North West London Diabetes Guidelines
Helping healthcare practitioners manage adults with diabetes

We would like to acknowledge and thank all healthcare partners and people with diabetes across North West London who contributed their expertise in producing and updating these guidelines.

These guidelines were ratified by the North West London Diabetes Transformation Programme Team in August 2019.
Next Review date - September 2020
For queries, please email: nwlccc.diabetes@nhs.net
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## TYPE 2 DIABETES – SCREENING

### WHOM TO TEST

It is very important to identify Diabetes as early as possible: 50% of newly presenting people with Type 2 Diabetes already have 1 or more complications at diagnosis

#### People PRESENTING WITH THE FOLLOWING SYMPTOMS:
- Excess thirst
- Polyuria (especially if nocturia)
- Weight loss
- Urinary incontinence
- Tiredness
- Pruritus Vulvae / recurrent candidiasis
- Recurrent infections / abscesses
- Balanitis
- Blurred Vision / changes in visual acuity
- Erectile Dysfunction
- Pain / Numbness / foot ulcers
- Non specific or unexplained symptoms

#### People AT INCREASED RISK OF DIABETES:
- People with BMI > 30
- People aged over 40 with BMI 25-30 (overweight)
- People aged 25–39 of South Asian, Chinese descent (especially those with BMI > 23)
- People with a family history of diabetes
- Women with polycystic ovary syndrome.
- Coronary disease, Cerebrovascular disease, peripheral vascular disease or hypertension/hyperlipidaemia.
- people on prolonged steroid therapy.
- people on atypical anti-psychotic drugs.

#### People AT HIGH RISK OF DIABETES:
- Women who have had Gestational Diabetes (screen at 6 weeks and one year post-partum, and then yearly)
- Those known to have impaired glucose tolerance, HbA1c 42-47mmol/mol or oral glucose tolerance test 2-hour value between 7.8 mmol/l and 11.1 mmol/l (Impaired Glucose Tolerance IGT) or fasting glucose 5.5 - 6.9mmol/l (Non Diabetic Hyperglycaemia NDH).

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3. The Expert Committee on the diagnosis and Classification of Diabetes Mellitus. Diabetes Care. 1997;20(7); 1183-1203

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**Diabetes is often missed in the elderly**

**At least half of people with Type 2 Diabetes are asymptomatic**

**Finger prick capillary results can not be used to diagnose Diabetes**

**Glycosuria on its own does not confirm Diabetes**

Date of preparation: July 2019. For review: June 2020
**DIABETES – DIAGNOSTIC CRITERIA**

**ROUTINE DIAGNOSIS OF DIABETES**

**DIAGNOSTIC CRITERIA FOR DIABETES**

Diabetes may be diagnosed on any of the following criteria ([WHO 2006](https://www.who.int/diabetes/publications/5.3.pdf), [John 2012](https://doi.org/10.1016/j.ajo.2012.06.011)).

<table>
<thead>
<tr>
<th></th>
<th>Diabetes</th>
<th>High risk of Diabetes</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HbA1c</strong></td>
<td>≥ 48 mmol/mol</td>
<td>42-47 mmol/mol</td>
<td>&lt; 42 mmol/mol</td>
</tr>
<tr>
<td>Fasting glucose</td>
<td>≥ 7 mmol/L</td>
<td>5.5 -6.9 mmol/L</td>
<td>≤ 5.4 mmol/L</td>
</tr>
<tr>
<td>2 hr glucose in OGTT</td>
<td>≥ 11.1 mmol/L</td>
<td>7.8-11.0 mmol/L</td>
<td>≤ 7.7 mmol/L</td>
</tr>
<tr>
<td>Random glucose</td>
<td>≥ 11.1 mmol/L</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Consider an urgent direct access CT scan (to be performed within 2 weeks), or an urgent ultrasound scan if CT is not available, to assess for pancreatic cancer in people aged 60 and over with weight loss and the new onset of diabetes. [https://www.nice.org.uk/guidance/ng12](https://www.nice.org.uk/guidance/ng12)

When diabetes and pancreatic adenocarcinoma coexist a diagnosis of diabetes usually precedes the diagnosis of PDAC by 24 months in 74–88% of people.

**WHICH TEST IS BEST?**

National and international expert groups do not know. Relevant groups (WHO, ADA, NICE) simply advise that HbA1c is now an option for diagnosing Diabetes.

NWL guidance recommend HbA1c – except in those groups where HbA1c may be unreliable and glucose should be used.

**SHOULD A POSITIVE TEST BE REPEATED?**

For glucose – yes, in most cases, a repeat glucose test is advised, unless there are classical osmotic symptoms of diabetes. Glucose measurements have greater biological variability compared to HBA1c.

For HbA1c – yes, in asymptomatic people. National guidance now advises a repeat HbA1c within two weeks in asymptomatic cases, as mislabelled samples or lab error are possible. Both results must be ≥48 mmol/mol to diagnose Diabetes; if the results are discordant, the lower is used.

The repeat sample must be sent with clinical detail (e.g. “repeat HbA1c to confirm diagnosis of Diabetes”), as repeats within 30 days may be rejected by the lab.

Do not delay urgent care while awaiting second test. For young, very symptomatic, or ill people, check ketones and seek specialist advice if necessary.
N.B. HbA1c is the recommended test for NDH due to practical benefits. However HbA1c is not suitable for use in everyone, and should not be used in people with anaemia, haemoglobinopathies or other causes of abnormal red cell turnover.
ROUTINE DIAGNOSIS OF DIABETES

WHEN NOT TO USE HBA1C TO DIAGNOSE DIABETES

These are the most common situations where HbA1c is not suitable.
Except in pregnancy, diagnose by fasting glucose ≥7.0 mmol/L twice, or once with symptoms or a random blood glucose ≥11.0 mmol/L with symptoms.

In pregnancy, follow NICE guidelines.

1. Rapid onset of Diabetes – an increase in HbA1c may not be detected until a few weeks later.
   a. Suspected Type 1 Diabetes – rapid onset of symptoms, weight loss, ketosis.
   b. Children – because most will have Type 1 Diabetes.
   c. Steroids, antipsychotics & immunosuppressants can raise blood glucose, rarely precipitously.
   d. After pancreatitis or pancreatic surgery.

2. Pregnancy. Multiple factors make HbA1c lower in pregnancy. The diagnosis of gestational Diabetes should be made by using glucose measurements in line with NICE guidance.

3. Conditions with reduced red blood cell survival may lower HbA1c markedly.
   a. Haemoglobinopathy which will normally be detected by the lab, but should be suspected in racial groups where there is a high prevalence of sickle trait, sickle disease or thalassaemia.
   b. Haemolytic anaemia
   c. Severe blood loss
   d. Splenomegaly
   e. Antiretroviral drugs

   **Fasting glucose or OGTT is recommended for diagnosis and fructosamine should be used in these people for monitoring.**

4. Increased red cell survival may increase HbA1c e.g. splenectomy.
5. Renal dialysis people have a markedly reduced HbA1c especially if treated with erythropoietin.
6. Iron and B12 deficiency and their treatment. May raise or lower HbA1c, but the effect is small.

WHAT IF YOU HAVE GLUCOSE VALUES AND AN HBA1C ON A SINGLE PATIENT?

If one only is abnormal then a further abnormal test result, using the same method, is required to confirm the diagnosis.

References

For people with Type 2 diabetes and their healthcare team the possibility of achieving remission can provide motivation and hope – something to aim for. It can help to improve how people engage in their diabetes management, not only because of the need to reduce risk of complications, but also because there is a possibility of minimising the day-to-day impact of their condition.

For the local health economy there are benefits in reduction of the cost of medications and diabetes complications.

**INTENSIVE LIFESTYLE INTERVENTIONS**

Intensive lifestyle interventions that result in weight loss have been reported to lead to about 10-15% remission rates at one-year follow-up. Evidence for long-term remission following lifestyle interventions is limited though increasing.

Various dietary interventions such as low fat diets, low carbohydrate diets, Mediterranean diets, very low-calorie diets, and meal replacements have been used to achieve weight loss in people with Type 2 diabetes. An individualised approach is recommended.

The Counterbalance study tested the theory that normal blood glucose levels could be achieved through a very low-calorie diet and showed that those people with shorter duration Type 2 diabetes who achieved normal glucose control maintained this for at least six months.

The Look Ahead study, which aimed at weight loss through intensive lifestyle intervention, reported a remission rate of 7% at four-year follow-up. The Predimed study which involved an intervention with Mediterranean diets also reported remission rate of 5% at six-year follow-up.

Remission through lifestyle interventions appears more likely in people newly diagnosed with Type 2 diabetes and those with lower baseline HbA1c.

Results from the larger long-term DiRECT study demonstrated a 46% remission rate in routine Primary Care using a low-calorie diet and supportive follow up at 1 year, with 36% remaining in remission at 2 years.

**BARIATRIC (METABOLIC) SURGERY**

Different remission rates have been reported depending on the procedure used, criteria for defining remission among other factors. An international consensus statement endorsed by 45 international diabetes associations including Diabetes UK and the ADA reported that Type 2 diabetes remission occurs in about 30–60% of people following surgery. To date, there is no reliable data to view surgery as a permanent cure, although remission of up to 15 years has been reported. Generally, the median diabetes-free years for people with Type 2 diabetes undergoing surgery is about eight years, depending on the procedure and available data suggest an erosion of remission over time.

Some studies have reported relapse rates of approximately 20% at three years and 25–35% at five years.

Whilst most of the long-term benefits of bariatric surgery can be attributed to weight loss, it has been suggested that some improvements in glucose control may occur independent of weight loss, via changes in gut hormones, microbiota, bile acid metabolism, intestinal glucose metabolism and nutrient sensing.
86% of obese people who manage to lose 15kg of weight within 6 years of diagnosis achieved remission from Type 2 diabetes

**COMPLETE REMISSION OF T2DM**

Type 2 Diabetes Remission can be confirmed if a person has achieved all of the following criteria:

i) Weight loss
ii) Fasting plasma glucose or HbA1c below the WHO diagnostic threshold (<7mmol/l or <48mmol/mol) on two occasions separated by at least 6 months
iii) The attainment of these glycaemic parameters following complete cessation of glucose-lowering therapies


However, remission is a fluid state and relapse can occur in various circumstances, especially if weight is regained. Patients need to continue to have regular monitoring at least annually and will need to remain on Diabetes QOF registers. The codes used below allow patients to remain on the register.

The following codes should be used for complete Type 2 remission: **C10P1** (EMIS) or **Xaagf** (SystmOne)

**PARTIAL REMISSION OF T2DM**

There are various definitions of partial remission including those included in this article: [https://www.bmj.com/content/358/bmj.j4030/rr-0](https://www.bmj.com/content/358/bmj.j4030/rr-0)

The key point is that there is significant patient benefit even if complete remission isn’t achieved.

**WHAT IS THE IMPACT OF REMISSION ON DIABETES COMPLICATIONS?**

Little is known about the actual effect of diabetes remission on new onset diabetes complications or progression of existing complications. A long-term follow-up observational study has concluded that bariatric surgery was associated with higher remission rates and fewer microvascular and macrovascular diabetes complications.

Systematic reviews have suggested that bariatric surgery may:
- Protect against new cases of diabetic retinopathy, and its progression in people with Type 2 diabetes
- Prevent the incidence and progression of albuminuria and stop the decline of renal function

It is recommended however that people diagnosed with diabetes continue with annual retinal and renal screening for life, even if they are in remission. The same targets for risk factors such as blood pressure and lipids should apply.
Remission from Type 2 diabetes is most likely through significant weight loss (this is normally 10-15kg of weight or 10-15% of body weight).

Achieving significant weight loss is possible through a number of approaches including those below:

A Very Low Calorie Diet or VLCD (800 calories/day). The best research evidence on how to achieve remission is based on the DIRECT study which was published in 2017. In that study, 46% the people who went on an 800 calorie Very Low Calorie Diet achieved remission at one year and 36% remained in remission at 2 years.

Importantly, 78% were successful in stopping their diabetes medication.

Nearly 86% of people who lost more than 15kg were in remission at one year.

The VLCD course normally lasts for 24 weeks: 12 weeks replacing all meals with soups, shakes and snacks from a specially formulated diet plan, and then 12 weeks gradually reintroducing food. This approach is challenging, but offers the highest chance of achieving sufficient weight loss over a short period.

There are clear inclusion and exclusion criteria

Other studies have shown that Low Carbohydrate and Mediterranean style diets are very effective in helping people achieve improvements in blood glucose and body weight whilst reducing need for medication, although there have been no formal remission trials like with VLCD. The key is to reduce the amount of starchy carbohydrates and sugary food eaten.

The Prospective Urban Rural Epidemiology (PURE) epidemiological cohort study demonstrated potential benefits of a low carb diet across a population. Dietary intake of 135,335 individuals was recorded using validated food frequency questionnaires.

High carbohydrate intake was associated with higher risk of total mortality, whereas total fat and individual types of fat were related to lower total mortality. Total fat and types of fat were not associated with cardiovascular disease, myocardial infarction, or cardiovascular disease mortality, whereas saturated fat had an inverse association with stroke. The authors recommended that Global dietary guidelines should be reconsidered in light of these findings.

Many people with Type 2 diabetes consume large quantities of carbohydrates. The Carbs and Cals World Foods book is a useful resource to aid conversations with people and demonstrate the impact of starchy carbs on glycaemic control.

Intermittent fasting is the other approach that has been demonstrated to be effective in supporting weight, blood glucose and medication reduction. This includes:

- **5:2 diet** (eating normally for 5 days a week then eating only 500-600 calories on the other two days) and
- **Time Restricted Eating** where the patient has a long period in the day when they don’t eat. With time restricted eating, most people choose a 16:8 cycle, which involves not eating for 16 hours in the day. Sometimes this is also referred to as an 8-hour eating ‘window’. All meals are eaten within an 8-hour time period and the patient fasts for the remaining 16 hours. Generally, this is done daily or almost daily. There is some evidence that suggests that the best period for eating is earlier in the day.
### WHEN AND HOW TO TEST FOR TYPE 1 DIABETES?

<table>
<thead>
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<th>Less likely to be Type 1 DM</th>
<th>Consider testing for Type 1 DM using GAD* antibodies and paired C-Peptide*Glucose, or refer to secondary care</th>
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</thead>
<tbody>
<tr>
<td>Family history of Type 2</td>
<td>No family history of Type 2</td>
</tr>
<tr>
<td>No family history of Type 1 Diabetes</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; or 2&lt;sup&gt;nd&lt;/sup&gt; degree relative with Type 1 Diabetes</td>
</tr>
<tr>
<td>BMI &gt; 28 kg/m²</td>
<td>BMI &lt; 28 kg/m²</td>
</tr>
<tr>
<td>Age &gt; 45 yrs.</td>
<td>Age &lt; 45 yrs.</td>
</tr>
<tr>
<td>Non-white ethnic group</td>
<td>White European</td>
</tr>
<tr>
<td>Dyslipidaemia, HDL &lt; 1.0</td>
<td>Any autoimmune disease</td>
</tr>
</tbody>
</table>

GAD antibodies* are autoantibodies against the enzyme glutamic acid decarboxylase found in pancreatic islet cells. GAD antibodies are detectable in the serum ≈80% of people with Type 1 diabetic at the onset of Diabetes

**C-peptide* can be considered in situations of diagnostic uncertainty, but must be paired with a glucose level to have any significance.**

Discuss with a specialist colleague first to avoid inappropriate expensive testing.

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4% of people diagnosed with Type 2 over the age of 40 in fact have Type 1 DM.

Less likely to be Type 1 DM

- Family history of Type 2
- No family history of Type 1 Diabetes
- BMI > 28 kg/m²
- Age > 45 yrs.
- Non-white ethnic group
- Dyslipidaemia, HDL < 1.0

Consider testing for Type 1 DM using GAD* antibodies and paired C-Peptide*Glucose, or refer to secondary care

- No family history of Type 2
- 1<sup>st</sup> or 2<sup>nd</sup> degree relative with Type 1 Diabetes
- BMI < 28 kg/m²
- Age < 45 yrs.
- White European
- Any autoimmune disease
- HDL > 1.5 mmol/l

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Date of preparation: July 2019. For review: June 2020
Could the diagnosis be maturity-onset Diabetes of the young (MODY)?
See http://www.Diabetesgenes.org

**Unusual Diabetes**
- Very strong maternal or paternal family history of Diabetes often in three generations with early onset, before 30yrs. With some family members diagnosed with Type 1 others with Type 2 Diabetes

**Unusual response to treatment**
- Highly sensitive to sulfonylurea. Or having excellent control on small amounts of insulin without having hypoglycaemia or becoming ketotic if stopping insulin

**No microvascular complications**
- They and family members have few if any diabetic complications

Refer to Secondary care where screening tests can be undertaken to make the diagnosis
**PRINCIPLES OF TREATMENT**

- Offer structured education advice to all newly diagnosed people according to local availability (i.e. X-PERT, DESMOND or conversation maps). Usually wait 6-12 weeks before glucose lowering agents are introduced unless patient is symptomatic.

- Carry out mental health screening (PHQ4 in primary and community care OR DDS2 in secondary care) and refer to IAPT or other relevant part of local pathway if +ve (See slide 29 for details of tools)

- Metformin is recommended for all people with Type 2 Diabetes at/soon after diagnosis in view of its cardioprotective effects (UKPDS legacy effect). However: Introduce oral hypoglycaemic agents early if fasting plasma glucose >15mmol/l and symptomatic.

- Ensure people are shown how to monitor their own diabetes if appropriate, and know what to do if results do not fall in the target range.

- Regular monitoring will identify the need to actively titrate treatment.

- Measure HbA1c every 2-6 months.

- Target HbA1c 48mmol/mol/6.5% in newly diagnosed Type 2 Diabetes and those on up to 2 oral hypoglycaemic agents unless individual target more appropriate. Involve the person in discussions about individual HbA1c target.

- In South Asian people BMI underestimates adiposity. Weight measurements need to be considered. Range for healthy weight is BMI 18.5-22.9 in South Asian people.

- Consider end of life care needs

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**TREATMENT DECISION TREE FOR EARLY INSULIN INITIATION**

**Symptoms of hyperglycaemia and a diagnostic blood glucose (random > 11.1mmol/L)**

**Is the patient ill (vomiting, semiconscious or clinically dehydrated)?**

- YES: Arrange direct admission to hospital

- NO: Does the urine test show moderate/heavy ketonuria?

- YES: Very likely to need insulin. Discuss with specialist team within 24 hours.

- NO: Are one or more of the following present?

  - Severe osmotic 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: Two or more are a strong indication for insulin

- NO: Is the patient under 30 years of age?

- YES: First degree relative on diet or tablets consider maturity Onset Diabetes of the Young (MODY). No immediate need for insulin but non-urgent referral to the specialist team for diagnostic consideration.

- NO: There is no immediate need for insulin. Give dietary advice on healthy eating. Provide regular review.
NICE recommends that well-designed and well-implemented structured education programmes are likely to be cost-effective for people with diabetes and should be offered to every person and/or their carer at and around the time of diagnosis, with annual reinforcement and review.

Structured education programmes for people with Type 2 diabetes are an essential component of effective diabetes management. Most people will spend only 1.5 hours with a health care professional per year, the rest of the time they are required to make daily lifestyle decisions that may have a significant impact on their health and overall quality of life.

The aim of structured education is for people with diabetes to improve their knowledge, skills and confidence, enabling them to take increasing control of their own condition and integrate effective self-management into their daily lives. High-quality structured education can have a profound effect on health outcomes and can significantly improve quality of life.

