance</td>
<td>Decreased body hair and skin alterations</td>
</tr>
<tr>
<td>Mood change – depression and irritability</td>
<td>Gynaecomastia</td>
</tr>
<tr>
<td>Sleep disturbance</td>
<td>Sub fertility</td>
</tr>
<tr>
<td>Reduced motivation</td>
<td>Reduced bone mineral density</td>
</tr>
<tr>
<td>Hot flushes and sweats</td>
<td>Low haematocrit</td>
</tr>
</tbody>
</table>

Diagnosis of hypogonadism

Who should be tested?
- All patients with type 2 diabetes who present with erectile dysfunction
- Patients with clear and unequivocal symptoms of hypogonadism
- Patients suspected of primary or central hypogonadism due to other clinical conditions

Investigations:
- 2 plasma testosterone levels before 11 am (testosterone has a circadian rhythm – highest at 06:00-08:00, lowest at 18:00), one week apart, in the presence of symptoms of hypogonadism
- Sex hormone binding globulin (SHBG) to aid in the calculation of free or bioavailable testosterone in borderline cases
- Other tests to establish underlying cause of hypogonadism (eg pituitary hormones, karyotype, imaging etc)
- Referral to Endocrinologist normally required

Interpretation of plasma testosterone:
- <8.0 nmol/l: consistent with hypogonadism
- 8.0-12.0 nmol/l (<10.4 nmol/L – hypogonadism more likely): possible hypogonadism and may justify trial of testosterone replacement
- >12.0 nmol/l: not hypogonadal
Testosterone Replacement Therapy (TRT)

**Aim of treatment**
The clinical goal of hormone replacement is to restore the hormone level to normal.
- Previously, it was not possible to achieve this aim with the available formulations of testosterone, which were often associated with sub-therapeutic, supra-physiological and inconsistent blood testosterone levels. In addition, the older intramuscular formulations often require frequent administration (every 1 to 4 weeks) and implants a minor surgical procedure
- The more modern gel formulations and the longer acting intramuscular injection of testosterone undecanoate allow dose titration to achieve physiological testosterone levels

**Preparations**

**Testosterone gels**
- 1% testosterone gel - Testogel® (50mg testosterone per 5g sachet)
- 2% testosterone gel - Tostran® in metered pump (10mg testosterone/depression of hand pump)

- Check blood testosterone 2 weeks after commencement with blood taken 3-4 hours after gel application. Inform patient not to apply testosterone gel over venepuncture site as this will lead to high levels as a result of skin contamination
- If testosterone is below 12nmol/l then check patient compliance prior to checking the level. The absorption of testosterone from the gel can be variable. Once patient compliance has been confirmed and the level is <12 nmol/l then the dose needs to be increased. This cannot be done easily with Testogel as, in most men, two sachets (100 mg) results in supraphysiological levels and guessing half sachet doses is difficult and inaccurate. In addition, it can lead to wastage and therefore increased costs. Under these circumstances, switching to an actuated metered pump dispenser (Tostran) provides best results. The usual dose required to achieve normal physiological testosterone level is 40-80mg
- If the testosterone level is >30 nmol/L then the dose should be reduced.

**Testosterone undecanoate depot – Nebido® (testosterone 250mg/ml)**
Given as slow, deep intra-muscular injection over 1 to 2 minutes. May require further dose after 6 weeks to achieve rapid steady state plasma testosterone levels. Then repeat every 10-14 weeks. The frequency of injection may need to be adjusted (8-14 weeks) depending on trough testosterone level

**Contraindications**
1. Prostate carcinoma (no evidence that testosterone increases the risk of prostatic disease but it may stimulate existing problems) – should be excluded before starting TRT. All men over 45 years should have a digital rectal examination (DRE) and a PSA (small rise not unusual, but consider urological referral if PSA rise >1.4 mcg/L over 3-6 months)
2. Any other sex-hormone dependent tumour (eg breast cancer or primary liver tumour)
3. Unexplained hypercalcaemia, nephrotic syndrome, untreated obstructive sleep apnoea

**Monitoring**
Following initial hospital baseline investigation and stabilisation:
- 3, 6 and 12 months, then annually (FBG, PSA, lipid profile, evaluation of previous trough testosterone at last Nebido injection. DRE if indicated)

GPs may opt to participate in shared responsibility for the patient under a shared care agreement
Paediatric Diabetes Services

**Emergencies**
Families are encouraged to seek prompt medical or specialist nurse advice in order to anticipate and prevent problems of hypoglycaemia, illness-induced ketoacidosis and persistent poor control.

**Barnsley Hospitals Contact details:**
Dr S Bhimsaria’s secretary: 01226 432280

**Paediatric DSNs:**
Denise Gibson denise.gibson@nhs.net 01226 455440
Janet Hoyland janet.hoyland@nhs.net 01226 432519
Jane Hinchmore jane.hinchmore@nhs.net 01226 432519

**Dietitian:**
Elmarie Moore Elmarie.moore@nhs.net

**Emergency Hospitals Contact details:**
During working hours: Through Paediatric Diabetes Specialist Nurses.

Out of hours and weekends: All Patients are provided with open access to the paediatric ward. They are able to ring the ward and bring the child in for assessment if required. They are also able to speak directly to the on-call paediatric registrar (via switchboard) and get advice.

**Regular clinic reviews**
Patients are seen at least 4 times per year. HbA1c, anthropometry and blood pressure are done at every visit.