The referrer will play a huge role in successfully engaging the person with diabetes and increasing uptake of an education course. Diabetes UK patient focus groups have shown that the attitude of health care professionals and information given at time of diagnosis can have a profound impact on people’s ability to self-manage their condition effectively.

If the person is not keen to engage, screen for psychological difficulties (PHQ4 in primary and community care OR DDS2 in secondary care) and refer to IAPT or other relevant part of local pathway if +ve, as well as assessment using Patient Activation Measure (PAM). See slide 29 for details of tools.

### STRUCTURED EDUCATION COURSES

<table>
<thead>
<tr>
<th>DESMOND</th>
<th>Group education delivered by trained educators: Two half day sessions or one full day</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-PERT</td>
<td>Group education delivered by trained educators: 2.5 hr sessions over 6 weeks with annual follow-up sessions</td>
</tr>
<tr>
<td>X-PERT Insulin</td>
<td>Group education delivered by trained educators: 2.5 hr sessions over 6 weeks with annual follow-up sessions</td>
</tr>
</tbody>
</table>
| DIGITAL STRUCTURED EDUCATION | NHS England accredited options include:  
• Changing Health  
• OurPath  
• Oviva  
These will be available through the Know Diabetes information and support service and provide combinations of app, coaching (by dietitian or health coach), self measurement of weight / activity and in the case of OurPath, 3G-connected scales. Length of course varies from 6 weeks to 6 months, but can be fitted around working hours or other activities. |

Date of preparation: July 2019. For review: June 2020
Algorithm for blood glucose lowering therapy in adults with type 2 diabetes

If HbA1c rises to 68 mmol/mol (8.5%) on lifestyle interventions:
- Offer standard-release metformin
- Support the person to aim for an HbA1c level of 53 mmol/mol (7.0%)

SECOND INTENSIFICATION

If HbA1c rises to 58 mmol/mol (7.5%) or higher:
- Consider triple therapy with:
  - metformin, DPP-4i and an SU
  - metformin, pioglitazone and an SU, or an SGLT-2i
  - insulin-based treatment
- Support the person to aim for an HbA1c level of 53 mmol/mol (7.0%)

Insulin-based treatments:
- When starting insulin, use a pre-mixed (biphasic) human insulin.
- Offer NPH insulin once or twice daily according to need.
- Consider starting both NPH and short-acting insulin either separately or as pre-mixed (biphasic) human insulin.
- Consider as an alternative to NPH insulin, using insulin detemir or glargine.
- Consider pre-mixed (biphasic) preparations that include short-acting insulin analogues, rather than pre-mixed (biphasic) preparations that include short-acting insulin analogues.
- Consider pre-mixed (biphasic) preparations that include short-acting insulin analogues.
- Consider pioglitazone in combination with an SU.
- Monitor people on insulin for the need to change the regimen.
- Offer a CLP-1 mimetic in combination with insulin with specialist care advice and ongoing support from a dietitian.
- Offer an SGLT-2i in combination with insulin with or without other antidiabetic drugs as an option.

Abbreviations:
- DPP-4i: Dipeptidyl peptidase-4 inhibitor
- GLP-1: Glucagon-like peptide 1
- SGLT-2i: Sodium-glucose cotransporter 2 inhibitors
- SU: Sulfonylurea

Type 2 diabetes in adults: management. NICE guideline NG28. Published December 2015, last updated April 2017. © National Institute for Health and Care Excellence 2015. All rights reserved.
Determine individual target HbA1c and **implement lifestyle measures**

Adapted from NICE: [https://www.nice.org.uk/guidance/ng28/resources/algo...](https://www.nice.org.uk/guidance/ng28/resources/algo...)

For more details for classes and individual drugs, see pages 32-35, 57-58

1 or individually agreed target
2 Support the person to aim for an HbA1c of 48mmol/mol (6.5%) or individually agreed target
3 Support the person to aim for an HbA1c of 53mmol/mol (7.0%) or individually agreed target
4 Dapagliflozin not recommended

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**Type 2 Diabetes – Algorithm for Glucose Lowering Therapy in Adults**

- **HbA1c ≥48mmol/mol (6.5%)**
  - **Metformin standard release**
  - If contraindicated

- **HbA1c ≥58mmol/mol (7.5%)**
  - **Metformin modified release**
  - If not tolerated

**Use:**
- Sulfonylurea
- Pioglitazone
- SGLT2i
- DPP4i

*NB: Repaglinide can be used, however, no licensed intensification options available.*

**HbA1c ≥58mmol/mol (7.5%)**

**Dual therapy**
- Add:
  - Sulfonylurea
  - Pioglitazone
  - DPP4i
  - SGLT2i

**HbA1c ≥58mmol/mol (7.5%)**

**Triple therapy**:
- Metformin +Sulfonylurea +DPP4i/Pioglitazone/SGLT2i, or
- Metformin +Pioglitazone+SGLT2i

If not effective, tolerated or contraindicated

**HbA1c ≥58mmol/mol (7.5%)**

**Consider insulin-based treatment**
- Based on NICE criteria

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**Monitor for deterioration/uncontrolled HbA1c**

*If symptomatically hyperglycaemic, consider insulin or sulfonylurea. Review treatment when blood glucose control achieved.*

*If symptomatically hypoglycaemic, treat hypoglycaemia and review blood glucose lowering therapies*
TYPE 2 DIABETES

Insulin-based treatment

Continue metformin if tolerated. Review the continued need for other blood glucose lowering therapies, for details see page 62.

Offer NPH insulin once or twice daily, according to need

If HbA1c ≥ 75 mmol/mol (9.0%)

Consider offering NPH and short-acting human insulin (separately or as pre-mixed (biphasic))

If person:
• Prefers injecting insulin immediately before a meal,
• Has hypoglycaemia as a problem
• Blood glucose levels rise markedly after meals

Consider pre-mixed (biphasic) short-acting insulin analogues instead of short-acting human insulin

Monitor person on insulin for the need to change the regimen

If person:
• Needs assistance to inject insulin,
• Lifestyle is restricted by recurrent symptomatic hypoglycaemic episodes
• Would otherwise need twice-daily NPH insulin in combination with oral blood glucose lowering drugs.

Consider using insulin detemir or glargine (Use biosimilars if available)

NB: Only offer a GLP-1 mimetic in combination with insulin with specialist care advice and on-going support from a consultant-led multidisciplinary team

Date of preparation: July 2019. For review: June 2020
### SUMMARY OF HYPOGLYCAEMIC AGENTS

<table>
<thead>
<tr>
<th></th>
<th>Metformin</th>
<th>DPP-4i (-gliptins)</th>
<th>GLP-1 Agonist (-tides)</th>
<th>SGLT-2i (-flozins)</th>
<th>Sulfonylureas</th>
<th>Repaglinide</th>
<th>Acarbose (AGI)</th>
<th>Thiazolidinediones (Pioglitazone)</th>
<th>Insulin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypoglycemia</strong></td>
<td>No</td>
<td>Only when combined with SU/Insulin</td>
<td>No</td>
<td>Only when combined with SU/Insulin</td>
<td>Associated risk</td>
<td>Associated risk</td>
<td>No</td>
<td>No</td>
<td>Associated risk</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>Loss</td>
<td>Loss</td>
<td>Loss</td>
<td>Gain</td>
<td>Gain</td>
<td>Neutral</td>
<td>Gain</td>
<td>Gain</td>
<td></td>
</tr>
<tr>
<td><strong>Renal dosing</strong></td>
<td>eGFR 30-44: Max daily dose 1g Contraindicated if eGFR&lt;30</td>
<td>Dose reduction required</td>
<td>Dose reduction required, Avoid if severe</td>
<td>Avoid initiation if eGFR&lt;60 Discontinue if eGFR&lt;30</td>
<td>Higher risk of hypoglycemia</td>
<td>Use with caution</td>
<td>Avoid if eGFR&lt;25</td>
<td>None</td>
<td>Dose reduction required, higher risk of hypoglycemia</td>
</tr>
<tr>
<td><strong>GI side effects</strong></td>
<td>Common</td>
<td>No known risks</td>
<td>Common</td>
<td>No known risks</td>
<td>Common</td>
<td>Common/rare</td>
<td>Common</td>
<td>No known risks</td>
<td>No known risks</td>
</tr>
<tr>
<td><strong>Cardiovascular risks/benefit</strong></td>
<td>Benefits</td>
<td>Neutral</td>
<td>Liraglutide may have CV benefit*</td>
<td>Empagliflozin and Canagliflozin may have CV benefit*</td>
<td>Neutral</td>
<td>CVD as a rare side effect</td>
<td>Neutral</td>
<td>Risk</td>
<td>Neutral</td>
</tr>
<tr>
<td></td>
<td>Caution in chronic stable hear failure</td>
<td>Caution in people with mild congestive heart failure.</td>
<td>Caution in CVD due to increased risk of volume depletion.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cardiac failure risk when used concurrently with Pioglitazone</td>
<td></td>
</tr>
<tr>
<td><strong>Liver impairment</strong></td>
<td>Withdraw if risk of tissue hypoxia, predisposes to lactic acidosis</td>
<td>No risk</td>
<td>No risk</td>
<td>No risk</td>
<td>If severe, reduce dose (risk of hypoglycemia)</td>
<td>Avoid if severe</td>
<td>Avoid if severe</td>
<td>Avoid, risk of liver toxicity</td>
<td>Reduced dose required</td>
</tr>
</tbody>
</table>

*As taken from SIGN 154 diabetes guideline and primary care, NICE has not made any recommendations following revision in March 2018 due to absence of robust cost-effectiveness evidence.

Date of preparation: July 2019. For review: June 2020
### Type 2 Diabetes – HbA1C Targets

#### Individualising HbA1C Targets

**HbA1C Target Recommendations:**

People with Type 2 Diabetes should normally have their HbA1c maintained between 48 and 58 mmol/mol.

Clinicians should aim to involve people in decisions about their individual HbA1c target level, which may in some cases be above that of 48-58 mmol/mol set for people with Type 2 Diabetes in general.

Target HbA1c level should be informed by a number of factors including duration of Diabetes, life expectancy, comorbidities including established vascular complications and available support.

| Tighter targets (6.0 - 6.5% / 42 – 48 mmol/mol) | Older, healthier |
| Loose targets (7.5 - 8.0% / 58-64 mmol/mol) | 
older, CKD, comorbidities, hypoglycaemia prone, End of Life |

Encourage the person to maintain their individual target unless the resulting side effects (including hypoglycaemia) or their efforts to achieve this impair their quality of life.

Offer therapy (lifestyle and medication) to help achieve and maintain the HbA1c target level.

Inform a person with a higher HbA1c that any reduction in HbA1c towards the agreed target is advantageous to future health.

Avoid pursuing highly intensive management particularly in elderly and frail people in whom the risk of hypoglycaemia is high.

**HbA1C IFCC Units:**

HbA1c values should be expressed in mmol/mol instead of percentages as follows:

<table>
<thead>
<tr>
<th>DCCT (%)</th>
<th>IFCC (mmol/mol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0</td>
<td>42</td>
</tr>
<tr>
<td>6.5</td>
<td>48</td>
</tr>
<tr>
<td>7.0</td>
<td>53</td>
</tr>
<tr>
<td>7.5</td>
<td>58</td>
</tr>
<tr>
<td>8.0</td>
<td>64</td>
</tr>
<tr>
<td>9.0</td>
<td>75</td>
</tr>
</tbody>
</table>

**Approach to Management of Hyperglycaemia**

<table>
<thead>
<tr>
<th>42 mmol/mol</th>
<th>53 mmol/mol</th>
<th>64 mmol/mol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient attitude and expected treatment efforts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly motivated, adherent Excellent self-care capacities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less motivated, non-adherent Poor self-care capacities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypoglycaemia risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
</tr>
<tr>
<td>Moderate</td>
</tr>
<tr>
<td>High</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disease duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>15</td>
</tr>
<tr>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Life expectancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long</td>
</tr>
<tr>
<td>Short</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Important comorbidities</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
<tr>
<td>Few/Mild</td>
</tr>
<tr>
<td>Multiple/Severe</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Established vascular complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
</tr>
<tr>
<td>Severe</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resources, support system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readily available</td>
</tr>
<tr>
<td>Limited</td>
</tr>
</tbody>
</table>

## Individualisation of Hba1c

**Adapted from Khunti and Davies 2010**

<table>
<thead>
<tr>
<th>Duration &gt; 10 years</th>
<th>Latest HbA1c &gt; 64-75</th>
<th>Complications: CVD, CKD, retinal, foot</th>
<th>Hx of Hypoglycaemia</th>
<th>On SU / Insulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td></td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

### Target Hba1c

<table>
<thead>
<tr>
<th>Age</th>
<th>Target Hba1c</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;65</td>
<td>&lt;48</td>
</tr>
<tr>
<td>65-70</td>
<td>48-53</td>
</tr>
<tr>
<td>&gt;70</td>
<td>53-58</td>
</tr>
</tbody>
</table>

### End of Life Care

- Severe frailty or Residential care
- End of Life Care

Refer to: Diabetes UK End of Life Diabetes Care Clinical Recommendations for advice on targets and potential deprescribing

Date of preparation: July 2019. For review: June 2020
## KEY PRINCIPLES OF PRACTICE

- 95% of the care people with Diabetes receive is self-care and all people should have access to high quality structured education programmes e.g. X-PERT, DESMOND, conversation maps
- The ability to monitor their own glucose level gives people with Diabetes the feedback they need in order to learn how to manage their condition optimally.
- The ability to self-monitor may be affected by their mental health: use PHQ4 (in primary and community care) to screen for anxiety and depression OR DDS2 (in secondary care) to screen for diabetes distress. Use 6 item COG for cognitive impairment (more prevalent in Diabetes after age 50). See slide 30 for tools
- Monitoring should be based on the individual’s clinical needs and in the context of Diabetes education and self-management.
- People should receive appropriate training in the technique and the acting on the results.
- The frequency of testing will be different for different people and will change with their circumstances. Any guidelines can only be used as a framework and then adapted to meet individual needs.
- People may move between different methods of monitoring dependent on their needs at that time.
- Equipment used for monitoring should be based on choice and agreed with patient.

### TYPE 2 DIABETES

- Routine self-monitoring of blood glucose is not usually required if people are well controlled on therapy without the potential to cause hypoglycaemia (see the table).
- HbA1c is important in assessing the adequacy of blood glucose control and should be tested every 3-6 months.
- Structured education is essential for people with newly diagnosed and existing Diabetes.
- Checking for wellbeing is essential as 40% of people with diabetes have poor mental health (see slide 29) and this affect their ability to self-care
- People with Type 2 Diabetes usually have more stable glycaemic control. In practice, the level of monitoring will vary according to the treatment regimen used and the target level of glycaemic control set for/with the patient.
- DVLA requirements for testing when driving apply to people with Type 2 Diabetes treated with insulin, Gliclazide, glimepiride, glibenclamide or another sulfonylurea, nateglinide or repaglinide.

### TYPE 1 DIABETES

- Approaches and targets should be individualised and agreed in consultation with people, as part of the care planning process.
- In addition to self-monitoring, HbA1c should be measured every 3-6 months.
- People prescribed insulin should be taught how to adjust therapy in line with their blood glucose monitoring and recognise patterns in their test results. This facilitates adjustments to their medication to achieve targets for fasting and postprandial blood glucose, which both contribute to HbA1c.
- Checking for wellbeing is essential as 40% of people with diabetes have poor mental health and this affect their ability to self-care be alert to eating disorders and insulin dose manipulation if there is poor glucose control, low BMI or over concern with body shape and weight
- All results should be recorded with the time and date to provide a cumulative record as a basis for day-to-day changes in therapy. Most meters will store this information and some will allow download to a computer or smart phone

### DIABETES AND DRIVING

**People with Diabetes must inform the DVLA.**

- Those on insulin or oral hypoglycaemic agents which carry a risk of hypoglycaemia, such as sulfonylureas should monitor their glucose before driving. [https://www.gov.uk/government/publications/information-for-drivers-with-diabetes](https://www.gov.uk/government/publications/information-for-drivers-with-diabetes)
- Group 2 drivers (bus and lorry), on insulin or oral medicines which carry a risk of hypoglycaemia, are still required to check their blood glucose using finger prick testing for the purposes of driving.
- Must have awareness of hypoglycaemia. If there is a total loss of 'hypo' warning signs their license will be withdrawn.
- Must not have had more than one episode of hypoglycaemia requiring third party assistance during the day within the preceding 12 months. If they have had more than one episode they must inform the DVLA and their licence will be withdrawn for one year following the first episode.
- All results should be recorded with the time and date to provide a cumulative record as a basis for day-to-day changes in therapy. Most meters will store this information and some will allow download to a computer or smart phone

| People with blood glucose levels <5 should not drive until they have eaten. |

### GROUP 2 ENTITLEMENT

People with Diabetes on insulin can apply for any Group 2 licence providing the patient has:

- Had no episodes of hypoglycaemia requiring third party assistance within the previous 12 months.
- Full awareness of hypoglycaemia and can demonstrate understanding of its risks.
- Meter recorded evidence of regular monitoring (twice a day and at times relevant to driving).
- Been reviewed annually by an independent consultant diabetologist.

Visit [www.dft.gov.uk/dvla/medical](http://www.dft.gov.uk/dvla/medical)
## DIABETES – FREQUENCY OF BLOOD GLUCOSE TESTING

### ADULTS WITH TYPE 2 DIABETES

<table>
<thead>
<tr>
<th>Treatment</th>
<th>ADULTS WITH TYPE 1 DIABETES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet and exercise</td>
<td>Insulin for Type 2 Diabetes: basal, twice daily fixed regimen or mixed insulins for basal bolus regimen see table for Type 1 Diabetes overleaf</td>
</tr>
<tr>
<td>Metformin</td>
<td>Inulin: basal bolus or delivered by a pump</td>
</tr>
<tr>
<td>Pioglitazone</td>
<td></td>
</tr>
<tr>
<td>DPP-4 inhibitors</td>
<td></td>
</tr>
<tr>
<td>SGLT-2 inhibitors</td>
<td></td>
</tr>
<tr>
<td>GLP-1 analogues*</td>
<td></td>
</tr>
<tr>
<td>sulfonylureas/meglitinides alone or in combination with other suitable hypoglycaemic agents except insulin</td>
<td></td>
</tr>
</tbody>
</table>

### Usual Monitoring

- Not usually necessary (* except when initiating exenatide, liaglutide or lixisenatide in people taking a sulfonylurea – see next column)
- Do not offer a meter unless a clear action based on test results has been agreed and for short term use only, e.g. to allow patient to adjust lifestyle when newly diagnosed
- 4 tests per week, usually testing once week before each of the three daily meals and before bedtime
- See advice on Diabetes and driving on previous page.

### Intensive Monitoring

- Before meals and 2 hours after evening meal
  - *Intensive monitoring is essential during initiation of exenatide, liaglutide or lixisenatide for people already on sulfonylureas until stabilised
  - Additional post prandial tests may be required to optimise the dose of the rapid acting insulin; include testing before meals and 1-2 hours after the largest meals
  - During periods of intensive monitoring additional supplies of strips may be required

### Prescribing

- Prescribe the minimum appropriate number of strips on acute
- Prescribe on repeat Additional supplies may be necessary for driving and intensive monitoring
- Prescribe on repeat Additional supplies may be necessary for driving and intensive monitoring
- Prescribe on repeat. Restricting access to strips may destabilise control and adversely affect people’s quality of life

---

### Intensive monitoring may be required in any of these situations

- During intercurrent illness
- Intermittent steroid therapy
- Osmotic symptoms
- Postprandial hyperglycaemia
- Terminal care/end of life
- People on the Diabetes Prevention Programme (diabetes remission programme)

- To prevent development of acute complications
  - Pre-conception and pregnancy
  - Increased or regular intensive exercise
  - When HbA1c testing is unavailable
  - Impaired awareness of hypoglycaemia

Date of preparation: July 2019. For review: June 2020
PRINCIPLES

People and health care professionals should be clear about what they hope to achieve by self-monitoring blood glucose because monitoring in itself does not improve control. It is the interpretation of the result and the action taken that makes the difference.

Assessment of monitoring at least once a year is desirable and should include:

- Self-monitoring skills including the cognitive ability of the person using 6 item cognitive impairment test (especially if there are microvascular changes in other organs apart from the brain)
- The quality and frequency of testing
- The use made of the results obtained
- The continued benefit
- The impact on quality of life
- The equipment used

If the patient does not benefit from monitoring or if it is adversely affecting their quality of life, then it should be stopped.

Self-monitoring of blood glucose does not replace HbA1c testing, which should be carried out at suitable intervals as part of regular care.

Remember other health education (healthy diet, regular physical activity, maintaining a healthy psychological state, maintaining a normal body weight and avoiding tobacco) to help people reduce their risk of Diabetes-related complications.

Provide Diabetes lifestyle leaflets and actively promote structured education and referral to IAPT if necessary.

CHOOSING A BLOOD GLUCOSE METER

For people with type 2 diabetes, prescribed blood glucose test strips should cost less than £10 for a pack of 50 strips. A wide variety of blood glucose meters are available where the cost of test strips is less than £10 per pack of 50.

For people with type 1 diabetes the preferred option is a combined ketone and blood glucose meter which utilises ketone strips (pack of 10) and blood glucose strips (pack of 50) costing less than £10 per pack for each (see slide 23).

Meters for testing glucose and ketones are usually provided free of charge from the manufacturer/supplier.

People prescribed FreeStyle Libre sensors on the NHS may be prescribed FreeStyle Optium blood glucose test strips (£16.12 per pack of 50) and FreeStyle Optium β-ketone test strips (£21.71 per pack of 10). Prescribers should check usage levels and prescribe appropriate quantities for these FreeStyle test strips.

People who need a meter with an in-built bolus adviser system should use an Accu-Chek Aviva Expert meter or FreeStyle Libre Reader. Aviva blood glucose test strips (£16.21/pack 50) and FreeStyle Optium blood glucose test strips (£16.12/pack 50) can be prescribed for people who have been advised to use these meters for the bolus adviser functionality.

People using insulin pumps with an in-built blood glucose meter should be prescribed blood glucose test strips compatible with their insulin pump system (see slide 24).

A decision to change meters should be used as an opportunity to review the purpose of testing and the interpretation of results as well as provide basic lifestyle advice and leaflets. If usage is low enough that one pot of strips lasts longer than its expiry date, review of the need for blood glucose monitoring is recommended.

The choice of meter and its functionalities and features should reflect the needs of the user. Some of the key functionalities to consider are show in the table below.

<table>
<thead>
<tr>
<th>Function/Feature</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory</td>
<td>Memory of at least 500 and cannot be deleted by the user</td>
</tr>
<tr>
<td>Display screen</td>
<td>Size and readability of the information displayed on the screen</td>
</tr>
<tr>
<td>Voice function</td>
<td>For users who are blind or have visual impairment</td>
</tr>
<tr>
<td>Replacement batteries</td>
<td>Does the manufacturer replace batteries free of charge?</td>
</tr>
<tr>
<td>Customer support</td>
<td>Does the manufacturer provide a freephone number to a customer support service?</td>
</tr>
<tr>
<td>External data output</td>
<td>Can data be transferred from the meter? Is data transfer wireless or via a cable?</td>
</tr>
<tr>
<td>Compatibility with Remote diabetes management software</td>
<td>Is the meter compatible with remote diabetes management software (e.g. Diasend or Tidepool)?</td>
</tr>
</tbody>
</table>

Date of preparation: July 2019. For review: June 2020
# Type 1 Diabetes – Combined Ketone and Glucose Meters

<table>
<thead>
<tr>
<th>Meter</th>
<th>4SURE Smart Duo</th>
<th>CareSens Dual Meter</th>
<th>Fora Advanced Pro GD40</th>
<th>GlucoMen Areo 2K</th>
<th>GlucoRx HCT &amp; Ketone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compatible strips - glucose</strong></td>
<td>4SURE β-ketone £9.92 for 10*</td>
<td>CareSens PRO blood glucose test strips £9.95 for 1x50* Expiry: 12 month from first opening vial</td>
<td>Fora Advanced Pro GD40 (glucose) £9.25 for 1x50* Expiry: 9 months after first opening vial</td>
<td>GlucoMen Areo Sensor £9.95 for 1x50* Expiry: 6 months after first opening vial</td>
<td>GlucoRx HCT £8.95 for 1x50* Expiry: 6 months after first opening vial</td>
</tr>
<tr>
<td><strong>Compatible strips - ketone</strong></td>
<td>4SURE β-ketone £9.92 for 10*</td>
<td>KetoSens £9.95 for 10* Expiry: up to expiry date on foil packet</td>
<td>Fora Advanced Pro GD40 (ketone) £9.92 for 10*</td>
<td>GlucoMen areo Ketone Sensors £9.95 for 10* Expiry: up to expiry date on foil packet</td>
<td>GlucoRx HCT Ketone Test Strips £9.95 for 10* Expiry: up to expiry date on foil packet (18 months from date of manufacture)</td>
</tr>
<tr>
<td><strong>Lancets</strong></td>
<td>Any lancets which cost ≤ £5.00 for 200</td>
<td>Any lancets which cost ≤ £5.00 for 200</td>
<td>Any lancets which cost ≤ £5.00 for 200</td>
<td>Any lancets which cost ≤ £5.00 for 200</td>
<td>Any lancets which cost ≤ £5.00 for 200</td>
</tr>
<tr>
<td><strong>Memory (no. of tests)</strong></td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>730 (User cannot delete)</td>
<td>1000 (User cannot delete)</td>
</tr>
<tr>
<td><strong>Replacement batteries</strong></td>
<td>1 x 1.5V AAA</td>
<td>2 x 3.0V lithium (CR2032) (replaced free of charge by company)</td>
<td>2 x 1.5V AAA</td>
<td>2 x 3v CR2032 Batteries (replaced free of charge by company)</td>
<td>2x AAA Batteries (replaced free of charge by company)</td>
</tr>
<tr>
<td><strong>External output (e.g. to PC, phone)</strong></td>
<td>Bluetooth V4.0 or Micro USB</td>
<td>Bluetooth or PC via free cable supplied on request</td>
<td>Bluetooth connectivity</td>
<td>USB cable to PC. Smartphone via Bluetooth adapter</td>
<td>PC interface cable</td>
</tr>
<tr>
<td><strong>Software and compatibility</strong></td>
<td>Diasend Uploader</td>
<td>SmartLog app</td>
<td>iFORA HM app</td>
<td>GlucoLog software on PC or GlucoLog App on smartphone</td>
<td>Diasend Uploader</td>
</tr>
<tr>
<td><strong>Company contact</strong></td>
<td><a href="mailto:Diagnostics-uk@nipro-group.com">Diagnostics-uk@nipro-group.com</a>, Freephone 0800 0858808</td>
<td><a href="mailto:info@spirit_healthcare.co.uk">info@spirit_healthcare.co.uk</a>, 0116 2865000</td>
<td>online support form <a href="https://foracare.com/patient-related-inquires/">https://foracare.com/patient-related-inquires/</a></td>
<td><a href="mailto:myglucomen@menarinidiag.co.uk">myglucomen@menarinidiag.co.uk</a>, Freephone 0800 243667</td>
<td><a href="mailto:info@glucorx.co.uk">info@glucorx.co.uk</a>, Freephone 0800 007 5892</td>
</tr>
</tbody>
</table>

*Drug Tariff July 2019*
**Flash Glucose Monitoring Systems**

Flash glucose monitoring is only available on the NHS in North West London for people with Type 1 diabetes, aged four years or over, who meet one of the criteria listed below:

**Indication 1:** People with type 1 diabetes on multiple daily injections or insulin pump therapy who test frequently (>8 times per day).

**Indication 2:** People with type 1 diabetes unable to routinely self-monitor blood glucose due to disability who require carers to support glucose monitoring and insulin management.

**Indication 3:** People with type 1 diabetes for whom the specialist diabetes MDT determines have occupational (e.g. working in insufficiently hygienic conditions to safely facilitate finger-prick testing) or psychosocial circumstances that warrant a 6 month trial of flash glucose monitoring with appropriate adjunct support.

**Indication 4:** People with any form of diabetes on haemodialysis and on insulin treatment and are clinically indicated as requiring intensive monitoring >8 times daily.

**Indication 5:** People with diabetes associated with cystic fibrosis on insulin treatment.

**Indication 6:** Pregnant women with type 1 diabetes (eligible for 12 months’ supply of flash glucose monitoring inclusive of post-delivery period).

**Indication 7:** For those with type 1 diabetes and recurrent severe hypoglycaemia or impaired awareness of hypoglycaemia, NICE suggests that Continuous Glucose Monitoring with an alarm is the standard. Other evidence-based alternatives with NICE guidance or NICE TA support are pump therapy, psychological support, structured education, islet transplantation and whole pancreas transplantation. However, if the person with diabetes and their clinician consider that a flash glucose monitoring system would be more appropriate for the individual’s specific situation, then this can be considered.

Initiation of people on flash glucose monitoring will be done by local diabetes specialist teams **ONLY** as per NHS London Clinical Networks recommendations and guidance produced by the North West London Collaboration of CCGs https://www.hounslowccg.nhs.uk/news,-publications-and-policies/publications.aspx?n=3850

FreeStyle Libre® measures the glucose in interstitial fluid and is not a complete substitute for finger-prick blood glucose testing.

Finger-prick blood glucose measurements will still be required in certain circumstances, including meeting requirements set by the Driver and Vehicle Licensing Authority (DVLA).
### BLOOD GLUCOSE TEST STRIP REQUIREMENTS

Test strips usually come in packs of 50 which cannot be split. This table indicates quantities for usual testing. Additional supplies may be necessary for intensive testing e.g. to meet DVLA requirements for driving. If people are required to test regularly please prescribe on repeat prescriptions. People should be encouraged not to over order or stockpile supplies. Additional supplies to meet a short term need should be prescribed on acute prescriptions.

### LANCET REQUIREMENTS

Prescribe a low cost brand of lancets (<£5 per pack of 200)

Lancers (the finger pricking devices) are not available on prescription and replacement lancing devices are available from companies (usually free of charge). Lancets are for single use only and should be prescribed in quantities which correspond to the expected frequency of testing.

### INSULIN PEN NEEDLE REQUIREMENTS

Safety pen needles are more expensive and should only be used where insulin is administered by a healthcare professional or appropriate carer.

Prescribe a low cost brand of insulin pen needles (<£4 per pack of 100 pen needles). Most brands of pen needles are compatible with all devices. Pen needles come in packs of 100.

Shorter needle lengths reduce the risk of intramuscular injection of insulin. The Forum for Injection Technique (FIT) UK considers the 4mm needle to be the safest pen needle for adults and children regardless of age, gender and body mass index (BMI).

For those currently using longer pen needle lengths (8mm or longer), it is advisable to change to a shorter needle length (6mm or less) but only after discussion with a healthcare professional, to ensure they receive advice on the correct injection technique.

<table>
<thead>
<tr>
<th>Tests per day</th>
<th>Tests/28 days</th>
<th>Packs/frequency</th>
<th>Tests per day</th>
<th>Tests/28 days</th>
<th>Packs/frequency</th>
<th>Injections per day</th>
<th>28 days</th>
<th>Packs/frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>28</td>
<td>8 /year</td>
<td>1</td>
<td>28</td>
<td>2 x 200 packs / year</td>
<td>1</td>
<td>28</td>
<td>4 x 100 packs /year</td>
</tr>
<tr>
<td>2</td>
<td>56</td>
<td>1 pack /month; 14 packs/year</td>
<td>2</td>
<td>56</td>
<td>4 x 200 packs / year</td>
<td>2</td>
<td>56</td>
<td>8 x 100 packs /year</td>
</tr>
<tr>
<td>4</td>
<td>112</td>
<td>2-3 packs/month; 29 packs/year</td>
<td>4</td>
<td>112</td>
<td>8 x 200 packs / year</td>
<td>3</td>
<td>84</td>
<td>11 x 100 packs /year</td>
</tr>
<tr>
<td>6</td>
<td>168</td>
<td>3-4 packs/month; 44 packs/year</td>
<td>6</td>
<td>168</td>
<td>11 x 200 packs / year</td>
<td>4</td>
<td>112</td>
<td>15 x 100 packs /year</td>
</tr>
<tr>
<td>8</td>
<td>224</td>
<td>4-5 packs/month; 58 packs/year</td>
<td>8</td>
<td>224</td>
<td>15 x 200 packs / year</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Date of preparation: July 2019. For review: June 2020
‘An ongoing process of two-way communication, negotiation and joint decision-making in which both the person with Diabetes and the healthcare professionals make an equal contribution to the consultation.’

THE HOUSE OF CARE:

The “house of care” highlights the importance of each part of the process:

- Commissioning
- Autonomous, engaged informed people with diabetes
- Health care professionals committed to partnership working
- Organisational processes

Without any one of these the house collapses.

PERSON CENTRED:

If we want to be more helpful to people who are trying to make changes but are finding it difficult, we need to base consultations on their concerns, their goals and the practical actions they wish to follow. This does not mean that the HCP is passive, unresponsive or does not have a view – the consultation shares the expertise and experience of both parties in order to influence the outcome.

See Language Matters, Language and Diabetes for guidance on principles and practices for better communication with people with diabetes.

Many people may not really have considered a lifestyle or behaviour change, or may feel ambivalent about making a change. In this situation, pushing or encouraging them to plan to change may not be appropriate. Indeed, a possible goal for that person might be to decide whether they do want to make a change. Their action plan may be to work out the ‘pros and cons’ of both making the change and not making the change, along with assessing its importance to them. If they are struggling with their mood or anxiety or coping with diabetes they usually want to be asked about this as this may be the thing that is standing in their way.

Goal setting and action planning are inextricably linked but they should be seen as separate stages.

THE INFORMATION SHARING PROCESS:

Information gathering: The patient attends for an appointment with the Health Care Assistant or Nurse to have their ‘annual review’ tests (e.g. blood and urine tests, blood pressure, weight +/- foot, eye screening and mental health screening -PHQ4 (in primary and community care) OR DDS2 (in secondary care). Use 6 item Cog if over 60. See slide for tools.

Information sharing: The annual review test results are included into a letter and posted to the patient to arrive at least one week before the Care consultation. Prompts and questions in the letter encourage the patient to consider the results and other aspects of their Diabetes before the consultation.

Consultation and joint decision making: The patient attends the Care Planning consultation with the practice nurse or GP, who have received training in partnership working. This should include the elements outlined later in the guide (goal setting and action planning).

Agreed and shared care plan: The agreed care plan is produced and shared with the patient either immediately or subsequently by post or electronically.

Useful tools:

- Partners in Care: Diabetes UK guide to care planning
- Consultation Quality Index (CQI-2): a questionnaire for understanding patient’s perception of clinician skills

Date of preparation: July 2019. For review: June 2020
**Goal Setting:**

**Summarise and Prioritise**

Goal setting involves summarising and prioritising the various issues that have been explored and discussed so far in the consultation.

For instance the healthcare professional might say “what, of all the concerns we have talked about, rise up for you as the important things to aim for in relation to your Diabetes, over this coming year?”

**Assess Importance**

When changing something is difficult, the reason for change, the place where someone would like to be, has to be worth the effort of changing. If the goal is of low importance, but the difficulty of achieving it is high, then it is unlikely to be successfully achieved. Why would you want to put yourself through that?

The value to someone can be assessed quite simply by asking the person to consider how important the goal or outcome is for them using a rating scale of 0 – 10 where 0 is low and 10 is high importance. For instance:

“If I asked you to tell me how important this change is for you, where zero was not important at all and 10 was really, really important, where would you put yourself between zero and ten?”

If they score e.g. 6, you could ask why it isn’t 7 and ask what would need to happen to make it 7. You could also ask why it isn’t 5 as this will help you and them explore why it IS important. This process illuminates their ambivalence and facilitates a motivational conversation.

**Reassess Importance**

If the score is lower than 7 then the reason for picking that goal needs to be explored.

---

**Agreeing Actions:**

**Follow people’s Priorities**

If we want to be more helpful to people who are trying to make changes but are finding it difficult, we need to base consultations on their concerns, their goals and the practical actions they wish to follow.

This does not mean that the HCP is passive, unresponsive or does not have a view – the consultation shares the expertise and experience of both parties in order to influence the outcome.

**SMART Goals**

Key ingredients of successful action planning:

- Plans need to be **SMART**
- Success is addictive
- Barriers to success need to be considered
- Rating scales to assess confidence and readiness
- Success really is addictive
- Take the time to do it

‘SMART’ is a well known acronym, the letters of which stand for the following:

| S | = Specific |
| M | = Measurable |
| A | = Action |
| R | = Realistic |
| T | = Time-scaled |

If an action plan can ‘tick the boxes’ of the above features, it is more likely to be successfully achieved.

**Assess Confidence**

Rating confidence: Self efficacy theory holds that a key determinant of a person’s ability to take action is the confidence they have in their ability to successfully undertake that action. So, a further way of assessing how realistic a plan is to ask the person to rate their confidence that they will be able to do it. This can be done in a similar way that we rated the importance of goals:

“If I asked you to rate how confident you feel you are to be able to do this, where zero was not at all and 10 was absolutely definitely, where would you put yourself between zero and ten?”

If they score e.g. 6, you could ask why it isn’t 7 and ask what would need to happen to make it 7. You could also ask why it isn’t 5 as this will help you and them explore what skills they DO have. This process illuminates the support and skills they can draw upon including you.
OVERCOMING RESISTANCE

I don't want
What do you want?

I must do / should do...
According to whom?
What would happen if you did?
What would happen if you didn’t?

I can’t ....
According to whom?
When can you?
What can you do?
What happens when you do?
What happens when you don’t?

I never...
Never?

I always ...
When Specifically?

I’ve tried that before...
So what did you learn?
And knowing what you learnt then, what needs to happen now?

• ENGAGE
  • Build rapport by matching people body language, words and tone.
  • Actively listen.
  • Ask curious questions that keep your map out of their world.

• GUIDE
  • Guide out of stuck state, what could they have differently (X) and the importance of it
  • “Regarding your health, what would you like to have happen?”
  • And is there anything else about that X?  What kind of X is that X?
  • What is important to you about that X?”

• EVOKE & ENVISAGE
  • What will it be like when they have it? Visualise this
  • “What would happen if you did?  What would happen if you didn’t?”
  • What wouldn’t happen if you did?  What wouldn’t happen if you didn’t?
  • Can you give me another example of this?”

• FOCUS FORWARDS
  • Clarify purpose of stuck behaviours (Y) & explore behaviour specifics to remove obstacles
  • “For what purpose are you doing Y?
  • What does doing Y give you?  What does Y stop you doing?
  • When / where / how / with who specifically do you Y?”
  • Summarise goals here - collectively recall back & transition X towards the future

• PLAN in STEPS
  • Develop a change plan & self-owned strategies to make it happen (cf SMART)
  • Repeat a "next steps" question until broken into manageable chunks and first step of action:
    “What needs to happen for that / X to happen?  Right, in order to do that, what do you need to do?  So what needs to happen for that to happen?”...
  • Summarise agreed action, commit to first step & a time-bound follow up - shake on it.