**General Information**
The Diabetes team at Barnsley is made up of the Consultant Paediatrician, 2.5 whole time Diabetes Specialist Nurses, 0.5 WTE Dietician, and at annual review there is also input from podiatry and eye screening staff.

The team currently looks after approximately 100 children with diabetes under 16 years, and 80 young people between the ages of 16 – 22, who are seen in the Young Adult Clinic. Approximately 20 children are diagnosed per year. Thirty one children and young people are on insulin pumps, with more planned. The diabetes team would undertake education, support and co-ordinate management of children, young people and their families with diabetes in hospital, at clinic, in school and at home. Structured education is started at diagnosis and carried on in a timely way including during annual review clinics.

Diabetes clinics are age banded, and children are seen 4 times per year,(with ongoing support in between clinics) one of these being an annual review. This is delivered as a one stop shop with podiatry examination, and dietary assessment, all children over 12 years also have retinal screening. We are also trying to obtain psychological support for children who may need it.

There is also a smooth process of transition to adult services.
Diabetes Care in the Last Few Months of Life

Rationale
The goals of diabetes care alter in patients approaching the end of life because of advanced cancer or other conditions, such as advanced dementia or end-stage cardiac failure, and the care of such people with all types of diabetes should be reviewed with this in mind.

Important principles

1. Aim of treatment is to avoid symptoms of hyperglycaemia and hypoglycaemia.
2. Treatment usually needs to be reduced because of anorexia and weight loss.
3. It is not necessary to aim for tight glucose control.
4. Dietary restriction should be avoided. Patients should be encouraged to eat food which gives them pleasure as enhancing the quality of life is the main aim of management. They should avoid sugary drinks such as lucozade, cola, lemonade if symptomatic hyperglycaemia (thirst, polyuria), and otherwise avoid large quantities of these drinks.
5. It is important to understand the views and preferences of the patient and the family; if treatment is being stopped this should not be misconstrued as the medical team having 'given up'.
6. Each patient needs individualised treatment; these guidelines may need to be adjusted according to the patient's condition or preference and the views of staff.

Management of existing diabetes

The following is a general guide; please contact the diabetes service if advice/review is needed

Preterminal phase (last few weeks/months of life)

Type 2 diabetes (likely if patient initially treated with diet/oral agents for >2 years)

- Stop glitazone (pioglitazone)
- If anorexia or weight loss:
  - stop metformin
  - halve dose of sulfonylurea, stop if on low dose (eg 40-80mg gliclazide)
  - reduce insulin by 25-50% if home BG levels < 7mmol/L
- If hypoglycaemia – see hypoglycaemia guidance for treatment of acute episode
  - discontinue sulfonylurea
  - discontinue metformin
  - reduce insulin by ~ 50%; monitor BG and discontinue insulin if hypoglycaemic symptoms or random BG < 7mmol/L
- Reduce treatment if HbA1c ≤ 59 mmol/mol (7.5%)
  - halve/stop sulfonylurea depending on dose, reduce insulin by 25 - 50%
Type 1 diabetes (likely if patient on insulin since diagnosis or within two years)

- If anorexia, weight loss or hypoglycaemia reduce insulin doses by ~ 25%, monitor BG and reduce insulin further if hypoglycaemia persists **but do not discontinue** – risk of ketoacidosis.

- Many patients, especially those who can carbohydrate count, may be able to self-manage.

- If intercurrent illness (eg chest infection), may need to increase insulin doses – liaise with diabetes nurse specialists if advice needed.

- Check urine for ketones if symptoms suspicious of diabetic ketoacidosis: vomiting, abdominal pain, shortness of breath – if ketones positive ring diabetes nurse specialist or diabetes team for advice; admit if heavy ketones and suspected diabetic ketoacidosis.

- Increase treatment only if symptoms of hyperglycaemia – thirst, urinary symptoms, lethargy – **and** BG >15 mmol/L. May be necessary to do this in intercurrent illness (eg chest infection).

Management of diabetes during steroid therapy for malignancy

**High dose steroid therapy**

- Increases blood glucose levels in people with diabetes.
- Increases risk of developing diabetes especially in patients already at high risk due to, for example, obesity/family history.
- Typically raises blood sugar levels later in the day after a morning dose, blood sugars tending to fall again overnight.

*Test for diabetes if suspicious symptoms (ie thirst polyuria weight loss fatigue) develop after starting steroids* – random glucose >11mmol/L confirms diabetes.

**Emergency management of steroid-induced diabetes**

- Consider admission if patient dehydrated/drowsy/vomiting.
- Admit or refer urgently to hospital for insulin if BG >25mmol/l. Start gliclazide 80mg bd pending referral.

**Elective Treatment of steroid-induced diabetes**

- Dietary advice – exclude sugary drinks (eg coke, lemonade, fruit juice). Otherwise avoid restricting diet.
- If osmotic symptoms persist, start gliclazide 80mg am, increasing to 160mg am over 48 hours if symptoms persist or random BG >20mmol/L.
- Check daily meter BG, ideally later in the day before tea, if symptoms persist; reduce frequency of monitoring if symptoms resolve and BG <20mmol/L.
- If symptoms persist or blood glucose levels >20mmol/L on gliclazide 160mg am start insulin (eg Humulin M3 insulin 8-12 units mane [higher insulin requirement likely if overweight]); stop oral agents, refer diabetes nursing service.
Management of known diabetes during steroid treatment
If osmotic symptoms, check random meter BG daily and if BG >15 mmol/L adjust treatment as follows:

<table>
<thead>
<tr>
<th>Previous treatment</th>
<th>Recommended intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet alone</td>
<td>Start oral agent (eg gliclazide 80mg mane). Increase to 80mg bd if symptoms persist or random sugar &gt;20mmol/l</td>
</tr>
<tr>
<td>Oral agents at maximum dose</td>
<td>Stop oral agents. Start insulin (eg Humulin M3 insulin 8-12u mane [higher dose if overweight]). Refer diabetes nurse specialists</td>
</tr>
<tr>
<td>Insulin</td>
<td>Increase morning and lunchtime doses by 20-50% or consult diabetes nurse specialists</td>
</tr>
</tbody>
</table>

NB If diabetes well controlled on high dose steroids, anticipate need for reduction in doses of insulin/oral agents when steroid dose reduced.