• CELEBRATE & BUILD
  • Follow up and celebrate success! Congratulate every small step and shift away from the stuck state with positive affirmations. Learn from mistakes
  • Keep building on goals and actions and carry on the conversation ...
  • “So knowing all that you know from the last time we met –what do you want to have happen now?”

Produced from work by Dr Yasmin Razak, GP Educator and Jo Wilson, NLP Coach from Beyond Training Solutions, in association with Diabetes UK

Date of preparation: August 2018. For review: March 2019
Approximately 40% of people with diabetes suffer with poor psychological well-being:

- The rate of depression and anxiety is more than doubled in people with diabetes.
- Other conditions such as diabetes distress, eating disorders, alcohol and substance use and needle phobias are more prevalent in diabetes.
- People with poorly controlled diabetes and vascular changes in feet, eyes and kidneys have a higher likelihood of such changes in their brains leading to cognitive impairment.
- People with type 2 diabetes are more likely to have experienced childhood adversity.
- People with severe mental illness such as schizophrenia and bipolar affective disorder are at higher risk of developing type 2 diabetes. Atypical antipsychotics increase this risk.

Impact of all these conditions in diabetes if not addressed is:

- Difficulty with motivation, hope for the future, cognitive function and self-esteem leading to difficulty with self-care.

Treatment for psychological conditions has been shown to lead to reduced symptoms and improved glycaemic control, as well as the costs of healthcare.

Person Centred approach

- People with diabetes want to be asked about their psychological wellbeing and how they are managing living with diabetes.
- People with diabetes want a menu of choices in terms of interventions, including peer support and self-help including online resources (see below).

### Screening tools

- **Alcohol screening tool “AUDIT”**
- **Diabetes Distress scale (DDS2 and DDS longer version)**
- **PHQ4 (depression and anxiety brief screen)**
- **PHQ9 (depression)**
- **GAD 7 (anxiety)**
- **6 item Cog**
- **Eating Disorder screening for primary care**

### Resources

- **Award winning self-help leaflets** about a number of different mental health issues (available in easy to read, audio available)
- **MIND Charity for information and support**
- **Samaritans for support in a crisis**

Date of preparation: July 2019. For review: June 2020.
**Refer to the five principles of the MCA**

1. Assume a person has capacity
2. Support the individual to make their own decision
3. Someone may make an unwise decision
4. Always act, or decide, for a person without capacity in their best interests
5. Choose the least restrictive option

**MCA (2005) Decision Making Flowchart**

All adults should be presumed to have capacity unless an assessment of capacity has proved otherwise. If the patient is capable, consent must be obtained by the person undertaking the procedure.

Can the person make the required decision?
(Do they need additional support, more time and to be given the information in a different format or asked at a more appropriate time?)

**The two-stage capacity test**

**Stage one.** Is there an impairment of, or disturbance in the functioning of the person’s mind or brain? If so,

**Stage two.** Does the impairment or disturbance impede the person’s capacity to make the particular decision?

Can the person:
1. Understand the information relevant to the decision,
2. Retain that information, Weigh that information as a part of the process of making a decision
3. Communicate their decision (whether by talking, using sign language or any other means)?

(Person must demonstrate all four functions above to be deemed as having capacity for the required decision-making)

Record this!
### Refer to the five principles of the MCA

- Must ensure that the proposed action/treatment is in the best interests of the person.
- The decision maker needs to check if there is an Advance Decision (AD), Lasting Power of Attorney (LPA) or Deputy covering health and welfare or if there is a friend/carer of person nominated by the person to consult.
- Advance Decision must be relevant to this decision.

### The best-interest checklist

When making a decision in someone’s best interests one must:

- Involve the person as much as possible
- Find out the person’s wishes and feelings
- Consult people who know the person well
- Consider all relevant information in time
- Avoid making the decision if it is likely that the person might regain capacity
- Think about what would be the least restrictive option and not:
  - Make assumptions based on the person’s age, appearance, condition or behaviour
  - Make a decision involving life-sustaining treatment that is motivated by a desire to end the person’s life.
- Consult with all relevant others, i.e. the person, medic/GP, carers, Allied Health Professionals, social care staff, Advocate/IMCA, or people who know the person well, i.e. LPA or Deputy or Enduring Power of Attorneys
- Consider all the relevant circumstances relating to the decision in question
- Be able to justify and evidence their decision making
- Ensure that other least restrictive options are always explored (complete best interests decision record).

### MCA (2005) Best Interests Decision Making

1. The person is assessed as not having the capacity to make a required decision
   - Has the person made valid advanced directive applicable to the required decision?
     - **No**
     - Is there a health and welfare LPA with authority for this health decision?
       - **No**
       - Refer to person with LPA with authority for the required decision
     - **Yes**
     - Has there been a court Deputy appointed with authority for the required decision?
       - **No**
       - Identify the decision maker, i.e. consultant/social worker/nurse etc.
         - Decision maker: Is this serious medical treatment or a proposed change of accommodation within the meaning of the Act?
           - **No**
           - Consult all involved in their care and make decision in person’s best interest
           - **Yes**
           - Is this person befriended?
             - **No**
             - Refer to IMCA, the decision maker must instruct and consult an IMCA (and others involved) to agree a decision that is in the best interest of the person
             - **Yes**
             - Decision maker to consult family/friends/carers and others (including professionals) who may be able to offer a view or opinion and make decision in the person’s best interest
     - **Yes**
     - Respect the person’s wishes
   - **Yes**

### Record keeping:

- It is important that you accurately record and evidence any decisions made with regards to best interests.

A formal best interests meeting is not always needed. It is important that consultation has taken place and the decision maker follows the guidance above with all relevant others and this is documented on the agreed paperwork.

Date of preparation: July 2019. For review: June 2020
### Biguanides (Metformin)

- **Decreases gluconeogenesis and increases peripheral utilisation of glucose. Improves insulin sensitivity.**

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Dose</th>
<th>Dose adjustments</th>
<th>Hepatic Impairment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td>500mg – 2g daily in divided doses, with or after a meal</td>
<td>Max daily dose, 1g</td>
<td>Contraindicated</td>
</tr>
<tr>
<td>Metformin modified-release</td>
<td>500mg – 2g once daily with evening meal</td>
<td>If glycaemic control is not achieved, 1g twice daily should be considered.</td>
<td></td>
</tr>
</tbody>
</table>

**Contraindications:**
- eGFR <30mL/min/1.73 m²,
- any acute metabolic acidosis (such as lactic acidosis, diabetic ketoacidosis),
- acute or chronic conditions that may alter renal function, hepatic insufficiency,
- cardiac and/or respiratory failure which may likely cause tissue hypoxia.

**Pregnancy and Breastfeeding:**
Can be used in pregnancy and breastfeeding.

**Cautions:**
- Chronic stable heart failure (monitor cardiac and renal function)
- May cause vitamin B12 malabsorption.
- Risk factors for lactic acidosis.

**Class side effects:**
- GI side effects (e.g. diarrhoea, abdominal pain, nausea, taste disturbance and vomiting.)

**Monitoring requirements:**
- Monitor eGFR when initiating and if starting antihypertensive, diuretics and NSAIDs or other conditions that can acutely worsen renal function.
- Withhold short term if dehydrated (including diarrhoea and vomiting), severe infection or shock (i.e. post-MI) and re-start once fully hydrated.

**Additional information:**
- All people, irrespective of eGFR, should be educated on good sick day guidance (see page 49).
- Metformin MR is an option for people poorly tolerant on standard-release.
- Based on clinical experience of increased side-effects, maximum dose for metformin immediate-release medicines in BNF Publications differs from product licence.
- Reduces cardiovascular disease in overweight or obese people.

### Sulfonylureas (Gliclazide, Glimepiride)

- **Stimulates insulin release from the pancreas.**

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Dose</th>
<th>Dose adjustments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gliclazide</td>
<td>Initially 40-80mg once daily, titrated until glycaemic control achieved before meals.</td>
<td>Use with care in mild to moderate renal impairment.</td>
</tr>
<tr>
<td>Glimepiride</td>
<td>1mg once daily, titrated in steps of 1mg every 1-2 weeks to 4mg once daily if need be. Maximum 6mg once daily. Similar time daily, shortly before or with first main meal</td>
<td>Avoid in severe hepatic insufficiency; use of insulin is recommended.</td>
</tr>
</tbody>
</table>

**Contraindications:**
- Presence of ketoacidosis.
- Severe renal or hepatic insufficiency.
- Gliclazide – Acute porphyrias, interaction with systemic and oromucosal miconazole.

**Pregnancy and Breastfeeding:**
- Avoid.

**Cautions:**
- Elderly due to a possible age-related increased risk of hypoglycaemia.
- People with G6PD deficiency.
- Concomitant use of sulfonylureas and insulin should be avoided in people with severe renal impairment (<45mL/min/1.73m²).

**Class side effects:**
- GI side effects (e.g. abdominal pain, nausea/vomiting, diarrhoea and constipation).
- Weight gain.
- Please see individual drug monograph in the BNF for a complete side-effect profile.

**Monitoring requirements:**
- Blood glucose (See page 21)

**Additional information:**
- Risk of hypoglycaemia when used with SGLT2i, DPP4i, pioglitazone and acarbose—consider reducing dose of sulfonylurea.
- ALL people should be told about recognition and management of hypoglycaemia when prescribed a sulfonylurea.
**THIAZOLIDINEDIONES (PIOGLITAZONE)**

- Reduces peripheral insulin resistance, leading to a reduction of blood-glucose concentration.

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Dose</th>
<th>Dose adjustments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pioglitazone</td>
<td>Initially 15–30 mg once daily, adjusted according to response up to 45 mg once daily with or without food. Elderly - initiate with lowest possible dose and increase gradually.</td>
<td>No dose adjustment is necessary. Should not be used in people with hepatic impairment (Therapy with pioglitazone should not be initiated if the ALT is &gt; 2.5 times the upper limit of normal or with any other evidence of liver disease.).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cardiac failure / Hx of cardiac failure (NYHA stages I to IV)</td>
</tr>
<tr>
<td>• Hepatic impairment</td>
</tr>
<tr>
<td>• Diabetic ketoacidosis</td>
</tr>
<tr>
<td>• Current bladder cancer or a history of bladder cancer</td>
</tr>
<tr>
<td>• Uninvestigated macroscopic haematuria</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monitoring requirements:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review treatment after 3–6 months and regularly thereafter</td>
</tr>
<tr>
<td>• Liver function tests prior to commencing therapy, and periodically thereafter</td>
</tr>
<tr>
<td>• Whilst on pioglitazone, if ALT levels are increased to 3 times upper limit of normal, liver enzyme levels should be reassessed as soon as possible. If ALT levels remain &gt; 3 X the upper limit of normal, therapy should be discontinued</td>
</tr>
<tr>
<td>• Weight</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional information:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Important safety information – Please see hyperlinks for more detailed advice</td>
</tr>
<tr>
<td>• MHRA/CHM advice: Pioglitazone cardiovascular safety (December 2007 and January 2011)</td>
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</table>

**DPP-4 INHIBITORS: DIPEPTIDYLPEPTIDASE-4 INHIBITORS (SITAGLIPTIN, SAXAGLIPTIN, LINAGLIPTIN, VILDAGLIPTIN, ALOGLIPTIN)**

- Inhibits dipeptidylpeptidase-4 to increase insulin secretion and lower glucagon secretion.

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Dose</th>
<th>Dose adjustments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alogliptin*</td>
<td>25 mg once daily</td>
<td>Moderate renal impairment (eGFR=ml/min/1.73 m²)</td>
</tr>
<tr>
<td>Linagliptin</td>
<td>5 mg once daily</td>
<td>N/A</td>
</tr>
<tr>
<td>Sitagliptin</td>
<td>100 mg once daily</td>
<td>eGFR 30–50: 12.5 mg once daily</td>
</tr>
<tr>
<td>Saxagliptin</td>
<td>5 mg once daily</td>
<td>eGFR 30–45: 50 mg once daily</td>
</tr>
<tr>
<td>Vildagliptin</td>
<td>50 mg twice daily</td>
<td>eGFR &lt;45: 2.5mg once daily</td>
</tr>
<tr>
<td></td>
<td>50 mg once daily</td>
<td></td>
</tr>
<tr>
<td></td>
<td>eGFR &lt;50: 50 mg once daily</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ketoacidosis</td>
</tr>
</tbody>
</table>

| Pregnancy and breast-feeding: Avoid |

<table>
<thead>
<tr>
<th>Cautions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Potentiates the hypoglycaemic effects of insulin and sulfonylureas (see page 32/62)</td>
</tr>
</tbody>
</table>

**Monitoring requirements:**

- Discontinue if symptoms of acute pancreatitis (persistent, severe abdominal pain)
- Vildagliptin associated with liver toxicity; seek medical attention if nausea, vomiting, abdominal pain, fatigue, and dark urine develops. Monitor liver enzymes 3 month interval for first year, periodically after.

<table>
<thead>
<tr>
<th>Additional information:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Alogliptin not licensed for monotherapy</td>
</tr>
</tbody>
</table>
SGLT-2 INHIBITORS: SODIUM GLUCOSE CO-TRANSPORTER 2 AGENTS (CANA GLIFLOZIN, DAPAGLIFLOZIN, EMPAGLIFLOZIN, ERTUGLIFLOZIN)

- Inhibit sodium-glucose co-transporter 2 (SGLT-2) in the proximal renal tubule to reduce glucose reabsorption and increase urinary glucose excretion.

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Dose</th>
<th>Dose adjustments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dapagliflozin</strong></td>
<td>10 mg once daily</td>
<td>If taking as current treatment: eGFR &lt;60 mL/min/1.73 m²: No change</td>
</tr>
<tr>
<td></td>
<td>With or without food</td>
<td>eGFR &lt;45 mL/min/1.73 m²: If persistent: Discontinue/Avoid</td>
</tr>
<tr>
<td></td>
<td><em>Initiation not recommended in adults &gt;75 years</em></td>
<td>Hepatic Impairment: Initial dose 5 mg daily in severe hepatic impairment, can increase to 10 mg according to response/tolerability</td>
</tr>
<tr>
<td><strong>Canagliflozin</strong></td>
<td>100 mg once daily</td>
<td>If persistent: Reduce dose to 100 mg once daily if tolerated</td>
</tr>
<tr>
<td></td>
<td>Increased if tolerated to 300 mg once daily if required</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Preferably before breakfast</td>
<td></td>
</tr>
<tr>
<td><strong>Empagliflozin</strong></td>
<td>10 mg once daily</td>
<td>If persistent: Reduce dose to 10 mg once daily</td>
</tr>
<tr>
<td></td>
<td>Increased up to 25 mg once daily if necessary with or without food</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Initiation not recommended in adult ≥85 years</em></td>
<td>Therapeutic experience in severe hepatic impairment is limited and therefore use is not recommended by manufacturer</td>
</tr>
<tr>
<td><strong>Ertugliflozin</strong></td>
<td>5 mg once daily</td>
<td>Monitor renal function</td>
</tr>
<tr>
<td></td>
<td>Increased to 15 mg once daily if necessary and if tolerated</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dose to be taken in the morning.</td>
<td></td>
</tr>
</tbody>
</table>

**Contraindications:**
- Diabetic ketoacidosis
- Pregnancy and breast-feeding: Avoid—toxicity in animal studies

**Cautions:**
- People at risk of hypotension/hypovolaemia (e.g. Elderly, CVD, dehydration)
- People taking loop diuretics (not recommended with dapagliflozin and empagliflozin specifically)
- Dapagliflozin not recommended in combination with pioglitazone
- Please see specific drug monograph in the BNF for complete cautions
- Potentiates the hypoglycaemic effects of insulin and sulfonylureas (see page 32/62)

**Class side effects:**
- Increased risk of UTI
- Polydipsia
- Urinary disorders
- Please see individual drug monograph in the BNF for a complete side-effect profile

**Monitoring requirements:**
- Renal function - before treatment and at least annually thereafter, and before initiation of drugs that may reduce renal function and periodically thereafter.
- Volume status and electrolytes

**Additional information:**
- Important safety information – Please see hyperlinks for more detailed advice
  - MHRA/CHM advice (updated April 2016): SGLT2 inhibitors: updated advice on the risk of diabetic ketoacidosis (DKA)
  - People should be informed on the signs and symptoms of DKA, discontinue treatment with the SGLT2 inhibitor immediately if DKA is suspected or diagnosed
  - MHRA/CHM advice (MHRA/CHM advice March 2017): SGLT2 inhibitors: updated advice on increased risk of lower-limb amputation (mainly toes)
  - SGLT2i’s may increase the risk of lower-limb amputation (mainly toes). All people taking an SGLT2i should be counselled on good preventive foot care. Review if lower limb complications develop (e.g. skin ulcer, osteomyelitis, or gangrene). Monitor people with risk factors for amputation, signs and symptoms of water or salt loss.
  - MHRA/CHM advice: SGLT2 inhibitors: reports of Fournier’s gangrene (necrotising fasciitis of the genitalia or perineum) (February 2019)
  - if Fournier’s gangrene is suspected, stop the SGLT2 inhibitor and urgently start treatment (including antibiotics and surgical debridement as required)

Date of preparation: July 2019. For review: June 2020
### ALPHA GLUCOSIDASE INHIBITORS (ACARBOSE)

- **Acarbose**, an inhibitor of intestinal alpha glucosidas, delays the digestion and absorption of starch and sucrose; it has a small but significant effect in lowering blood glucose.

#### Preparation | Dose | Dose adjustments | Renal Impairment | Hepatic Impairment:
--- | --- | --- | --- | ---
Acarbose | Initially 50 mg daily, Titrated up to maximum of 200 mg 3 times a day, if required. Before food | As Acarbose has not been studied in people with severe renal impairment, it should not be used in people with a creatinine clearance <25 ml/min/1.73m² | Contraindicated in people with hepatic impairment |  
Contraindications:  
- Hepatic impairment  
- Hernia;  
- inflammatory bowel disease;  
- predisposition to partial intestinal obstruction;  
- previous abdominal surgery  

#### Pregnancy and breast-feeding:  
Avoid

#### Cautionary use in:  
- Potentiates the hypoglycaemic effects of insulin and sulfonylureas (see page 32/62), hypoglycaemic episodes may be treated with oral glucose, but not with sucrose.

#### Side effects:  
- Abdominal pain  
- Diarrhoea  
- Flatulence

#### Monitoring requirements:  
- It is recommended that liver enzyme monitoring is considered during the first 6 to 12 months of treatment. If elevated transaminases are observed, withdrawal of therapy may be warranted, particularly if the elevations persist. In such circumstances, people should be monitored at weekly intervals until normal values are established.

#### Additional information:  
- For use in people inadequately controlled by diet alone, or by diet with oral anti-diabetic drugs.  
- Poorer anti-hyperglycaemic effect than many other antidiabetic drugs.  
- Low incidence of hypoglycaemia.

### MEGLITINIDES (REPAGLINIDE)

- **Stimulates insulin secretion.**

#### Preparation | Dose | Dose adjustments | Renal Impairment | Hepatic Impairment:
--- | --- | --- | --- | ---
Repaglinide | Initially 500 micrograms (max. per dose 4 mg), adjusted according to response at intervals of 1–2 weeks. Maximum daily dose: 16 mg per day in divided doses.  
*Initiation not recommended in adults ≥75 years*  
To be taken within 30 minutes before main meals | Use with caution in renal impairment | Avoid in severe liver disease |  
Contraindications:  
- Ketoacidosis

#### Pregnancy and breast-feeding:  
Avoid

#### Cautionary use in:  
- Debilitated people;  
- Malnourished people

#### Side effects:  
- Abdominal pain;  
- diarrhoea;  
- hypoglycaemia

#### Monitoring requirements:  
- It is recommended that liver enzyme monitoring is considered during the first 6 to 12 months of treatment.