Terminal phase (last few days of life)

Practice points

- In type 2 diabetes insulin and oral agents can usually be stopped in the terminal phase; steroid-treated patients may be an exception.
- Blood glucose monitoring should be kept to the minimum necessary.
- It is important to ensure that clinical deterioration is not due to hyperglycaemia or hypoglycaemia before making decisions about management.
- Regular review of the patient and management plan is necessary, due to difficulties with prognostication of death and varying length of terminal phase.
- If death imminent (ie expected in < 24 hour), it may be appropriate to discontinue all monitoring and insulin, usually after discussion with the family.
- Contact diabetes nurse specialist if advice needed. For advice out of hours contact on call Diabetologist; if no diabetologist on call, contact on-call medical SpR.

Reference
End of Life Diabetes Care: Clinical Care Recommendations: Commissioned by Diabetes UK. October 2013
Diabetes Management in the Last Few Days of Life:

Type I Diabetes
This is a general guide; insulin dose may need adjustment. Ring diabetes nurse specialists if advice needed (eg if BG levels > 20-25mmol/L)

Give 40% usual insulin dose split twice daily as human isophane (eg insulatard or humulin I) or as detemir (Levemir®) twice daily or glargine (Lantus®) once daily if already on one of these insulins

Check meter blood glucose (BG) once daily before breakfast

BG 7-17 mmol/L?

YES

NO

BG <7 mmol/L
Reduce insulin dose by 25-50%

BG >17 mmol/L
Increase insulin dose by approximately 25%
Diabetes Management in the Last Few Days of Life:

Type 2 Diabetes

This is a general guide; insulin dose may need adjustment. Ring diabetes nurse specialists if advice needed (eg if BG levels > 20-25mmol/L)

STOP hypoglycaemic treatment (insulin and/or oral agents)
STOP blood glucose monitoring

If symptomatic – thirst/polyuria/dry mouth – check meter blood glucose (BG)

Is BG >17 mmol/L?

NO

Repeat random BG daily if symptoms persist

YES

Previous oral agent
Give human insulatard or humulin I 8-12 units once daily at teatime

Previous insulin
Give 40% insulin dose (before it was stopped) as human insulatard or humulin I 8-12 units once daily at teatime

Check meter blood glucose (BG) once daily before breakfast

BG 7-17 mmol/L?

YES

NO

BG <7 mmol/L
Reduce insulin dose by 25-50%

BG >17 mmol/L
Increase insulin dose by approximately 25%
Appendix A: Lucozade / OGTT

Lucozade Energy Original and the Oral Glucose Tolerance Test (OGTT)
70kcal/100ml variant

The sole source of carbohydrate (CHO) in Lucozade Sparkling Glucose Drink is glucose syrup (liquid glucose) with a dextrose equivalent of approximately 52.5. The glucose syrup used is a solution, in water, of a mixture of CHO’s, obtained by the hydrolysis of starch, ranging from glucose to high molecular weight polysaccharides. The precise CHO composition is controlled to give the optimum balance of taste and performance. The body’s digestive processes convert all the sugars quickly and easily to glucose.

Please note: Due to manufacturing changes in the production of Lucozade the volume of Lucozade required for a Glucose Tolerance Test (GTT) has changed.

Lucozade: Sparkling Glucose Energy Drink, 70kcal/100ml formulation

<table>
<thead>
<tr>
<th>Volume of Lucozade to provide the equivalent of 75g anhydrous glucose or 82.5g glucose monohydrate</th>
<th>Weight of Lucozade to provide the equivalent of 75g anhydrous glucose or 82.5g glucose monohydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>410ml</td>
<td>438g</td>
</tr>
</tbody>
</table>

N.B. For children the recommended test load is 1.75g glucose per kg body weight up to a total of 75 g of glucose, this is equivalent to 9.564ml Lucozade per kg body weight up to a total of 410ml of Lucozade.

The ingredients of Lucozade Sparkling Glucose Energy Drink are given below.

Single and multi-serve bottles:
Carbonated Water, Glucose Syrup, Citric Acid, Lactic Acid, Flavouring, Preservatives (Potassium Sorbate, Sodium Bisulphite), Caffeine, Antioxidant (Ascorbic Acid), Colour (Sunset Yellow).

Cans:
Carbonated Water, Glucose Syrup, Citric Acid, Lactic Acid, Acidity Regulator (Sodium Citrate), Flavouring, Preservative (Potassium Sorbate), Caffeine, Antioxidant (Ascorbic Acid), Colour (Sunset yellow).

Volume of Lucozade equivalent to 75g anhydrous glucose = 410ml.
Appendix B: Sick day rules

Illness and infections tend to increase blood glucose levels, even when the person is not eating or is vomiting. Occasionally, blood glucose levels may remain low so regular monitoring at least 4 hourly, and even as much as 2 hourly, is necessary to decide how treatment with tablets or insulin should be adjusted.

If you are ill:

- **NEVER STOP YOUR INSULIN.** Continue to take your insulin and tablets even if you are eating little or nothing.
- Drink plenty of non-sugary fluids (4-6 pints/day, a tumbler-full every hour between meals) to avoid dehydration.
- When you are unwell you may eat different foods from normal, but don’t worry:
  - Try toast, soups, milk puddings, ice cream, jelly, plain biscuits
- Avoid fried or spicy foods.

**What if I have type 1 diabetes and I can’t eat?**

- If you really cannot eat, replace your food with an alternative such as Lucozade, ordinary cola or lemonade (not diet – and you may prefer it flat) or soup or fruit juice.
- If you are vomiting try to sip small amounts of the above.
- As a guide, try to take 2-3 servings from the following table 4-5 times per day (each serving provides 10g of carbohydrate):

```
<table>
<thead>
<tr>
<th>Food</th>
<th>Servings</th>
<th>Carbohydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lucozade</td>
<td>50mls</td>
<td>¼ glass</td>
</tr>
<tr>
<td>Fruit juice</td>
<td>100mls</td>
<td>½ glass</td>
</tr>
<tr>
<td>Non-diet cola or lemonade</td>
<td>150-200mls</td>
<td>1 glass</td>
</tr>
<tr>
<td>Soup</td>
<td>200mls</td>
<td>1 mug</td>
</tr>
<tr>
<td>Ice cream</td>
<td>50g</td>
<td>1 large scoop</td>
</tr>
<tr>
<td>Dextrose tablets</td>
<td>3-4</td>
<td></td>
</tr>
</tbody>
</table>
```

**Monitoring your blood glucose and altering your insulin dose**

- Test blood glucose and alter insulin according to the guidelines or instructions from your DSN or doctor.
- If ketones are present you may need a considerable increase in your insulin even without much food.

<table>
<thead>
<tr>
<th>Blood tests</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood glucose &lt;12 mmol/L No ketonaemia</td>
<td>No actionContinue with usual insulin dose and test before each meal</td>
</tr>
<tr>
<td>Blood glucose 12-18 mmol/L Ketones &lt;1.5 mmol/L</td>
<td>If on two occasions and you are taking up to 20 units of insulin, give an extra 4 units. If more than 20 units, give an extra 6 units</td>
</tr>
<tr>
<td>Blood glucose up to 20 mmol/L Ketones 1.5-2.5 mmol/L</td>
<td>Seek advice from your DSN or doctor but, as a guide, take 1½ x your usual dose of insulin and repeat blood tests in 2 hours</td>
</tr>
<tr>
<td>Blood glucose &gt;20 mmol/L Ketones &gt;2.5 mmol/L</td>
<td>Seek urgent medical advice. You are likely to require admission to hospital</td>
</tr>
</tbody>
</table>

- If you are unsure what to do, telephone for advice.
- Whatever the blood glucose, if you are unable to drink, have persistent vomiting, become drowsy or your breathing changes, you need hospital admission urgently.
- **NEVER STOP YOUR INSULIN. DON’T GUESS - TEST**
### Appendix C: Helpline numbers

#### Blood glucose meters

<table>
<thead>
<tr>
<th>Company</th>
<th>Meters</th>
<th>Care line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbot Diabetes Care</td>
<td>Freestyle Insulinx/Lite/Freedom</td>
<td>0500 467 466</td>
</tr>
<tr>
<td><a href="http://www.abbottdiabetescare.co.uk">www.abbottdiabetescare.co.uk</a></td>
<td>Lite/Option/Mini</td>
<td></td>
</tr>
<tr>
<td>Bayer Diabetes Care</td>
<td>Contour, Contour USB, Contour</td>
<td>0845 6006 030</td>
</tr>
<tr>
<td><a href="http://www.bayerdiabetes.co.uk">www.bayerdiabetes.co.uk</a></td>
<td>Next/Next USB/Link/XT, Breeze2</td>
<td></td>
</tr>
<tr>
<td>GlucoMen</td>
<td>GlucoMen LX Plus/GM/LX/Visio/PC/Glyco</td>
<td>0800 243 667</td>
</tr>
<tr>
<td><a href="http://www.glucomen.co.uk">http://www.glucomen.co.uk</a></td>
<td></td>
<td>01189 444128</td>
</tr>
<tr>
<td>Lifescan</td>
<td>OneTouch Verio/UltraEasy/Vita/Ultra</td>
<td>0800 121 200</td>
</tr>
<tr>
<td><a href="http://www.lifescan.co.uk">www.lifescan.co.uk</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roche Diabetes Care</td>
<td>Accu-Chek Aviva/Aviva Nano/Aviva</td>
<td>0800 701 000</td>
</tr>
<tr>
<td><a href="http://www.accu-chek.co.uk">www.accu-chek.co.uk</a></td>
<td>Expert/Compact Plus/Mobile</td>
<td></td>
</tr>
<tr>
<td>Sanofi</td>
<td>BG Star iBG Star</td>
<td>08000 352525</td>
</tr>
<tr>
<td><a href="http://www.diabetesmatters.co.uk">www.diabetesmatters.co.uk</a></td>
<td></td>
<td></td>
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</tbody>
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#### Insulin companies