#### Additional information:  
- Licensed as monotherapy, or in combination with metformin, when metformin alone inadequate.  
- Rapid onset of action and short duration of action.  
- Substitute insulin during intercurrent illness (such as myocardial infarction, coma, infection, and trauma) and during surgery.
The aim of the Diabetes level 2 service is to provide a high quality service for safe initiation and optimization of injectable therapy within GP networks.

INCLUSIONS

Initiation or optimisation of injectable therapy will be provided to people with Type 2 Diabetes who satisfy the following criteria:

1. Type 2 people that are registered with a GP in the CCG over the age of 18

2. Are not achieving HbA1c targets with maximum-tolerated oral combination hypoglycaemic therapy and/or insulin/GLP-1, compliant with combination therapy without any significant improvement in HbA1c:
   - Triple therapy (three different oral agents)
   - Dual therapy (two different oral agents)

3. In people who have significantly poor glycaemic control that is unlikely to respond to triple therapy OR in people who express a desire to start injectable therapy OR need to do so for occupational reasons (e.g. GLP-1 in taxi drivers)

4. The patient or carer is deemed capable of safely managing their injectable, including being able to undertake home blood glucose monitoring, inject insulin and adjust their own dose

5. Express an intention to start injectable, having been advised of what this involves and the risks associated with the treatment

EXCLUSIONS (REFERRAL TO ACUTE SPECIALIST CLINIC REQUIRED)

1. Pregnancy

2. People aged under 18
### WOMEN OF CHILDBEARING AGE WITH DIABETES or PREVIOUS GESTATIONAL DIABETES (GDM)

<table>
<thead>
<tr>
<th>50% of all pregnancies are unplanned</th>
</tr>
</thead>
<tbody>
<tr>
<td>All women with Diabetes</td>
</tr>
<tr>
<td>Offer contraceptive advice</td>
</tr>
<tr>
<td>All forms of contraception may be used for women with Diabetes</td>
</tr>
<tr>
<td>Pre-conception care</td>
</tr>
<tr>
<td>Stress the importance of:</td>
</tr>
<tr>
<td>Folic acid</td>
</tr>
<tr>
<td>Good glycaemic control</td>
</tr>
<tr>
<td>Medicines review (stop ACE, ARBs and statins)</td>
</tr>
<tr>
<td>Ensure retinal screen and microalbuminuria test performed within the last 12 months</td>
</tr>
<tr>
<td>All women with Type 1 Diabetes actively seeking pregnancy</td>
</tr>
<tr>
<td>Refer to secondary care for pre-conception counselling</td>
</tr>
<tr>
<td>for consideration of pump therapy to optimise their glycaemic control. Start folic acid 5mg OD</td>
</tr>
<tr>
<td>All women with Type 2 Diabetes actively seeking pregnancy</td>
</tr>
<tr>
<td>Refer to secondary or intermediate care for pre-conception counselling</td>
</tr>
<tr>
<td>Discontinue all oral agents and injectable therapies except Metformin and insulin</td>
</tr>
<tr>
<td>Optimise glycaemic control with a basal bolus regime if needed</td>
</tr>
<tr>
<td>Start folic acid 5mg OD</td>
</tr>
<tr>
<td>For women with a previous history of gestational Diabetes</td>
</tr>
<tr>
<td>Emphasise importance of annual review</td>
</tr>
<tr>
<td>Check a HbA1c yearly to exclude Diabetes</td>
</tr>
<tr>
<td>Give dietary and weight management advice</td>
</tr>
<tr>
<td>Explain the high probability that GDM will recur in any future pregnancy and need for early booking</td>
</tr>
<tr>
<td>On confirmation of pregnancy</td>
</tr>
<tr>
<td>Refer immediately to the Diabetes Antenatal Clinic</td>
</tr>
<tr>
<td>Refer to retinal screening</td>
</tr>
<tr>
<td>Ensure folic acid 5mg OD is being taken and ACE , ARBs and statins stopped</td>
</tr>
</tbody>
</table>

Date of preparation: July 2019. For review: June 2020
All people with Diabetes are considered to be at high cardiovascular risk.

All require lifestyle advice and multifactorial risk factor intervention.

However note lipid guidelines now recommend QRISK2 assessment for statin initiation.

## LIFESTYLE INTERVENTION

### Smoking cessation

Smoking cessation should be encouraged, with use of Stop Smoking clinics as required.

### Dietary intervention

- Should include weight loss for those with high waist circumferences
  - >94cm in Northern European white male
  - >80cm in Northern European white females
  - >90cm in South Asian males
  - >80cm in South Asian females

  and, for all should include advice about a low fat diet high in fruit and vegetables (at least 5 portions per day).

- Should include advice to decrease total dietary fat to <30% of total energy intake

- Should include advice to decrease saturated fats to <10% of total fat intake.

- Should include advice about lowering salt intake to be less than 6g of salt (=2.4 g sodium chloride) per day.

- Alcohol intake should be discussed, with the advice for males to limit to 14 units per week.

- Regular intake of oily fish and other sources of omega 3 fatty acids (at least 2 portions of fish per week)

### Exercise

The benefits of regular exercise should be explained and people should be advised to perform regular aerobic activity. Clinical studies show that walking for 30 minutes every day has cardiovascular benefits.

## BLOOD PRESSURE

All people with Diabetes (Type 1 or Type 2) should be treated to a target of 140/80 with a combination of lifestyle intervention (see above) and drug therapy. If kidney, eye or cerebrovascular damage set a target <130/80.

Up to half the people with Type 2 Diabetes will need 3 or more antihypertensive agents, and it is important for people to be made aware of this when discussion around hypertension occurs.

ACE inhibitors and ARBs are preferred first line therapy in people with any degree of nephropathy (micro- or macroalbuminuria).

In all people measure renal functions and electrolytes 1-2 weeks after initiation of ACE inhibitors and ARBs and with each increase in dose. The British Hypertension Society’s Guidelines should be followed.

Assess blood pressure at least 3 monthly until targets are achieved, and monitor every 4-6 months once targets are achieved.

People who do not achieve target should be referred for further management. Remember that, if the patient does not achieve target despite greatest efforts by the multidisciplinary team, any improvement towards the target is better than the patient’s baseline.

### Smoking

Please assess people for smoking status and refer to Smoking Cessation Teams for patient support.
DIABETES – CARDIOVASCULAR RISK (2)

LIPIDS

PRIMARY PREVENTION IN TYPE 1 DIABETES:
Consider statin treatment for the primary prevention of CVD in all adults with Type 1 Diabetes
Offer statin treatment for the primary prevention of CVD to adults with Type 1 Diabetes who:
• are older than 40 years or
• have had Diabetes for more than 10 years or
• have established nephropathy or
• have other CVD risk factors.

PRIMARY PREVENTION IN TYPE 2 DIABETES:
Offer atorvastatin 20 mg for the primary prevention of CVD to people with Type 2 Diabetes who have a 10% or greater 10-year risk of developing CVD. Estimate the level of risk using the QRISK2 assessment tool.

PEOPLE WITH CKD
Increase the dose if a greater than 40% reduction in non-HDL cholesterol is not achieved and eGFR is 30 ml/min/1.73 m² or more. Agree the use of higher doses with a renal specialist if eGFR is less than 30 ml/min/1.73 m²

EXCEPTION - WOMEN OF CHILD-BEARING POTENTIAL/PREGNANT

TREATMENT TARGETS
Dietary interventions alone only reduce cholesterol by <10%. To reach targets, often drug therapy will be required.

Monitor LFTs 6 weeks post initiation of statin. If normal check annually

Fibres should not be commenced if eGFR is <45. They should be discontinued with deterioration of renal function.

ANTI-PLATELET AGENTS
Aspirin 75 mg daily is indicated for all people with Diabetes who have any form of cardiovascular disease. In those who are also hypertensive the blood pressure should be controlled to 145/90 or below before commencement of aspirin. If aspirin is not tolerated or is contraindicated, clopidogrel 75 mg daily should be considered.

In females who are planning a pregnancy or who are pregnant these drugs should be withheld until breast feeding has ceased

Ezetimibe should be prescribed as per NICE’s guidance. (TA 385)
If a greater than 40% reduction in non-HDL cholesterol is not achieved:
• discuss adherence and timing of dose
• optimise adherence to diet and lifestyle measures
• consider increasing the dose if started on less than atorvastatin 80 mg and the person is judged to be at higher risk because of comorbidities, risk score or using clinical judgement

It is important to note that the target triglyceride level is a fasting target, so an individual with a non-fasting result >2.3 mmol/l should be invited back to have a fasting triglyceride estimation. HDL and triglyceride interventions include lifestyle (predominantly weight loss and exercise) and drug therapies. The drug of choice is a fibrate, usually Fenofibrate 160mg. If using a combination lipid lowering regimen, monitoring of ALT and CK is appropriate.

Monitor lipids 6 weekly until targets have been achieved, and annually thereafter.
Remember that, if the patient does not achieve target despite greatest efforts by the multidisciplinary team, any improvement towards the target is better than the patient’s baseline.

Date of preparation: July 2019. For review: June 2020

Lifestyle advice is integral to the management of Diabetes and should be reinforced at every available opportunity.
### BACKGROUND POINTS

Obesity is a major modifiable risk factor in the development of Type 2 Diabetes. Decrease in weight in those who are obese can improve Diabetes control enormously without the need for escalation in therapy.

**Weight loss can help the patient achieve Type 2 diabetes remission**

### GUIDANCE

Those people with Diabetes whose adipose tissue mass is likely to contribute to the progression of their Diabetes control should be offered the opportunity to discuss their weight. The benefits to the patient of weight loss should be made clear. If the individual does not wish to consider making any changes then this should be reviewed at future consultations. Any choice of weight loss intervention should be negotiated between patient and health care professional. Consideration of what has been tried before is important.

### INTERVENTIONS

Interventions include lifestyle advice, specific drug therapy such as metformin in combination with either SGLT2 or GLP1 and obesity surgery.

**General points**

Realistic targets for weight loss should be discussed

- Maximum weekly weight loss of 0.5-1kg
- Aim to lose 5-10% of original weight

Realistic targets for exercise will vary greatly depending on the individual. Ideally, individuals should be encouraged to take up to 45 minutes of exercise per day, 5 times per week. Encouragement to join a commercial weight loss organisation can be beneficial.

Check for mental health factors using PHQ4 in primary and community care), DDS2 (in secondary care) and refer bariatric surgery or IAPT or other relevant part of the local pathway if +ve.

**Lifestyle intervention**

This is the mainstay of obesity management. Any advice offered is more likely to be accepted by the patient if we as health care professionals offer the advice in an enthusiastic manner. Ideally, a combination of reduction of calorie intake and an increase in energy expenditure should be considered.

### OBESITY SURGERY

Surgical intervention is considered appropriate option for adults with obesity if all of the following local criteria are fulfilled:

- they have Type 2 Diabetes and a BMI of 35 kg/m² or more
- all appropriate non-surgical measures have been tried but have failed to achieve or maintain adequate, clinically beneficial weight loss for at least 6 months
- the person has been receiving or will receive intensive management in a specialist obesity service
- the person is generally fit for anaesthesia and surgery
- the person commits to the need for long-term follow-up.

Bariatric surgery is also recommended as a first-line option (instead of lifestyle interventions or drug treatment) for adults with a BMI of more than 50 kg/m² in whom surgical intervention is considered appropriate.

Bariatric services provides intensive psychological interventions prior to surgical intervention-the aim is to consider and screen for binge eating disorder, depression and alcohol use disorder; to refer onward or provide self help information for these conditions as they will affect the people’ ability to effectively implement any lifestyle, medication or surgical intervention offered.
OBESITY MEDICATION

BACKGROUND POINTS

Before deciding to start treatment, and choosing the drug, discuss with the patient the potential benefits and limitations, including the mode of action, adverse effects and monitoring requirements, and their potential impact on the patient’s motivation.

• When prescribing, make arrangements for appropriate healthcare professionals to offer information, support and counselling on additional diet, physical activity and behavioural strategies as well as mental health interventions if appropriate.

• Give information on patient support programmes.
• Follow the drug’s summary of product characteristics.

SPECIFIC ADVICE ON ORLISTAT

NICE guidance available

• Use only in those with Diabetes or endocrine conditions who have a BMI >28kg/m².
• Continue beyond 3 months of therapy only if the patient has lost at least 5% of their body weight.
• Continue beyond 12 months for weight maintenance only after discussion of potential benefits and limitations with the patient.

CONTINUED PRESCRIBING AND WITHDRAWAL

• Review regularly, to monitor the effect of drug treatment, and to reinforce lifestyle advice and need for adherence.
• Drug treatment may be used to help people to maintain weight loss, as well as to continue to lose weight.
• Consider withdrawing drug treatment if the person does not lose enough weight.

Agree goals with the person and review regularly

• If concerned about micronutrient intake, consider giving a supplement providing the reference nutrient intake for all vitamins and trace elements, particularly for vulnerable groups such as older people, who may be at risk of malnutrition.

• If withdrawing a person’s drug treatment, offer support to help maintain weight loss because their self-confidence and belief in their ability to make changes may be low.

DRUG THERAPY

Pharmacological agents are only to be used once lifestyle interventions have been instigated and the patient has reached a plateau in their weight loss but still wishes to lose more weight. It is important to set achievable targets for weight loss of no more than 10% of body weight.

When considering the use of pharmacological agents to aid weight loss, ensure that the patient:

1. wishes to lose weight (the benefits of weight loss should be discussed)
2. is prepared to make changes to their calorie intake following appropriate dietary advice, preferably from a diettian with an interest in obesity
3. is prepared to increase the level of physical activity (if able), preferably up to 45 minutes of moderate exercise at least 5 times per week
4. is prepared to consider joining a commercial weight loss programme.
5. Understands that, if the drug is deemed not to be successful then it will be withdrawn.

All studies showing the greatest benefit with the weight loss drugs involved lifestyle intervention as part of the management.
TYPE 2 DIABETES – ABNORMAL LFTs

GP receives abnormal LFTs
- History and examination with attention to alcohol consumption, metabolic syndrome, BMI, hepatotoxic drugs and risk factors for viral hepatitis

Flowchart:
- Raised Bilirubin AND raised Alk Phos / ALT
  - Jaundice
  - No Jaundice
  - IMMEDIATE REFERRAL TO ACUTE MEDICAL ASSESSMENT. Request liver screen but do not await result.

- Isolated rise in bilirubin with other normal LFTs
  - Check previous tests to confirm new finding. If new, repeat fasting sample: LFTs, conjugated bilirubin and FBC
  - No anaemia
  - Anaemia
  - PROBABLE GILBERTS SYNDROME: Inform patient and provide information
  - HAEMOLYSIS SCREEN:
    - Haptoglobins <200
    - LDH
    - Reticulocyte count
  - If abnormal, refer to haematology

- Isolated rise in Alk Phos
  - Repeat fasting sample: including Gamma GT, AST and FBC
  - Normal Gamma GT
  - Raised Gamma GT
  - CONSIDER BONE AETIOLOGY:
    - Vitamin D deficiency
    - Pagets disease

- Raised ALT
  - ALT <300 IU/L
  - ALT >300 IU/L
  - SEEK TELEPHONE ADVICE AND CONSIDER URGENT TESTS

LIVER SCREEN
- Ultrasound liver
- Liver test panel:
  - Hepatitis B & C
  - Autoantibodies
  - Ferritin / Transferrin saturation
  - Caeruloplasmin
  - Immunoglobulins
  - FBC
  - TFTs
  - Albumin
  - HbA1c, Lipids, Fasting Glucose
  - Alpha Fetoprotein
  - Coeliac screen
  - If abnormal

- NORMAL LIVER SCREEN
  - Fatty liver demonstrated
  - CONTINUE TO FATTY LIVER GUIDELINE

- ABNORMAL LIVER SCREEN
  - REFER TO LIVER SPECIALIST FOR POSSIBLE:
    - Viral hepatitis
    - ALD with advanced fibrosis
    - PSC, PBC, autoimmune hepatitis
    - Gallstone disease
    - Hepatic vascular disorders
    - Hepatic metabolic disorders

Recommend annual LFTs in all patients with Type 2 Diabetes

Manage in Primary Care:
- Lifestyle advice
- Repeat LFTs in 1 year

From NWL Gastroenterology Guidelines

Date of preparation: July 2019. For review: June 2020
Non Alcoholic Steatohepatitis (NASH) is a form of Non Alcoholic Fatty Liver Disease (NAFLD), now affects up to 5% of the UK population and is more common in T2DM.

Primary Care Management of Fatty Liver:
- Is part of metabolic syndrome / CVD risk factor
- Assess cardiovascular risk and treat:
  - Cholesterol – QRISK and consider statin Can still initiate statin if ALT raised due to fatty liver
  - Diabetes
  - Alcohol
  - Hypertension
  - Weight loss
- Annual review of LFTs and reassess NAFLD score if LFTs still abnormal

Refer to Secondary Care:
- For assessment of liver disease
- For management of advanced fibrosis
- Screening and treatment of portal hypertension
- HCC screening and management

Date of preparation: July 2019. For review: June 2020
Annual Foot Review
Assumed patient receiving ongoing care and education

Foot examination with shoes and socks/stockings removed

<table>
<thead>
<tr>
<th>Test foot sensation</th>
<th>Ask about change in foot shape</th>
<th>Ask about any pain or numbness</th>
<th>Ask about previous foot ulcers</th>
<th>Palpate foot pulses</th>
<th>Inspect for deformity/significant callus</th>
<th>Inspect footwear</th>
<th>Check for signs of infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ulcer – wound below the ankle, even minor</td>
<td>Rapid referral to Acute Multidisciplinary Foot Team (MDFT)</td>
<td></td>
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</tr>
<tr>
<td>Infection – red/hot/swollen/shiny foot</td>
<td>Admission to secondary care if systemically unwell or vascular hub if critical limb ischaemia</td>
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<tr>
<td>Critical Limb ischaemia – severe pain at rest or new cold red/blue/purple foot</td>
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<tr>
<td>Gangrene – Black toe/wound/foot</td>
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<tr>
<td>Could it be Charcot’s? – unexplained warmth/swelling/unusual pain in just one foot</td>
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</tbody>
</table>

Active Problem

High Risk

Previous ulcer or amputation or on Dialysis or with a kidney transplant or any TWO of the following:

- No pulses felt in the foot
- Neuropathy (numbness or unpleasant tingling/sensation/burning or painless blisters/wounds)
- Significant hard skin/callus
- Abnormal Foot shape/change in foot shape

Refer to local Foot Protection Team: Confirm risk status 1-3 monthly foot checks

Moderate Risk

Any ONE of the following:

- No pulses felt in the foot
- Neuropathy (numbness or unpleasant tingling/sensation/burning or painless blisters/wounds)
- Significant hard skin/callus
- Abnormal Foot shape/change in foot shape

Refer to local Foot Protection Team: Confirm risk status 3-6 monthly foot checks

Low Risk

Healthy Foot – no foot shape change, no significant callus, no skin breaks, normal skin colour
- No neuropathy
- Pulses felt in the foot

Footcare advice
- Daily self checks
- Annual foot screening in primary care

Rapid referral to Acute Multidisciplinary Foot Team (MDFT)

Admission to secondary care if systemically unwell or vascular hub if critical limb ischaemia

Refer to local Foot Protection Team: Confirm risk status 1-3 monthly foot checks

Date of preparation: July 2019. For review: June 2020

Risk Status
Document and explain risk status to patient and/or carer. Provide written and verbal education and emergency contact numbers

Risk status may go up or down

Provide patient information leaflets:
- Ulcer
- Charcot’s Foot
- High Risk
- Moderate risk
- Low risk
## DIABETES – FOOT EXAMINATION

<table>
<thead>
<tr>
<th>FINDING</th>
</tr>
</thead>
<tbody>
<tr>
<td>History</td>
</tr>
<tr>
<td>Previous ulcer or amputation (toe/foot leg)</td>
</tr>
<tr>
<td>Kidney Transplant or Dialysis</td>
</tr>
<tr>
<td>Impaired vision</td>
</tr>
<tr>
<td>Inspection</td>
</tr>
<tr>
<td>Significant callus or corns</td>
</tr>
<tr>
<td>Abnormal foot shape: High arch/bunion/flat foot</td>
</tr>
<tr>
<td>Abnormal toes: Claw toes/Hammer toes/overriding toes</td>
</tr>
<tr>
<td>Change in foot shape in one foot</td>
</tr>
<tr>
<td>Neuropathy</td>
</tr>
<tr>
<td>Neuropathic pain (tingling/burning/electric shock)</td>
</tr>
<tr>
<td>Painless blister or wound</td>
</tr>
<tr>
<td>Score 8 or less on 10g monofilament testing</td>
</tr>
<tr>
<td>Vascular Disease</td>
</tr>
<tr>
<td>Claudication (calf or buttock pain on walking, relieved by rest)</td>
</tr>
<tr>
<td>Any foot pulses not palpable</td>
</tr>
<tr>
<td>Active Problem</td>
</tr>
<tr>
<td>Change in foot shape in one foot with swelling and warmth</td>
</tr>
<tr>
<td>Foot wound/ulcer</td>
</tr>
<tr>
<td>Ingrown toenail with signs of infection</td>
</tr>
<tr>
<td>Infection (redness/swelling/warmth/malodour/discharge)</td>
</tr>
<tr>
<td>Gangrene (black toe foot wound)</td>
</tr>
<tr>
<td>Foot/leg pain at rest, improved by hanging leg down</td>
</tr>
<tr>
<td>New cold foot with new blue/red/purple colour change</td>
</tr>
</tbody>
</table>

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**All people with Diabetes should be on a register and minimum data should include annual measures for microvascular disease. Please see Cardiovascular Risk for additional requirements**

**Mental health problems affect the ability to self-care. Check for:**
- Impaired memory - 6 item cog (see slide 29)
- Anxiety or depression – PHQ4 (see slide 29)

---

High arch, prominent metatarsal heads

Bunion

Claw toes

Photographs courtesy of Dermatronics ‘A pictorial guide to diabetic foot examinations’ 2016

Date of preparation: July 2019. For review: June 2020
## USING A MONOFILAMENT

- Apply the filament to a sensitive area of skin (e.g. the forearm) so that the patient is aware of the sensation they are supposed to feel.
- Test 5 sites* on both feet:
  - ✔ Plantar surface of the hallux and 3rd toe
  - ✔ 1st, 3rd, and 5th metatarsal heads
  *If callus is present at any of the sites then test at the nearest non-calloused area.
- Ask the patient to close their eyes and say ‘yes’ every time that they feel you touch the skin on the foot
- Place the monofilament at 90° to the skin surface
- Slowly push the monofilament until it has bent ~ 1cm (don’t jab)
- Hold the monofilament in this position for 1-2 seconds, then slowly release the pressure until the monofilament is straight
- Remove contact from the skin
- If the patient does not respond, repeat the test at the site twice. If there is still no response, record as a negative response

- **Maximum score 10. A score of 8 or less indicates neuropathy**
- **Replace monofilament after 500 uses (approximately 6 monthly frequent testing, yearly infrequent testing)**
## NWL Foot Teams – contact details

<table>
<thead>
<tr>
<th>CCG</th>
<th>Acute Diabetes Specialist Foot Team</th>
<th>Foot Protection Team</th>
<th>Vascular Hub</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inner NW London</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H &amp; F</td>
<td>St Mary’s Hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central London</td>
<td>T: 0203 312 5437 F: 0203 312 6875</td>
<td>E: <a href="mailto:imperial.idfootreferrals@nhs.net">imperial.idfootreferrals@nhs.net</a></td>
<td></td>
</tr>
<tr>
<td>West London</td>
<td>Chelsea &amp; Westminster Hospital</td>
<td></td>
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<tr>
<td></td>
<td>T: 0203 315 3161 F: 0203 315 2732</td>
<td>E: <a href="mailto:Diabetes.TeamCW@chelwest.nhs.uk">Diabetes.TeamCW@chelwest.nhs.uk</a></td>
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<td><strong>Inner NWL Vascular Hub:</strong></td>
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<tr>
<td>Hounslow</td>
<td>West Middlesex Hospital</td>
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<tr>
<td></td>
<td>T: 05511 434910</td>
<td>E: <a href="mailto:Hounslow.RFS@nhs.net">Hounslow.RFS@nhs.net</a></td>
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<td><strong>All Hounslow Diabetes foot referrals go via the Hounslow referral facilitation service</strong></td>
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<tr>
<td><strong>Outer NW London</strong></td>
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<tr>
<td>Brent</td>
<td>Central Middlesex Hospital</td>
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<tr>
<td></td>
<td>T: 020 8453 2401/2607</td>
<td>E: <a href="mailto:LNWH-tr.Diabetes-BCS@nhs.net">LNWH-tr.Diabetes-BCS@nhs.net</a></td>
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<tr>
<td></td>
<td>F: 020 8453 2415</td>
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<tr>
<td>Ealing</td>
<td>Ealing Hospital</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>T: 020 8967 5383 F: 020 8967 5507</td>
<td>E: [High Risk (DICE) @nhs.net](mailto:High Risk (DICE) @nhs.net)</td>
<td><strong>Outer NWL Vascular Hub:</strong></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td>T:020 8869 2100 F: 020 869 2961</td>
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<tr>
<td>Hillingdon</td>
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<tr>
<td></td>
<td>T:01895 279229</td>
<td>E: <a href="mailto:thh.diab-endo-referrals@nhs.net">thh.diab-endo-referrals@nhs.net</a></td>
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</table>

Date of preparation: July 2019. For review: June 2020
## RETINOPATHY

### NSF KEY INTERVENTION

Regular surveillance for diabetic retinopathy in adults with Diabetes and early laser treatment of those identified as having sight threatening retinopathy can reduce the incidence of new visual impairment and blindness in people with Diabetes.

### MANAGEMENT OF RETINOPATHY

Optimisation of BP (<130/80), lipids and glycaemic control are of paramount importance.

### SCREENING

Ensure that all people (including those blind and partially sighted) with Type 2 Diabetes from diagnosis and those with Type 1 (from 12 months after diagnosis) > 12 yrs old are referred to and followed up with retinal screening using the CCG-commissioned community retinal screening programme.

### BACKGROUND POINTS

- Diabetic retinopathy is the most common cause of blindness in people of working age. (1)
- Poor mental wellbeing may put people at greater risk through poor self-care - screen for depression, anxiety, diabetes distress, cognitive impairment
- About 26% of Type 2 diabetics have retinopathy at diagnosis. (2)
- Progresses over the years: after 15 years, at least two thirds of people may have background retinopathy.

### ALGORITHM FOR THE PRIMARY CARE MANAGEMENT OF EYE SYMPTOMS IN TYPE 2 DIABETES

| Sudden loss of vision | Sudden drop in visual acuity
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Retinal detachment</td>
<td>Pre-retinal and/or vitreous haemorrhage</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Subacute drop in visual acuity (over days-weeks)</th>
</tr>
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<tbody>
<tr>
<td>Macular oedema</td>
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</table>

<table>
<thead>
<tr>
<th>Gradual worsening of symptoms since last examination</th>
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</thead>
<tbody>
<tr>
<td>Worsening of retinopathy</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Minimal or background retinopathy</th>
</tr>
</thead>
</table>

### Possible cause

- Pre-retinal and/or vitreous haemorrhage
- Rubeosis iridis
- Macular oedema
- Preproliferative or severe retinopathy
- Worsening of retinopathy

### Referral/management

<table>
<thead>
<tr>
<th>Emergency referral to Ophthalmologist / Eye Casualty</th>
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<tbody>
<tr>
<td>Same day referral</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Urgent referral to Ophthalmologist</th>
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<tbody>
<tr>
<td>Referral within 1 week</td>
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<table>
<thead>
<tr>
<th>Referral</th>
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</thead>
<tbody>
<tr>
<td>Arrange referral for specialist opinion within 4 weeks</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Early review</th>
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<tbody>
<tr>
<td>Arrange recall and review every 3-6 months</td>
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</table>

<table>
<thead>
<tr>
<th>Yearly review</th>
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Date of preparation: July 2019. For review: June 2020
Diabetic Nephropathy is characterised by the excretion of abnormal amounts of albumin in the urine, arterial hypertension or progressive decline in kidney function.

### ALBUMINURIA

- Albuminuria is the earliest sign of kidney involvement in Type 2 Diabetes. It is abnormal amounts of albumin excretion in the urine which is assessed by laboratory measurement of the albumin creatinine ratio (ACR).

- Albuminuria is an independent CV risk factor. It is also associated with a higher risk of progression to end-stage kidney disease.

- All people with albuminuria should be on maximal ACEi or ARB therapy and have BP controlled to target.

### MANAGEMENT OF INDIVIDUAL WITH DIABETIC NEPHROPATHY

- Patient education is an integral part of overall management
  - Screening for and optimising mental health should be an integral part of overall management

- Lifestyle changes, weight loss and smoking cessation should be advised

- **Target HbA1c:**
  - 48 - 53 mmol/mol (6.5% - 7%) in CKD G3a
  - 53 - 68 mmol/mol in CKD G3b/G4 (individualisation of patient target)

- **Maintain blood pressure below 140/90 (130/80 if ACR > 70)**
  - Maximal doses of ACE inhibitors or Angiotensin II receptor blockers (ARBs) are recommended first line drugs (unless contraindicated)
  - Calcium channel blocker (non-dihydropyridine class) drugs and low dose thiazide diuretics are useful second line agents
  - Loop diuretics are useful in the presence of volume overload (e.g. leg oedema not caused by the side effects of calcium channel blockers)
  - Additional antihypertensive therapy may be required.

### SEEK RENAL ADVICE IF

- Unexplained sudden increases in albuminuria
- Unexplained eGFR decline in absence of albuminuria

### PROTEINURIA MEASUREMENTS AND BLOOD PRESSURE TARGETS (adjust in frailty)

<table>
<thead>
<tr>
<th>ACR</th>
<th>PCR</th>
<th>BP target</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 70</td>
<td>≤ 100</td>
<td>140/90</td>
</tr>
<tr>
<td>&gt; 70</td>
<td>□ 100</td>
<td>130/80</td>
</tr>
</tbody>
</table>
CHRONIC KIDNEY DISEASE – DIAGNOSIS

WHO SHOULD BE TESTED FOR CKD

Offer testing for CKD using eGFR, serum creatinine and urinary ACR to people with any of the following risk factors:
- diabetes
- hypertension
- acute kidney injury
- cardiovascular disease (ischaemic heart disease, chronic heart failure, peripheral vascular disease or cerebral vascular disease)
- structural renal tract disease, recurrent renal calculi or prostatic hypertrophy
- multisystem disease e.g. systemic lupus erythematosus
- family history of end-stage kidney disease (GFR category G5) or hereditary kidney disease
- Haematuria

INTERPRETING eGFR VALUES

- Interpret eGFR values of > 60 ml/min/1.73 m² with caution - estimates of GFR become less accurate as the true GFR increases
- eGFR is unreliable at extremes of body weight:
  - eGFR underestimates in people with high BMI
  - eGFR overestimated in people with low BMI
- Confirm an eGFR result of less than 60 ml/min/1.73 m² in a person not previously tested by repeating the test within 2 weeks. Allow for biological and analytical variability of serum creatinine (±5%) when interpreting changes in eGFR

CLASSIFICATION OF CKD USING eGFR AND ACR CATEGORIES

<table>
<thead>
<tr>
<th>GFR categories, description and range</th>
<th>ACR categories (mg/mmol) description and range</th>
<th>Increasing risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 90 Normal and high</td>
<td>&lt;3 Normal to mildly increased</td>
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<tr>
<td>60-89 Mild reduction related to normal range for a young adult</td>
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<td>30-44 Moderate-severe reduction</td>
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<tr>
<td>15-29 Severe reduction</td>
<td></td>
<td></td>
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<tr>
<td>≤15 Kidney failure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ACR categories (mg/mmol) description and range
- <3 Normal to mildly increased
- 3-30 Moderately increased
- >30 Severely increased

HAEMATURIA

- Use dipstick reagent strips rather than urine microscopy
- Evaluate further if there is a result of 1+ or more (rpt in 2 weeks)
- Dipstick haematuria not diagnostically useful with concurrent menstrual period, infection or in catheter samples

PROTEINURIA

- Proteinuria is a useful marker of kidney damage and complication risk
- ACR is the recommended method for assessing proteinuria
- If initial ACR = 3-70 confirm with a subsequent early morning sample
- If initial ACR > 70 mg/mmol, a repeat sample need not be tested
- Confirmed ACR ≥ 3 signifies clinically important proteinuria
# CHRONIC KIDNEY DISEASE – REFERRAL CRITERIA

## URGENT
- Suspected multisystem disease with evidence of renal involvement
- Suspected acute kidney injury
- Newly diagnosed eGFR < 15
- Nephrotic syndrome
- Accelerated hypertension
- Severe hyperkalaemia

## NON-URGENT
- Stage 3 CKD where diagnosis uncertain
- Asymptomatic CKD G4 or G5 with or without Diabetes
- ACR > 70 mg/mmol, unless known to be caused by Diabetes and already appropriately treated
- ACR > 30 mg/mmol together with haematuria
- Sustained decrease in GFR of ≥ 25%, and a change in GFR category or sustained decrease in GFR of ≥ 15 ml/min within 12 months
- Hypertension that remains poorly controlled despite the use of at least 4 antihypertensive drugs at therapeutic doses
- Known or suspected rare or genetic causes of CKD
- Suspected renal artery stenosis (serum creatinine rises by >30% or eGFR falls by >25% after starting ACEI/ARB)

## INVESTIGATING THE CAUSE OF CKD

### Determining the risk of adverse outcomes
Agree a plan to establish the cause of CKD during an informed discussion with the person with CKD, particularly if the cause may be treatable (for example, urinary tract obstruction, nephrotoxic drugs or glomerular disease).

Use the person’s GFR and ACR categories to indicate their risk of adverse outcomes (for example, CKD progression, acute kidney injury, all cause mortality and cardiovascular events) and discuss this with them.

### INDICATIONS FOR RENAL ULTRASOUND
Offer a renal ultrasound scan to all people with CKD who:
- have accelerated progression of CKD
- have visible or persistent invisible haematuria
- have symptoms of urinary tract obstruction
- have a family history of polycystic kidney disease and are aged over 20 years
- have a GFR of less than 30 ml/min/1.73 m² (GFR category G4 or G5)
- are considered by a nephrologist to require a renal biopsy

Advise people with a family history of inherited kidney disease about the implications of an abnormal result before a renal ultrasound scan is arranged for them.

## MINIMAL INFORMATION REQUIRED FOR REFERRAL OR ADVICE
- Dates and results of all previous creatinine/eGFR measurement
- Medical history
- Drug history
- Current BP
- Urine results: dipstick and a measure of urine proteinuria
- Renal Ultrasound result (unless exceptional reason delineated)
- HCO₃ Bicarbonate <20 mol/l, bicarbonate supplementation slows the rate of decline of renal function in stage 4 CKD, and is routinely used in the renal diabetic clinic

**Refer if:**
- Sustained decrease in GFR of ≥ 25%, and a change in GFR category within 12 months
- Sustained decrease in GFR of ≥ 15 ml/min within 12 months
- eGFR<20 Hb<10.5, K>6, Ca<2.1 Phosphate>1.5 (AD)
**CHRONIC KIDNEY DISEASE – REFERRAL ALGORITHM**

### eGFR<60

- **Is patient unwell?**
  - **YES**
    - Manage acute illness
    - Is this acute kidney injury (AKI)?
      - Repeat eGFR within 1 week, refer urgently if declining
  - **NO**

- **Urine dipstick**
  - **YES**
    - Persistent haematuria (≥1+)?
      - **YES AND > 50 YRS**
        - Urology referral
      - **YES AND < 50 YRS**
        - **YES**
          - Nephrology advice/referral if declining
  - **NO**

- **ACR >70?**
  - **YES**
    - Nephrology advice/referral
  - **NO**

- **Repeat eGFR stable?**
  - **YES**
    - Nephrology advice/referral if declining
      - Sustained decrease in GFR of ≥ 25% within 12 months
      - Sustained decrease in GFR of ≥ 15ml/min within 12 months
  - **NO**

### STAGE G3a and G3b
Monitor according to page 49

- Most people with CKD 4/5 should be being followed in secondary care HOWEVER – if RRT not indicated (e.g. frail elderly), management of advanced CKD may be appropriate in primary care

### STAGE G4 - 5

- What is cause for CKD?
  - Seek nephrology guidance if this is uncertain

- Minimum information for referral
  - Dates and results of previous creatinine/eGFR measurement
  - Medical history
  - Drug history
  - Current BP
  - Urine dipstick and ACR if dipstick positive

- **Renal Ultrasound if:**
  - accelerated progression of CKD
  - visible or persistent invisible haematuria
  - symptoms of urinary tract obstruction
  - family history of polycystic kidney disease and are aged over 20 years
  - eGFR of <30 ml/min/1.73 m2 (GFR category G4 or G5)

**URGENT REFERRAL**
- Suspected multisystem disease with evidence of renal involvement
- Acute kidney injury (without an obvious cause manageable in primary care)
- Newly diagnosed eGFR < 15
- Nephrotic syndrome
- Accelerated hypertension
- Severe hyperkalaemia (>6.5mmol/L)

**Email advice from nephrology consultants is available to North West London primary care services:**
- [ICHC-tr.ckdadvice@nhs.net](mailto:ICHC-tr.ckdadvice@nhs.net)

Date of preparation: July 2019. For review: June 2020
**MANAGEMENT OF STABLE CKD**

Agree management plan with patient

Lifestyle advice
Smoking cessation advice

BP:
- Encourage home BP monitoring
- Target BP: < 140/90 if ACR ≤ 70
  < 130/80 if ACR > 70
- Caution of BP targets in frailty (See page 54)
- Prioritise ACEi/ARB with associated sick day guidance

Cardiovascular risk:
- Aspirin – if CV risk at 10yrs >20%
- Proton-pump inhibitors (PPIs) – esp. if higher risk of gastric irritation with aspirin. Observational data suggest PPIs may cause insidious inflammatory kidney injury – switch to ranitidine if eGFR falling
- Statins – all people with CKd3b and beyond should be on unless contra-indicated

Avoid NSAIDs (even topical)

Vaccinate for influenza and pneumococcus

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**RENAL ANAEMIA**

Renal anaemia can start to develop from CKD stage 3b (eGFR<45) and is common in advanced CKD5 (eGFR<15). This may require treatment with intravenous iron and erythropoietin.