<table>
<thead>
<tr>
<th>Company</th>
<th>Contact number</th>
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<tbody>
<tr>
<td>Lilly Diabetes</td>
<td>01256 315000/315999</td>
</tr>
<tr>
<td><a href="http://www.lillypro.co.uk">www.lillypro.co.uk</a></td>
<td>0800 783 6764 (pens)</td>
</tr>
<tr>
<td>Novo Nordisk Ltd</td>
<td>0845 600 5055</td>
</tr>
<tr>
<td><a href="http://www.novonordisk.co.uk">http://www.novonordisk.co.uk</a></td>
<td></td>
</tr>
<tr>
<td>Sanofi</td>
<td>08000 352525</td>
</tr>
<tr>
<td><a href="http://www.diabetesmatters.co.uk">www.diabetesmatters.co.uk</a></td>
<td></td>
</tr>
<tr>
<td>Wockhardt UK</td>
<td>01978 661261</td>
</tr>
<tr>
<td><a href="http://www.wockhardt.co.uk">http://www.wockhardt.co.uk</a></td>
<td></td>
</tr>
</tbody>
</table>
# Education checklist for insulin-treated diabetes

## Introduction

<table>
<thead>
<tr>
<th>Date</th>
<th>Signature</th>
<th>Comment</th>
</tr>
</thead>
</table>

### What is diabetes?

### What is good control?
- short term (blood glucose levels)
- long term (HBA1)

## Injections

- Insulin administration
- Pen devices
- Storage of insulin
- Safe disposal of needles
- Timing of injections
- Name and type of insulin
- Action of insulin
- Injection sites
- Site rotation
- Dose adjustment
- Honeymoon period

## Diet

- Basic dietary advice
- Detailed dietary advice (offer appointment with Specialist Dietitian for Diabetes)
- Advice on weight management
- Carb awareness if applicable
- Alcohol

## Blood glucose testing

- Timing/frequency
- Recording results
- Interpreting results
- Quality control of meter
- Safe disposal of lancets

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Patient details:

Name:

NHS number:
# Education checklist for insulin-treated diabetes (cont ...)

<table>
<thead>
<tr>
<th><strong>Hyperglycaemia</strong></th>
<th><strong>Date</strong></th>
<th><strong>Signature</strong></th>
<th><strong>Comment</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs, symptoms</td>
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<tr>
<td>Causes and prevention</td>
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<tr>
<td>Ketones and ketoacidosis</td>
<td></td>
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<tr>
<td>Illness</td>
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<tr>
<td>Sick day rules</td>
<td></td>
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</table>

**Hypoglycaemia**

<table>
<thead>
<tr>
<th><strong>Causes</strong></th>
<th><strong>Recognition</strong></th>
<th><strong>Avoidance</strong></th>
<th><strong>Treatment with diet</strong></th>
<th><strong>Treatment with Glucogel</strong></th>
<th><strong>Treatment with Glucagon</strong></th>
<th><strong>Effect of exercise</strong></th>
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**General**

<table>
<thead>
<tr>
<th><strong>Driving</strong></th>
<th><strong>Employment</strong></th>
<th><strong>Retinopathy screening</strong></th>
<th><strong>Benefits</strong></th>
<th><strong>Free prescriptions</strong></th>
<th><strong>NHS podiatry services</strong></th>
<th><strong>Foot care information</strong></th>
<th><strong>Smoking cessation advice</strong></th>
<th><strong>Erectile dysfunction</strong></th>
<th><strong>Contraception</strong></th>
<th><strong>Pregnancy</strong></th>
<th><strong>Pre-pregnancy counselling</strong></th>
<th><strong>Holidays/travel</strong></th>
<th><strong>Complications</strong></th>
<th><strong>Annual review</strong></th>
<th><strong>Exercise</strong></th>
<th><strong>HBA1c</strong></th>
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Barnsley Diabetes Guidelines January 2014
**Education checklist for diet/tablet treated diabetes**

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<thead>
<tr>
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<th><strong>Date</strong></th>
<th><strong>Signature</strong></th>
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<tr>
<td><strong>What is diabetes?</strong></td>
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<td>Explanation of disease process</td>
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<td><strong>Tablet Treatment</strong></td>
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<td>Action of tablets</td>
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<tr>
<td>Dose</td>
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<td>When to take</td>
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<td>Basic dietary advice</td>
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<td>Detailed dietary advice (offer appointment with Specialist Dietitian for Diabetes)</td>
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<td>Advice on weight management</td>
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Patient details:
Name:
NHS number:
Education checklist for diet/tablet treated diabetes (cont …)

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<td>- Insurance</td>
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<tr>
<td>- Hypos</td>
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<tr>
<td>Employment</td>
<td></td>
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<td></td>
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<tr>
<td>Retinopathy screening</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Benefits</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Free prescriptions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NHS podiatry services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Foot care information</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking cessation advice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erectile dysfunction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contraception</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy counselling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holidays/travel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual review</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HBA1c</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes UK</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Appendix E : Cardiovascular status and ED management**