Particularly in CKD stages 3b/4, renal anaemia should only be diagnosed after exclusion of other causes including iron deficiency, folate/B12 deficiency, haemolysis.

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**FREQUENCY OF MONITORING eGFR (NUMBER OF TIMES PER YEAR)**

<table>
<thead>
<tr>
<th>GFR and ACR categories and risk of adverse outcomes</th>
<th>ACR categories (mg/mmol) description and range</th>
<th>Increasing risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;3 Normal to mildly increased</td>
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<td>&gt;30 Severely increased</td>
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<td>2</td>
</tr>
<tr>
<td>15-29 Severe reduction</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>≤15 Kidney failure</td>
<td>≥4</td>
<td>≥4</td>
</tr>
</tbody>
</table>

**REDIN-ANGIOTENSIN SYSTEM INHIBITORS IN CKD (ACEi and ARB)**

- ACEi and ARB prevent scarring in CKD and should be used preferentially in people with proteinuria
- Assess kidney function and electrolytes. 1-2 weeks after initiating therapy, watch out for hyperkalemia
- Assess kidney function after any subsequent increase in dose
- A small rise in creatinine or a mild fall in eGFR values is expected with therapy – repeat the assessment of kidney function if the rise in creatinine is greater than 15%
- STOP therapy - If serum creatinine rises by >30% or eGFR falls by >25%; seek specialist advice (to exclude possible renovascular disease)
- If K>6.0 stop ACEi/ARB and start low potassium diet – if the patient has proteinuria and would benefit from an ACEi/ARB seek Nephrological advice as introduction of frusemide or bicarbonate can facilitate reintroduction of these agents
- Cautious use of ACEi/ARB with spironolactone and other potassium sparing diuretics, very close monitoring of potassium required.
Management of CKD in the context of frailty requires a holistic approach

**Kidney Ageing**

Kidney function (GFR) declines with age:
- ~0.8 mL/min/year after 35 years old
- up to 2mL/min/year after 70 years old
- eGFR >30mL/min in the absence of acute illness, proteinuria or uncontrolled HTN is unlikely to progress to end-stage kidney disease

**Focus of Care in Frail people**

- Should be patient and outcome centred
- View CKD in the context of an individual’s comorbidities and personal priorities
- Renal replacement therapy (RRT) may not improve quality of life – focus on symptom control may be more appropriate
- Advance care planning should be a priority

**MANAGEMENT OF FRAIL PEOPLE WITH CKD**

**Identify frailty and screen for cognitive impairment**
- Calculate EFI score (https://doi.org/10.1093/ageing/afw039)
- Screen cognition using GPCOG (http://gpcog.com.au/)

**Medications**
- Frail people are more susceptible to harm from medications
- Refer to “Drugs and CKD” page 53

**Blood pressure (BP) or HbA1c targets** - individualise to patient:
- Be wary of falls risk – check postural BPs
- Higher BP targets are appropriate e.g.. systolic BP 130-159 mmHg / diastolic BP 70-89 mmHg
- Be wary of hypoglycaemia risk with insulin and oral hypoglycaemic agents
- Higher HbA1c targets are appropriate e.g.. 58-68 mmol/mol

**Diet** – avoid protein restriction / aggressive salt restriction

**Monitoring of renal function**
- If renal replacement therapy (RRT) is considered - refer to page 52
- If RRT is unlikely to improve quality of life, tailor frequency to clinical need

**In event of sudden eGFR decline exclude common causes:**
- UTIs
- Dehydration
- Obstructive uropathy
- Medications (e.g.. Diuretics, anti-hypertensives, NSAIDs)

**Consider nephrology advice if:**
- Unexplained and sustained decline in renal function / new nephrotic range proteinuria
- Refractory and symptomatic anaemia (<100g/L) in advanced CKD (stages 3b – 5) may require intravenous iron +/− erythropoietin supplementation

**Further advice**

Specialty advice is available to North West London primary care services:
- ICHC-tr.ckdadv consequat@nhs.net (nephrology consultant advice)
- ICHC-tr.adviceelderlymedicine-imperial@nhs.net (consultant geriatrician advice)
## For the safe administration and use of insulin and GLP-1 receptor agonists you should be able to:

### 1. UNREGISTERED PRACTITIONER

- Describe the effect of insulin on blood glucose levels.
- Be aware of local sharps disposal policy.
- Show an understanding of the ongoing nature of the therapy.
- Administer insulin competently where supported by local policy.
- Report identified problems appropriately.

### 2. COMPETENT NURSE AS 1, AND:

- Actively seek and participate in peer review of one’s own practice.
- Demonstrate a basic knowledge of insulin and GLP-1 receptor agonists (e.g. drug type, action, side-effects) and administration devices used locally.
- Demonstrate a high level of competency in the safe administration of insulin or GLP-1 receptor agonists.
- Demonstrate and be able to teach the correct method of insulin or GLP-1 receptor agonist self-administration, including:
  - Correct choice of needle type and length for the individual.
  - Appropriate use of lifted skin fold, where necessary.
  - Site rotation.
  - Storage of insulin.
  - Single use of needles.
- Examine injection sites at least annually for detection of lipohypertrophy.
- Identify correct reporting system for injectable therapy errors.
- Describe circumstances in which insulin use might be initiated or altered and make appropriate referral.
- Report concerns related to blood glucose or HbA1c results in a timely and appropriate fashion.

### 3. EXPERIENCED OR PROFICIENT NURSE

As 2, and:

- Demonstrate a broad knowledge of different insulin types (i.e. action, use in regimens).
- Demonstrate a broad knowledge of GLP-1 receptor agonists (e.g. drug type, action, side-effects).
- Assess individual people’ self-management and educational needs and meet these needs or make appropriate referral.
- Support and encourage self-management wherever appropriate.
- Initiate insulin or GLP-1 receptor agonist therapy where clinically appropriate.
- Recognise when injection therapy needs to be adjusted.
- Recognise the potential psychological impact of insulin or GLP-1 receptor agonist therapies and offer support to the person with diabetes or their carer.
- Recognise signs of needle fear/needle phobia and offer strategies to help manage this.
WHAT ARE GLP-1s AND HOW DO THEY WORK?

- GLP-1s are injected to increase insulin secretion, suppress glucagon secretion, and slow gastric emptying.
- The incretin effect is described by the fact that an oral load of glucose induces a greater insulin response than when glucose is administered IV. This is due to the effect on gut hormones, particularly glucagon-like peptide-1 (GLP-1s).
- Their effect includes stimulating glucose dependent insulin secretions, increasing satiety and slowing gastric emptying. These actions can lead to reduction in HbA1c with a low risk of hypoglycaemia (unless used with sulfonylureas). This action is often accompanied by weight loss.
- GLP-1 injections can be used to improve glucose control in adults with Type 2 Diabetes by reducing fasting and post prandial glucose levels. They can be used with metformin, a sulfonylurea or in combination with other antidiabetic drugs.
- Administered by subcutaneous injection.

CONTRAINDICATIONS & CAUTIONS

- GLP-1s are not substitutes for insulin in insulin-dependent people and are not licensed for use in Type 1 Diabetes.
- Persistent and severe abdominal pain with or without vomiting may be a sign of acute pancreatitis. If this is suspected, the GLP-1 should be stopped, and if confirmed, not be resumed.
- See individual monographs for dose adjustments in renal impairments and/or hepatic impairments, and missed dose information.
- Not recommended for use in people with severe gastrointestinal disease
- People receiving a GLP-1 in combination with a sulfonylurea or insulin may have an increased risk of hypoglycaemia. The risk of hypoglycaemia can be lowered by a reduction in the dose of sulfonylurea or insulin.
- Not recommended during pregnancy or where pregnancy is planned, or for nursing mothers.
- GLP-1 agonists require some oral medications to be taken at least 1 hours before, or 4 hours after. See individual monographs.

INDICATIONS FOR CONTINUED USE

NICE recommends that treatment with GLP-1s is continued only if HbA1c has reduced by 1% AND a weight loss of 3% is achieved within 6 months of commencing treatment.

WHO SHOULD USE GLP-1s?

Treatment with GLP-1s is associated with the prevention of weight gain and possible promotion of weight loss

- GLP-1s should be considered as part of second intensification in people with a BMI of 35 kg/m² or higher (adjust accordingly for people from black, Asian and other minority ethnic groups) and specific psychological or other medical problems associated with obesity or
- have a BMI lower than 35 kg/m² and:
  - for whom insulin therapy would have significant occupational implications or
  - weight loss would benefit other significant obesity-related comorbidities
- See NICE algorithm for recommendations as to where GLP-1s fit with other glycaemic treatments.

ADVICE TO people

- Provide them with patient information leaflet. people will need to understand the following:
- Discuss the risk of hypoglycaemia and symptoms, treatment and prevention.
- Drivers holding a Group 1 (cars and motorcycles) license may drive and need not notify the DVLA, provided the requirements set out are met and is under regular medical review (See DVLA guidance for requirements) when being treated with a GLP-1. Normal precautions to avoid low blood glucose when driving apply. Drivers holding Group 2 (Bus and lorry) licences need to inform the DVLA if they are being treated with a GLP-1.
- Discuss common side effects such as nausea, vomiting diarrhoea, dizziness, headache and dyspepsia.
- GLP-1s may reduce appetite.
- Injection techniques- Subcutaneous injection upper arm, thigh, abdomen.
- Pen needles use/supply - a variety of pen needles are available, HCP should discuss which needle is best for them. A new one should be used for each injection.
- If they experience severe and persistent symptoms they must contact their health care provider as a matter of urgency.

STORAGE OF GLP-1 PEN DEVICES

- Unopened GLP-1 pre-filled pens should be stored in the refrigerator 2-8°C (36-46°F). Do not freeze.
- The GLP-1 pen in use can be kept at room temperature but away from direct light.
- See individual monograph for shelf-life/expiry. Once in use refer to individual drug information overleaf.

Date of preparation: July 2019. For review: June 2020
**LIxisenatide (Lyxumia)**

Indicated in combination with oral glucose-lowering medicinal products and/or basal insulin when these together do not provide adequate glycaemic control.

<table>
<thead>
<tr>
<th>Dose</th>
<th>Dose Adjustments</th>
<th>Time to be taken</th>
<th>Storage and Shelf-life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initially 10 micrograms once daily for 14 days, then increased to 20 micrograms once daily</td>
<td>Use with caution for people with an eGFR 30–50 mL/min/1.73 m². Not recommended for people with eGFR &lt;30 mL/min/1.73 m². Dose of concomitant sulfonylurea or insulin may need to be reduced.</td>
<td>Within 1 hour before the first meal of the day or the evening meal</td>
<td>Unopened - Store in a refrigerator (2°C - 8°C). Do not freeze. After first use - Store below 30°C. Shelf-life: 14 days</td>
</tr>
</tbody>
</table>

**Missed dose:**
- Should be injected within the hour prior to the next meal. Do not administer after a meal.
- Some orally administered drugs should be taken at least 1 hour before, or 4 hours after, lixisenatide injection.
- People receiving Lyxumia with a sulfonylurea or with a basal insulin may have an increased risk of hypoglycaemia. Reduction of the dose of the sulfonylurea or the basal insulin may be considered to reduce the risk of hypoglycaemia. Lixisenatide should not be given in combination with basal insulin and a sulfonylurea due to increased risk of hypoglycaemia.
- Its use does not require specific blood glucose monitoring. However, when used in combination with a sulfonylurea or a basal insulin, blood glucose monitoring or blood glucose self-monitoring may become necessary to adjust the doses of the sulfonylurea or the basal insulin.

**Liraglutide (Victoza)**

Indicated for monotherapy when metformin is considered inappropriate due to intolerance or contraindications OR in addition to other medicinal products for the treatment of diabetes.

<table>
<thead>
<tr>
<th>Dose</th>
<th>Dose Adjustment</th>
<th>Storage and Shelf-life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initially 0.6 mg once daily for at least 1 week, then increased to 1.2 mg once daily. Max daily dose: 1.8mg</td>
<td>eGFR &lt;15mL/min/1.73 m². No therapeutic experience in people with end-stage renal disease, and Victoza is therefore not recommended for use in these people. Not recommended for use in people with severe hepatic impairment.</td>
<td>Unopened - Store in a refrigerator (2°C - 8°C). Do not freeze. After first use - Store below 30°C. Shelf-life: 1 month</td>
</tr>
</tbody>
</table>

**Missed dose:**
- If a dose is more than 12 hours late, the missed dose should not be taken and the next dose should be taken at the normal time.
- Pen adjusted to give either 0.6mg, 1.2mg or 1.8mg. Comes in a pre-filled pen - 6mg per ml.
- Victoza can be added to existing sulfonylurea or to a combination of metformin and sulfonylurea therapy or insulin.
- Self-monitoring of blood glucose is not needed in order to adjust the dose of liraglutide. However, when initiating treatment with liraglutide in combination with a sulfonylurea or insulin, blood glucose self-monitoring may become necessary to adjust the dose of the sulfonylurea/insulin.

**Semaglutide (Ozempic)**

Indicated for monotherapy when metformin is considered inappropriate due to intolerance or contraindications OR in addition to other medicinal products for the treatment of diabetes.

<table>
<thead>
<tr>
<th>Dose</th>
<th>Dose Adjustment</th>
<th>Storage and Shelf-life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initially 0.25 mg once weekly for 4 weeks, then increased to 0.5 mg once weekly for at least 4 weeks, then increased if necessary to 1 mg once weekly</td>
<td>No dose adjustment is required for renal impairment. Experience in people with severe renal impairment is limited. Not recommended for use in people with end-stage renal disease. Dose of concomitant sulfonylurea or insulin may need to be reduced.</td>
<td>Unopened - Store in a refrigerator (2°C - 8°C). Do not freeze. After first use - Store below 30°C. Shelf-life: 6 weeks</td>
</tr>
</tbody>
</table>

**Missed dose:**
- It should be administered as soon as possible and within 5 days after. If more than 5 days have passed, the missed dose should be skipped, and the next dose should be administered on the regularly scheduled day. In each case, patients can then resume their regular once weekly dosing schedule.
- Comes in 1.34 mg per ml in 1.5 and 3ml pre-filled pens.
- When adding to existing therapy of sulfonylurea or insulin, a reduction in the dose of sulfonylurea or insulin should be considered to reduce the risk of hypoglycaemia.
- Self-monitoring of blood glucose is not needed when adjusting the dose. When initiating treatment in combination with a sulfonylurea or an insulin, blood glucose self-monitoring may become necessary to reduce the risk of hypoglycaemia.
- Caution should be exercised when using semaglutide in patients with diabetic retinopathy treated with insulin.

Date of preparation: July 2019. For review: June 2020
**EXENATIDE (NOTE: IMMEDIATE-RELEASE AND MODIFIED-RELEASE AVAILABLE)**

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Licensed to be used in combination with:</th>
<th>Dose</th>
<th>Dose Adjustment</th>
<th>Time to be taken</th>
<th>Storage and Shelf-life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard-Release (BYETTA)</td>
<td>• Metformin • Sulfonylurea (+/-Metformin) • Pioglitazone(+/-Metformin) • Basal Insulin (+/-Metformin/Pioglitazone)</td>
<td>Initially 5 micrograms twice daily for at least 1 month, then increased if necessary up to 10 micrograms twice daily</td>
<td>eGFR 30-50 mL/min/1.73 m²: Use with caution eGFR &lt;30 mL/min/1.73 m²: Avoid</td>
<td>Within 60-minute period before the morning and evening meal (6 hours or more apart). Should not be administered after a meal.</td>
<td>Unopened - Store in a refrigerator (2°C - 8°C). After first use - Store below 25 °C. Do not freeze. Shelf-life: 30 days</td>
</tr>
<tr>
<td>Modified-Release (BYDUREON)</td>
<td>• Other glucose-lowering medicinal products including basal insulin, when the therapy in use, together with diet and exercise, does not provide adequate glycaemic control.</td>
<td>2 mg once a week on the same day each week.</td>
<td>Avoid if eGFR less than 50 mL/minute/1.73 m²</td>
<td>N/A</td>
<td>Unopened - Store in a refrigerator (2°C - 8°C). Do not freeze. Pens may be kept for up to 4 weeks below 30°C prior to use. After first use - suspension must be injected immediately after mixing Store in the original package in order to protect from light.</td>
</tr>
</tbody>
</table>

- Dose of concomitant sulfonylurea may need to be reduced to reduce the risk of hypoglycaemia.
- Blood glucose self-monitoring may be necessary to adjust the dose of sulfonylurea.

**Standard-Release (BYETTA)**
- With standard-release exenatide: some orally administered drugs should be taken at least 1 hour before, or 4 hours after, exenatide injection.
- Missed dose: If an injection is missed, the treatment should be continued with the next scheduled dose.

**Modified-Release (BYDUREON)**
- Comes as a 2 mg powder and solvent for modified-release suspension for injection in pre-filled pen.
- People switching from standard-release (Byetta) to modified-release exenatide may experience transient elevations in blood glucose concentrations, which generally improve within the first two weeks after initiation of therapy.
- Missed dose: It should be administered as soon as practical. For the next injection people can return to their chosen injection day. However, only one injection should be taken in a 24-hour period.
- Women of child-bearing age should use effective contraception during treatment with modified-release exenatide and for 12 weeks after discontinuation.

**DULAGLUTIDE (TRULICITY)**

**Indicated as:**
- Monotherapy in people for whom the use of metformin is not tolerated or contraindicated.
- Add-on therapy In combination with other glucose-lowering medicinal products including insulin, when these together do not provide adequate glycaemic control

<table>
<thead>
<tr>
<th>Dose</th>
<th>Dose adjustments</th>
<th>Storage and Shelf-life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monotherapy - 0.75 mg once weekly Add-on therapy - 1.5 mg once weekly.</td>
<td>eGFR &lt; 15 mL/min/1.73 m²: Not recommended</td>
<td>Unopened - Store in a refrigerator (2°C - 8°C). Do not freeze. After first use - Store below 30°C. Do not freeze. Shelf-life: 14 days</td>
</tr>
</tbody>
</table>

- Long-acting GLP-1
- Dose of concomitant insulin or drugs that stimulate insulin secretion may need to be reduced.
- **Missed Dose:** If a dose is missed, it should be administered as soon as possible if there are at least 3 days (72 hours) until the next scheduled dose. If less than 3 days (72 hours) remain before the next scheduled dose, the missed dose should be skipped and the next dose should be administered on the regularly scheduled day. In each case, people can then resume their regular once weekly dosing schedule.

**NB:** All information presented is in line with the Summaries of Product Characteristics (SPC) of each drug or the BNF.
**Indications for Insulin**

- Introduce the likely need for insulin in the future early on as part of patient education
- Emphasise that it is the pancreas that fails not the patient
- Assess if greater compliance with oral agents and lifestyle changes could negate the need for insulin

<table>
<thead>
<tr>
<th>ALWAYS</th>
<th>USUALLY</th>
<th>CONSIDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1 Diabetes</td>
<td>Type 2 Diabetes failure to reach glycaemic targets using diet and non insulin therapies</td>
<td>Symptomatic e.g. rapid weight loss, polyuria, nocturia</td>
</tr>
<tr>
<td>Not sure of whether the diagnosis is Type 1 Diabetes or Type 2</td>
<td>Type 2 Diabetes Pre and post surgery or following a MI</td>
<td>Women with Type 2 DM on oral agents hoping to conceive</td>
</tr>
<tr>
<td>Pregnant women with Type 2 DM</td>
<td>Chronic pancreatitis</td>
<td>Acute neuropathies i.e. femoral amytrophy</td>
</tr>
<tr>
<td>Gestational Diabetes</td>
<td>Type 2 Diabetes requiring enteral feeding</td>
<td>Ketosis prone Type 2 Diabetes</td>
</tr>
<tr>
<td>Not controlled on diet or metformin</td>
<td></td>
<td>Steroid induced Diabetes</td>
</tr>
<tr>
<td>Post surgical pancreatectomy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
WHICH INSULIN SHOULD BE USED INITIALLY FOR T2DM DIABETES (T2DM)

**Animal insulin is no longer used for insulin starts**

Begin with human NPH insulin injected at bed-time or twice daily according to need such as Insuman Basal, Humulin I or Insulatard. Can be given at breakfast when required e.g.: people on steroids.