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Low risk</th>
<th>Intermediate risk</th>
<th>High risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Controlled hypertension</td>
<td>• Recent MI or CVA (i.e., within last 6 weeks)</td>
<td>• Severe or unstable or refractory angina</td>
</tr>
<tr>
<td></td>
<td>• Asymptomatic ≤3 risk factors for CAD</td>
<td>• Asymptomatic but &gt;3 risk factors for CAD – excluding age and gender</td>
<td>• Uncontrolled hypertension (SBP&gt;180 mmHg)</td>
</tr>
<tr>
<td></td>
<td>• Mild valvular disease</td>
<td>• LVD/CHF (II)</td>
<td>• CHF (III, IV)</td>
</tr>
<tr>
<td></td>
<td>• Minimal/mild stable angina</td>
<td>• Murmur of unknown cause</td>
<td>• Recent MI or CVA (i.e. within last 14 days)</td>
</tr>
<tr>
<td></td>
<td>• Post successful revascularisation</td>
<td>• Moderate stable angina</td>
<td>• High risk arrhythmias</td>
</tr>
<tr>
<td></td>
<td>• CHF (I)</td>
<td>• Heart transplant</td>
<td>• Hypertrophic cardiomyopathy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Recurrent TIAs</td>
<td>• Moderate/severe valve disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Manage within the primary care setting</td>
<td>• Refer for specialised cardiac evaluation and management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Review treatment options with patient and his partner (where possible)</td>
<td>• Treatment for ED to be deferred until cardiac condition established</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>and/or specialist evaluation completed</td>
</tr>
</tbody>
</table>

CAD, coronary artery disease; MI, myocardial infarction; CVA, cerebral vascular accident; CHF, congestive heart failure, LVD, left ventricular dysfunction; SBP, systolic blood pressure; ED, erectile dysfunction; TIA, Transient Ischaemic Attack
Appendix F: Barnsley Diabetic Foot Podiatry Care Pathway

Does the patient have FOOT ULCERATION &/OR NECROSIS / GANGRENE &/OR ACTIVE CHARCOT FOOT?

- **NO**
  - Does the patient show evidence of neuropathy or peripheral arterial disease?
    - **NO**
      - Does the patient have additional risk factors? (e.g., callus, limited joint mobility, foot deformity)
        - **NO**
          - Risks Level 1
            - No podiatry referral needed.
            - See Care Plan.
        - **YES**
          - Risks Level 2
    - **YES**
      - Risks Level 3

- **YES**
  - Complete an Acute Assessment Referral & fax to the Diabetes Centre on: 01226 434466 (Queries: 433173 or 432375)

Risks Level 2

- Risks Level 3

Risks Level 4

Risks Level 5

Patients assessed as being in Risk Levels 2 to 5 – complete podiatry referral and forward to the Podiatry Department, New Street, Barnsley, S70 1LP.

PLEASE ENSURE THAT RISK LEVEL IS INDICATED ON THE COMPLETED REFERRAL FORM.
Appendix G: Acute Diabetic Foot Referral (FAX to 01226 434406)

Patient name: 
Address: 

Date of birth:
Contact number:
NHS number:
G.P.:
G.P. Address:

Reason for referral:

- Ulceration
- Necrosis/gangrene
- Acute Charcot

Location on foot: 

Depth:

- No skin breach
- Abrasion/blister
- Superficial open wound
- Tendon visible
- Bone visible
- Sinus

Infection:

- No
- Yes

(tick appropriate boxes below)

- < 3cm erythema, warmth, swelling
- ‘sausage’ shaped toe
- > 3cm erythema, warmth, swelling
- Systemically unwell with infection
- Wet gangrene

Signs of ischaemia:

- Poor tissue viability
- Absent foot pulses

- Discolouration of tissue
  (rubor, pallor, blue/black)
- Areas of necrosis

Other information

- Previous ulceration
- History of amputation
- Patient on dialysis

Referrer

Name: ____________________________ Designation: ____________________________

Contact number: _______________________(we may need to contact you for further information)
### Appendix H: DSN Referral Form

**South West Yorkshire Partnership NHS Foundation Trust**

**Barnsley Business Delivery Unit**

Community Diabetes Specialist Service, Apollo Court Medical Centre, High Street, Dodworth, Barnsley, S75 3RF  
Tel: 01226 209884 Fax: 01226 209888

**Diabetes Specialist Service; Nursing Referral Form**  
For use by GP/Community Clinicians  
**PLEASE ENSURE ALL FIELDS ARE COMPLETED OTHERWISE THIS REFERRAL MAY NOT BE PROCESSED.**

<table>
<thead>
<tr>
<th>Patient Details:</th>
<th>GP Details:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
<td>Name:</td>
</tr>
<tr>
<td>Address:</td>
<td>Address:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post Code:</th>
<th>GP Telephone No:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone No:</td>
<td></td>
</tr>
<tr>
<td>Date of Birth:</td>
<td></td>
</tr>
<tr>
<td>NHS No:</td>
<td>Signature:</td>
</tr>
<tr>
<td>Date Diagnosis of Diabetes:</td>
<td>Date:</td>
</tr>
</tbody>
</table>

**PLEASE STATE URGENCY/REASON FOR REFERRAL:**

<table>
<thead>
<tr>
<th>CRISIS</th>
<th></th>
<th>URGENT</th>
<th></th>
<th>SOON</th>
<th></th>
<th>ROUTINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(same day intervention/within working hours) – please contact the diabetes team directly on 01226 209884 / 07500100530 and ask to speak to the nurse with the emergency mobile AND fax the referral to 01226 209888</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
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<td>□</td>
</tr>
</tbody>
</table>