Consider, as an alternative, using a long-acting insulin analogue such as Insulin Detemir, Insulin Glargine if:
- The person needs assistance from a carer or healthcare professional to inject insulin, and use of a long-acting insulin analogue (Insulin Detemir, Insulin Glargine) would reduce the frequency of injections from twice to once daily, or
- The person's lifestyle is restricted by recurrent symptomatic hypoglycaemic episodes, or
- The person would otherwise need twice-daily NPH insulin injections in combination with oral glucose-lowering drugs, or
- The person cannot use the device to inject NPH insulin

Consider twice daily pre-mixed (biphasic) human insulin (particularly if HbA1c ≥ 75 mmol/mol or 9%) Consider pre-mixed preparations that include short-acting insulin analogues, rather than pre-mixed preparations that include short acting human insulin preparations, if:
- A person prefers injecting insulin immediately before a meal, or
- Hypoglycaemia is a problem, or
- Blood glucose levels rise markedly after meals
- Consider initiation of pre-mixed insulin if the A1c is high particularly above 75 mmol/mol or 9%

This would however depend on the individual people preference and convenience.

Other factors to consider:
- **Lifestyle**
  - Meal times
  - Employment
- **Potential risk of hypoglycaemia**
  - High alcohol intake
  - Malnutrition
  - Low BMI
- **Physical barriers**
  - Dexterity
  - Vision
- **Emotional barriers**
  - Needle phobia

PEOPLE WITH TYPE 1 DIABETES (T1DM)

**In Type 1 Diabetes Insulin needs to be started within 24 hours of diagnosis**

If the patient is severely ketotic and or vomiting, pregnant, or a child, admission is required/urgent referral / telephone contact to the specialist team or acute on call medical team is required

T: or hospital switchboard and ask to speak to a diabetologist or paediatrician or acute on call medical team

Out of hours may well be the on call medical team who deal with this
THERE ARE MANY TYPES OF INSULIN TO CHOOSE FROM: ALL OF TODAY’S INSULINS ARE MANUFACTURED USING RECOMBINANT DNA TECHNOLOGY

<table>
<thead>
<tr>
<th>HUMAN INSULINS</th>
<th>ANALOGUE INSULINS</th>
</tr>
</thead>
<tbody>
<tr>
<td>e.g. Insumin Rapid, Humulin S, Insulatard</td>
<td>e.g. Novorapid, Glargine</td>
</tr>
<tr>
<td>• Human insulins are produced by recombinant DNA technology and have the same amino acid sequence as endogenous human insulin</td>
<td>• Insulin analogues are produced in the same way as human insulins, but the insulin is modified to produce a desired kinetic characteristic, such as an extended duration of action or faster absorption and onset of action.</td>
</tr>
<tr>
<td>• Time of action can be modified by the addition of protamine</td>
<td>• They are more expensive</td>
</tr>
<tr>
<td></td>
<td>• When bioequivalent insulins may become available, these may be more cost-effective</td>
</tr>
</tbody>
</table>

Human Insulins should be the initial choice of insulin for most people with Type 2 Diabetes as they are safe and considerably cheaper than the analogue insulins. Exceptions are:

• Those at high risk of hypoglycaemia
• Low BMI, malnourished, frail and elderly, erratic eating patterns

<table>
<thead>
<tr>
<th>Type</th>
<th>Rapid Acting</th>
<th>Short Acting</th>
<th>Intermediate Acting</th>
<th>Long Acting</th>
<th>Mixtures Rapid + Intermediate Acting</th>
<th>Mixtures Short + Intermediate Acting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset of action</td>
<td>Analogue within 15 minutes</td>
<td>Human 30 - 60 mins</td>
<td>Human 1 - 2 hours</td>
<td>Analogue 2 - 3 hours</td>
<td>Analogue Up to 15 mins</td>
<td>Human Up to 30 mins</td>
</tr>
<tr>
<td>Duration*</td>
<td>2-5 hours</td>
<td>up to 9 hours</td>
<td>11 - 24 hours</td>
<td>Up to 36 hours</td>
<td>Up to 24 hours</td>
<td>Up to 24 hours</td>
</tr>
<tr>
<td>Examples</td>
<td>Novorapid</td>
<td>Humulin S</td>
<td>Insulatard</td>
<td>Levemir (Determir)</td>
<td>NovoMix 30</td>
<td>Humulin M3</td>
</tr>
<tr>
<td></td>
<td>Humalog</td>
<td>Insumin Rapid</td>
<td>Humulin I</td>
<td>Abasaglar/Lantus/ Sempglee (Glargine)</td>
<td>Humalog Mix 25</td>
<td>Insumin Comb 15, 25, 50</td>
</tr>
<tr>
<td></td>
<td>Apidra</td>
<td></td>
<td>Insumin Basal</td>
<td></td>
<td>Humalog Mix 50</td>
<td></td>
</tr>
<tr>
<td>Peak effect</td>
<td>0.5 - 1.5 hours</td>
<td>1 - 4 hours</td>
<td>3 - 12 hours</td>
<td>varies based on the dose</td>
<td>1 - 4 hours</td>
<td>2 - 8 hours</td>
</tr>
</tbody>
</table>

Date of preparation: July 2019. For review: June 2020
<table>
<thead>
<tr>
<th>ORAL AND NON – INSULIN THERAPY</th>
<th>USE WITH INSULIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td>Normal and overweight people with Type 2 Diabetes can be continued on Metformin as there is evidence that this combination is insulin sparing and has other benefits including weight management glycaemic control and cardiovascular disease (CVD).</td>
</tr>
<tr>
<td><strong>sulfonylureas (SU)</strong></td>
<td>Continue with regular dose reviews if the individual is on a daily isophane or analogue insulin. Avoid concurrent use in people with severe renal impairment (&lt;45mL/min/1.73m²).</td>
</tr>
<tr>
<td>Glimepiride</td>
<td>Continue with regular dose reviews if the individual is on a daily isophane or analogue insulin. Avoid concurrent use in people with severe renal impairment (&lt;45mL/min/1.73m²).</td>
</tr>
<tr>
<td>Gliclazide</td>
<td>Continue with regular dose reviews if the individual is on a daily isophane or analogue insulin. Avoid concurrent use in people with severe renal impairment (&lt;45mL/min/1.73m²).</td>
</tr>
<tr>
<td><strong>DPP-4 Inhibitors (DPP-4Is):</strong></td>
<td>May be used in combination with insulin. Risk of hypoglycaemia when used together, consider reducing dose of insulin.</td>
</tr>
<tr>
<td>Alogliptin</td>
<td>May be used in combination with insulin. Risk of hypoglycaemia when used together, consider reducing dose of insulin.</td>
</tr>
<tr>
<td>Linagliptin</td>
<td>May be used in combination with insulin or other antidiabetic drugs (if existing treatment fails to achieve adequate glycaemic control). Risk of hypoglycaemia when used together, consider reducing dose of insulin.</td>
</tr>
<tr>
<td>Saxagliptin</td>
<td>May be used in combination with insulin. Risk of hypoglycaemia when used together, consider reducing dose of insulin.</td>
</tr>
<tr>
<td>Sitagliptin</td>
<td>May be used in combination with insulin. Risk of hypoglycaemia when used together, consider reducing dose of insulin.</td>
</tr>
<tr>
<td>Vildagliptin</td>
<td>May be used in combination with insulin. Risk of hypoglycaemia when used together, consider reducing dose of insulin.</td>
</tr>
<tr>
<td><strong>Sodium glucose co-transporter 2 Inhibitors (SGLT-2)</strong></td>
<td>May be used in combination with insulin. Risk of hypoglycaemia when used together, consider reducing dose of insulin.</td>
</tr>
<tr>
<td>Canagliflozin</td>
<td>May be used in combination with insulin or other antidiabetic drugs (if existing treatment fails to achieve adequate glycaemic control). Risk of hypoglycaemia when used together, consider reducing dose of insulin.</td>
</tr>
<tr>
<td>Dapagliflozin</td>
<td>May be used in combination with insulin or other antidiabetic drugs (if existing treatment fails to achieve adequate glycaemic control). Risk of hypoglycaemia when used together, consider reducing dose of insulin.</td>
</tr>
<tr>
<td>Empagliflozin</td>
<td>May be used in combination with insulin or other antidiabetic drugs (if existing treatment fails to achieve adequate glycaemic control). Risk of hypoglycaemia when used together, consider reducing dose of insulin.</td>
</tr>
<tr>
<td>Ertugliflozin</td>
<td>May be used in combination with insulin or other antidiabetic drugs (if existing treatment fails to achieve adequate glycaemic control). Risk of hypoglycaemia when used together, consider reducing dose of insulin.</td>
</tr>
<tr>
<td>Pioglitazone</td>
<td>May be used in combination with insulin. Risk of hypoglycaemia when used together, consider reducing dose of insulin.</td>
</tr>
<tr>
<td><strong>Glucagon-like peptide-1 receptor agonists (GLP-1 Agonists)</strong></td>
<td>May be used in combination with insulin. In adults with type 2 diabetes, only offer a GLP-1 mimetic in combination with insulin with specialist care advice and ongoing support from a consultant-led multidisciplinary team.</td>
</tr>
<tr>
<td>Exenatide modified-release (once weekly)</td>
<td>May be used in combination with insulin. In adults with type 2 diabetes, only offer a GLP-1 mimetic in combination with insulin with specialist care advice and ongoing support from a consultant-led multidisciplinary team.</td>
</tr>
<tr>
<td>Exenatide standard-release (twice daily)</td>
<td>May be used in combination with insulin. In adults with type 2 diabetes, only offer a GLP-1 mimetic in combination with insulin with specialist care advice and ongoing support from a consultant-led multidisciplinary team.</td>
</tr>
<tr>
<td>Liraglutide (once daily)</td>
<td>May be used in combination with insulin. In adults with type 2 diabetes, only offer a GLP-1 mimetic in combination with insulin with specialist care advice and ongoing support from a consultant-led multidisciplinary team.</td>
</tr>
<tr>
<td>Lixisenatide (once daily)</td>
<td>May be used in combination with insulin. In adults with type 2 diabetes, only offer a GLP-1 mimetic in combination with insulin with specialist care advice and ongoing support from a consultant-led multidisciplinary team.</td>
</tr>
<tr>
<td>Dulaglutide (once weekly)</td>
<td>May be used in combination with insulin. In adults with type 2 diabetes, only offer a GLP-1 mimetic in combination with insulin with specialist care advice and ongoing support from a consultant-led multidisciplinary team.</td>
</tr>
<tr>
<td>Acarbose</td>
<td>Not recommended in combination with insulin. Risk of hypoglycaemia when used together, consider reducing dose of insulin.</td>
</tr>
<tr>
<td><strong>Meglitinides:</strong></td>
<td>Not recommended in combination with insulin.</td>
</tr>
<tr>
<td>Repaglinide</td>
<td>Not recommended in combination with insulin.</td>
</tr>
</tbody>
</table>

*Please see pages 33-36 and 57-58 for individual drug monographs*
TYPE 2 DIABETES – SEQUENTIAL INSULIN STRATEGIES

Low
1

Mod
2

High
3+

More flexible

Less flexible

Diabetes Care, Diabetologia. 19 April 2012 [Epub ahead of print]
**TYPE 2 DIABETES – BENEFITS OF INITIATING BASAL INSULIN**

**PROS**

- Just one injection a day
- Easy for the patient to adjust the dose
- Can stay on current oral agents to start with
- Buys time and confidence until a twice or three or 4 times a day insulin regime is required
**PROS**

- Provides both background and prandial cover with two injections a day
- Unlike the analogue insulin mixtures provides sufficient background insulin to cover a light lunch

**CONS**

- More difficult to titrate evening mixed insulin against pre-breakfast glucose due to risk of nocturnal hypoglycaemia
- Requires people to have a regular meal pattern including breakfast and a main meal in the evening, rather than lunch time
- Increased risk of hypoglycaemia if eat dinner very late at night or tendency to skip breakfast or lunch
Tell the patient they are likely to need between 20-50 units of insulin and it is safe for them to increase the insulin.

Start with 10 units before bed of insulin if <100kg (or 20 units of insulin if >100kg)

For elderly frail people where there is no requirement for tight control, morning NPH (human basal) insulin is safe as the peak will cover breakfast and a bit of lunch, and can be given by a morning carer who can ensure the patient has eaten. In the elderly it is quite likely that NPH will have a much longer duration of action as when the eGFR falls the half life of the insulin increases.

Increase by 2 units every 3rd day until before breakfast blood glucose is 8-10 mmol/l

Reduce the sulfonylurea dose. Continue to increase by 2 units every 3rd day aiming for before breakfast blood glucose of 6-8 mmol/l

STOP INCREASING if:

- symptoms of hypoglycaemia at night - go back to previous dose
- some readings are <5mmol/l
- when insulin dose reaches 50 units - review with Diabetes team
• Is the before breakfast blood glucose 5-8 mmol/l? **If no:**
• Continue to increase basal insulin by 2 units every 3rd day providing there is no nocturnal hypoglycaemia:
• If HbA1c above agreed individual target at 3-4 months? –and the before breakfast blood glucose 5-8 mmol/l; examine post prandial blood glucose readings

• **If > 10mmol/l:**
• Switch to twice daily mixed insulin.
Tell the patient the insulin needs to be given 20-30 minutes before breakfast and dinner and stress the need to eat on time. Stop all sulfonylureas.

- Start with 10 units BD if <100kg (or 20 units BD of insulin if >100kg mixed insulin) 20-30 minutes before breakfast and dinner
- Start with the pre-dinner mixed insulin. Increase by 2 units every 3rd day until the 2 hour post-dinner glucose is <10 mmol/l and before breakfast blood glucose is 6-8 mmol/l
- Then increase the pre-breakfast mixed insulin by 2 units every 3rd day until the 2 hour post-breakfast glucose is <10 mmol/l and before dinner glucose is 6-8 mmol/l

**STOP INCREASING** if:
- symptoms of hypoglycaemia
- pre-breakfast or dinner glucose <5mmol/l
- when total insulin dose reaches 100 units and review with diabetic team
• Is the pre-breakfast blood glucose 5-8 mmol/l and 2 hour post-meals blood glucoses if > 10mmol/l?
• Continue to increase the evening mixed insulin by 2 units every 3rd day to target post-dinner and pre-breakfast values if no nocturnal hypoglycaemia:
• Continue to increase the morning mixed insulin by 2 units every 3rd day to target post-breakfast and pre-dinner values if no day time hypoglycaemia:
• If HbA1c above agreed individual target at 3-4 months and pre-meal glucose values in target and post prandial blood glucoses > 10mmol/l:
• Review diet and consider switch to an Analogue Insulin Humalog Mix 50 BD or NovoMix 30
# DIABETES – REUSABLE INSULIN PEN DEVICES

**Device**

<table>
<thead>
<tr>
<th>Device</th>
<th>Autopen Classic</th>
<th>Autopen 24</th>
<th>Novopen 4</th>
<th>Novopen 5</th>
<th>Novopen Echo</th>
<th>Humapen SAVVIO</th>
<th>Humapen LUXURA HD</th>
<th>Allstar</th>
<th>Allstar Pro</th>
<th>Juniorstar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dosing</strong></td>
<td>1 unit (1-21)</td>
<td>1 unit (1-21)</td>
<td>1 unit (1-60)</td>
<td>1 unit (1-60)</td>
<td>½ unit (0.5-30)</td>
<td>1 unit (1-60)</td>
<td>½ unit (1-30)</td>
<td>1 unit (1-80)</td>
<td>1 unit (1-80)</td>
<td>½ unit (1-30)</td>
</tr>
<tr>
<td><strong>General features</strong></td>
<td>Plastic</td>
<td>Metal Blue or chrome</td>
<td>Metal Blue or chrome</td>
<td>Metal Blue or red</td>
<td>Metal Audible click</td>
<td>Multiple colours</td>
<td>Metal Green Audible click</td>
<td>Purple or Teal</td>
<td>Blue or Silver</td>
<td>Blue, red or silver</td>
</tr>
<tr>
<td><strong>Special uses</strong></td>
<td>Release button on side makes it easier for some to handle</td>
<td>Spring loaded release button ensures that force required to push the insulin is significantly less than for other insulin pens.</td>
<td>Memory function on pen end indicates timing and units of last dose</td>
<td>Memory Function - Records dose and time since last injection for extra reassurance</td>
<td>Half unit doses so suitable for children or those with low insulin requirements</td>
<td>Allows for half-unit dose increments which helps to provide flexibility especially in young people.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Insulin compatibility</strong></td>
<td>Lilly Humulin Humalog Abasaglar Wockhardt</td>
<td>Sanofi Insuman Lantus Apidra</td>
<td>Novo Nordisk Insulatard Novorapid Novomix Levemir</td>
<td>Novo Nordisk Insulatard Novorapid Novomix Levemir</td>
<td>Lilly Humulin Humalog</td>
<td>Sanofi Insuman Lantus Apidra</td>
<td>Sanofi Insuman Lantus Apidra</td>
<td>Sanofi Insuman Lantus Apidra</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Date of preparation: July 2019. For review: June 2020
<table>
<thead>
<tr>
<th>DEVICE</th>
<th>SOLOSTAR</th>
<th>FLEXPEN</th>
<th>FLEXTOUCH</th>
<th>INNOLET</th>
<th>KWIKPEN</th>
<th>SEMGLEE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dosing</strong></td>
<td>1 unit (1-80)</td>
<td>1 unit (1-60)</td>
<td>1 unit (1-80)</td>
<td>1 unit (1-50)</td>
<td>1 unit (1-60)</td>
<td>1 unit (1-80)</td>
</tr>
<tr>
<td><strong>General features</strong></td>
<td>Apidra and Lantus versions of this pen have different colours (blue for Apidra, grey for Lantus) and textures to help users distinguish between the types of insulin. Insuman is a white pen. Green label for basal and blue for comb.</td>
<td>Pen is blue, with labels of different colours for various types of insulin.</td>
<td>An easy-to-use doser with a large, ergonomic dial</td>
<td>Buff colour for human insulin, blue for analogue. Humalog Junior Kwikpen can be differentiated by a orange and white label.</td>
<td>A light blue pen with white label.</td>
<td></td>
</tr>
<tr>
<td><strong>Special uses</strong></td>
<td></td>
<td>Reduced manual dexterity (due to push button not having to extend)</td>
<td>Poor eyesight Reduced manual dexterity (usually due to different joint related conditions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Insulin compatibility</strong></td>
<td>Sanofi Apidra Lantus Insuman Basal Insuman Comb Insulin Lispro</td>
<td>Novo Nordisk NovoRapid Novomix Levemir</td>
<td>Novo Nordisk NovoRapid</td>
<td>Novo Nordisk Insulatard Levemir</td>
<td>Lilly Humulin Humalog Humalog Junior Abasaglar</td>
<td>Mylan Semglee</td>
</tr>
</tbody>
</table>

**Device**

- SOLOSTAR
- FLEXPEN
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