- Newly diagnosed Type 1 diabetes
- Acutely unwell patient with Type 1 diabetes with for example, diarrhoea and vomiting or infection which is causing significant disturbance to their diabetes control e.g. blood or urine ketones / hyperglycaemia
- Hypoglycaemia requiring third party intervention
- Nursing home patients experiencing hypoglycaemia
- Acute illness causing hyperglycaemia
- Patients requiring short term steroids (Type 1 / Type 2 on insulin) and experiencing hyperglycaemia
- Pregnant women with pre-existing diabetes or gestational diabetes
- Patients with Type 2 diabetes needing assessment for insulin
- Poor Glycaemic control in Type 1 diabetes / Type 2 Diabetes on Insulin
- Other - please state
- Poor glycaemic control
- Assessment for GLP therapy
- Change of insulin regime
- Diabetes medication review
- Type 2 structured education (please discuss with the patient and tick preferred choice - □ XPERT 6 x 3hrs sessions or □ Standard 2 x 3hrs sessions
- Other – please state
Diabetes Specialist Service; Nursing Referral Form

NHS NUMBER: [ ] NAME: [ ]

**CLINICAL HISTORY**

- [ ] WEIGHT LOSS
- [ ] POLYURIA
- [ ] POLYDIPSIA
- [ ] OTHER (please state)

**INVESTIGATIONS PERFORMED AND RESULTS**

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Results</th>
<th>Date</th>
<th>Results</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLOOD PRESSURE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HbA1c</td>
<td></td>
<td></td>
<td>LIVER FUNCTION TEST</td>
<td></td>
</tr>
<tr>
<td>FASTING BG</td>
<td></td>
<td></td>
<td>CREATININE</td>
<td></td>
</tr>
<tr>
<td>RANDOM BG</td>
<td></td>
<td></td>
<td>UREA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>WEIGHT/BMI</td>
<td></td>
</tr>
</tbody>
</table>

**HOUSEBOUND**

YES / NO

**MEDICAL HISTORY**


**CURRENT MEDICATIONS**


**ANY OTHER RELEVANT INFORMATION**


Barnsley Diabetes Guidelines January 2014
**Appendix J: Insulins**

Each insulin has its own unique therapeutic effect. The following is a list of insulin types available in the United Kingdom, with their onset, peak, and duration. Remember that these are only rough guides to what usually happens. There can be huge variations between individuals and even within the same person.

<table>
<thead>
<tr>
<th>Insulin*</th>
<th>Onset of action</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Highly purified animal insulins</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypurin® Bovine Neutral</td>
<td>Within 1 hour</td>
<td>2-5 hours</td>
<td>6-8 hours</td>
</tr>
<tr>
<td>Hypurin® Porcine Neutral</td>
<td>Within 1 hour</td>
<td>2-5 hours</td>
<td>6-8 hours</td>
</tr>
<tr>
<td><strong>Ultra short-acting insulin analogues</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspart (NovoRapid®)</td>
<td>Within 15 minutes</td>
<td>15 minutes-1 hour</td>
<td>3-4 hours</td>
</tr>
<tr>
<td>Glulisine (Apidra®)</td>
<td>Within 15 minutes</td>
<td>15 minutes-1 hour</td>
<td>3-4 hours</td>
</tr>
<tr>
<td>Lispro (Humalog®)</td>
<td>Within 15 minutes</td>
<td>15 minutes-1 hour</td>
<td>3-4 hours</td>
</tr>
<tr>
<td><strong>Human sequence short-acting insulins</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actrapid®</td>
<td>Within 30 minutes</td>
<td>1-3 hours</td>
<td>6-8 hours</td>
</tr>
<tr>
<td>Humulin S®</td>
<td>Within 30 minutes</td>
<td>1-3 hours</td>
<td>6-8 hours</td>
</tr>
<tr>
<td>Insuman® Rapid</td>
<td>Within 30 minutes</td>
<td>1-3 hours</td>
<td>6-8 hours</td>
</tr>
<tr>
<td><strong>Highly purified animal intermediate insulins</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypurin® Bovine Isophane</td>
<td>Within 2 hours</td>
<td>6-12 hours</td>
<td>18-24 hours</td>
</tr>
<tr>
<td>Hypurin® Porcine Isophane</td>
<td>Within 2 hours</td>
<td>6-12 hours</td>
<td>18-24 hours</td>
</tr>
<tr>
<td><strong>Human sequence intermediate insulins (Isophane/NPH)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulatard®</td>
<td>Within 2 hours</td>
<td>2-12 hours</td>
<td>18-24 hours</td>
</tr>
<tr>
<td>Humulin I®</td>
<td>Within 2 hours</td>
<td>2-12 hours</td>
<td>18-24 hours</td>
</tr>
<tr>
<td>Insuman® Basal</td>
<td>Within 2 hours</td>
<td>2-12 hours</td>
<td>18-24 hours</td>
</tr>
<tr>
<td><strong>Highly purified animal long-acting insulin</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypurin® Bovine Lente</td>
<td>4-6 hours</td>
<td>10-20 hours</td>
<td>28-36 hours</td>
</tr>
<tr>
<td><strong>Long-acting insulin analogues</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detemir (Levemir®)</td>
<td>Within 1 hour</td>
<td>None</td>
<td>12-24 hours</td>
</tr>
<tr>
<td>Glargine (Lantus®)</td>
<td>Within 1 hour</td>
<td>None</td>
<td>12-24 hours</td>
</tr>
<tr>
<td>¥Degludec (Tresiba®)</td>
<td>Within 1 hour</td>
<td>None</td>
<td>&gt;24 hours</td>
</tr>
<tr>
<td><strong>Mixtures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Highly purified animal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypurin® Porcine 30/70 mix</td>
<td>Within 1 hour</td>
<td>2-12 hours (biphasic)</td>
<td>18-24 hours</td>
</tr>
<tr>
<td><strong>Insulin analogues</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biphasic insulin aspart (NovoMix® 30)</td>
<td>10-30 minutes</td>
<td>1-6 hours (biphasic)</td>
<td>10-24 hours</td>
</tr>
<tr>
<td>Biphasic insulin lispro (Humalog® Mix 25 &amp; 50)</td>
<td>10-30 minutes</td>
<td>1-6 hours (biphasic)</td>
<td>10-24 hours</td>
</tr>
</tbody>
</table>

* Sources: Manufacturers’ prescribing information, Diabetes UK ‘Insulin Actions, Onset, Peak Activity and Duration’

¥ Approved as ‘red’ by the APC at the time of writing. Available as 100 units/ml and 200 units/ml preparations
APPENDIX K: The Clinical Utility of C-peptide and Antibody Testing

C-peptide
C-peptide measurement is an inexpensive, widely available test that may assist the clinical management of diabetes, particularly in insulin-treated patients where there is uncertainty about diabetes subtype.

- C-peptide is produced in equal amounts to insulin and can therefore be used to assess endogenous insulin secretion
- C-peptide can be used to differentiate between type 1 and type 2 diabetes, usually in long-standing cases, because there is considerable overlap at the time of diagnosis.
  - Detectable C-peptide after many years of ‘type 1’ diabetes suggests a misdiagnosis.
  - Conversely, low or undetectable C-peptide levels within the initial years support a diagnosis of type 1 diabetes
- Persistence of C-peptide outside the honeymoon period in a patient thought to have type 1 diabetes may indicate monogenic diabetes or ‘Maturity Onset Diabetes of the Young’ (MODY). Some forms of MODY, including the commonest (HNF1α mutation), respond to treatment with a sulfonylurea or may not require glucose-lowering treatment (Glucokinase mutation)
- C-peptide can also be used to ascertain if there is residual β-cell function in patients in whom certain drugs that depend on this for their action are being considered (eg GLP-1 agonists or DPP-4 inhibitors)

Reference
Jones, AG, Hattersley, AT. Review article. The clinical utility of C-peptide measurement in the care of patients with diabetes. Diabetic Medicine 2013;30:803-817

Humoral autoantibodies in diabetes

- The presence of islet cell antibodies (ICA), insulin autoantibodies (IAA), antibodies against glutamic acid decarboxylase (GAD/GAD65) and the transmembrane tyrosine phosphatase IA-2 or ICA512 are evidence of islet cell reactivity
- The presence of any combination of two or more of these antibodies denotes
  - a high risk for the development of autoimmune diabetes in someone with normal glucose tolerance
  - an increasing likelihood that someone with existing diabetes has an autoimmune aetiology in proportion to the number and titres of antibodies present
- More than 70% of people with type 1 diabetes are positive for anti-GAD antibodies at diagnosis and titres may persist for years, making this a useful aid in the diagnosis of latent auto-immune diabetes of adults (LADA)

Pointers (to be used in conjunction with other factors – body habitus, age, type of symptoms, family history, presence/absence metabolic syndrome etc)

<table>
<thead>
<tr>
<th>Current diagnosis</th>
<th>Duration of diabetes</th>
<th>C-peptide</th>
<th>GADA/ICA</th>
<th>Suspect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 2</td>
<td>Short</td>
<td>Low/absent</td>
<td>Pos</td>
<td>Type 1</td>
</tr>
<tr>
<td>Type 2</td>
<td>Longer</td>
<td>Low/absent</td>
<td>Pos</td>
<td>LADA</td>
</tr>
<tr>
<td>Type 1</td>
<td>Longer</td>
<td>Significant</td>
<td>Absent</td>
<td>Type 2</td>
</tr>
<tr>
<td>Type 1</td>
<td>Any (+ family history)</td>
<td>Significant</td>
<td>Absent</td>
<td>MODY</td>
</tr>
</tbody>
</table>
Appendix L: Referral Form for Community Nutrition and Dietetic Service

Community Nutrition and Dietetic Service Referral Form

Patient’s Name: Mr/Mrs/Miss etc: ................................................................. Date of birth: .................................................................
NHS number: ..................................................................................
Patient’s telephone numbers: ..............................................................
Address: ..........................................................................................
Postcode: ..................................................................................
Social information: ........................................................................
GP name: .......................................................... Telephone number: ..........................................................
Practice address: ...........................................................................
Reason for referral to the dietitian: ..........................................................

Is this patient able to attend an outpatient appointment? Please circle  Yes  No

Diagnosis/relevant clinical details: ...........................................................
Current medications: ........................................................................

Medical history: Please tick yes or no and give relevant details below:

<table>
<thead>
<tr>
<th>Clinical conditions</th>
<th>Yes</th>
<th>No</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes: Type 1 or Type 2 (please specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastrointestinal disorder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food allergies and intolerances</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renal impairment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dementia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swallowing problems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dyslipidaemia e.g. high cholesterol level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Weights: ..................kg (date: ) ..............kg (date: ) ..............kg (date: )
Height: ...................m (actual or estimated) Current BMI: ..............kg/m2

Other relevant information e.g. recent weight changes, biochemistry, diagnostic test results etc: ..........................................................

Referral completed by: ................................................................. Date: .................................................................
Designation: ........................................................................
Address: ..................................................................................
Telephone number: .................................................................

Please Post or Fax form to:
Community Dietetics & Nutrition Service, The Cudworth Centre, Carlton Street,
Barnsley, S72 8ST Fax: 01226 438888  Tel: 01226 438817

Referral form updated May 2013