# BNF Chapter 6.3 Diabetes mellitus and hypoglycaemia

Formulary prepared and based on BNF, Summary of Product Characteristics and information provided below unless otherwise stated.For full information on treatment side effects, cautions and contraindications, see electronic British National Formulary (www.bnf.org) or the relevant summary of product characteristics (www.medicines.org.uk).

## NICE Clinical Guidelines

Type 1 diabetes in adults: diagnosis and management

NICE guidelines NG17

Diabetes (type 1 and type 2) in children and young people: diagnosis and management

NICE guideline NG18

Type 2 diabetes in adults: Management

NICE guideline NG28

## NICE Technology Appraisals

NICE TA288 Dapagliflozin in combination therapy for treating type 2 diabetes

NICE TA288

NICE TA315 Canagliflozin in combination therapy for treating type 2 diabetes

NICE TA315

NICE TA336 Empagliflozin in combination therapy for treating type 2 diabetes

NICE TA336

NICE TA 390 Canagliflozin, dapagliflozin and empagliflozin as monotherapies for treating type 2 diabetes

NICE  TA390

## Local Prescribing Information

Norfolk Diabetes Management Guidelines 2013 From the Norfolk Clinical Diabetes Networks
http://nww.knowledgeanglia.nhs.uk/diabetes/diabetes_guidelines/diabetes_guidelines.pdf

## Drug Safety Update

Pioglitazone: risk of bladder cancer

https://www.gov.uk/drug-safety-update/pioglitazone-risk-of-bladder-cancer

Insulin combined with pioglitazone: risk of cardiac failure

https://www.gov.uk/drug-safety-update/insulin-combined-with-pioglitazone-risk-of-cardiac-failure

Exenatide (Byetta ▼): risk of severe pancreatitis and renal failure

https://www.gov.uk/drug-safety-update/exenatide-byetta-risk-of-severe-pancreatitis-and-renal-failure

Dipeptidylpeptidase-4 inhibitors (‘gliptins’): risk of acute pancreatitis

https://www.gov.uk/drug-safety-update/dipeptidylpeptidase-4-inhibitors-risk-of-acute-pancreatitis

SGLT2 inhibitors (canagliflozin, dapagliflozin, empagliflozin): risk of diabetic ketoacidosis

https://www.gov.uk/drug-safety-update/sglt2-inhibitors-canagliflozin-dapagliflozin-empagliflozin-risk-of-diabetic-ketoacidosis

SGLT2 inhibitors: updated advice on the risk of diabetic ketoacidosis

https://www.gov.uk/drug-safety-update/sglt2-inhibitors-updated-advice-on-the-risk-of-diabetic-ketoacidosis

## NEL CSU Key Message Guidance available for further information

http://nww.knowledgeanglia.nhs.uk/KMS/Norwich/Home/Prescribing,PharmacyandMedicinesOptimisation/PrescribingGuidance/Keymessagebulletins(NELCSU).aspx

Bulletin 22: Blood Glucose Test Strips
Blood Glucose Meters and Test Strip cost comparison

Bulletin 23: Lancets
Lancets cost comparison

Bulletin 24: Pen Needles
Needles for pre-filled and reusable Pen Injectors cost comparison

| Formulary Key | | | |
|---|---|---|---|
| 1st line formulary choice | Encouraged | | |
| Alternative formulary choice | On Formulary | | |
| 2nd line formulary choice | 2nd Line | | |
| Shared Care (TAG Amber) | Shared Care Agreement | | |

## Short acting Insulins

### Soluble Insulin

**First line for adults with Type-1 Diabetes on multiple insulin injection regimens with meal-time insulin**

| Product | Formulation | Compatible pens | Notes |
|---|---|---|---|
| **Actrapid® 100 units/mL** (On Formulary) | 10mL vial | | |
| **Insuman® Rapid 100 units/mL** (On Formulary) | 3mL cartridge* | *Compatible pens for 3mL cartridges = ClikSTAR®, Autopen® 24 | |
| **Humulin S® 100 units/mL** (On Formulary) | 10mL vial<br>3mL cartridge* | *Compatible pens for 3mL cartridges = HumaPen®, Autopen® Classic | |

### Rapid-Acting Insulin Analogues

**Second line for adults with Type-1 Diabetes on multiple insulin injection regimens with meal-time insulin when:**
- **Nocturnal or late inter-prandial hypoglycaemia is a problem**
- **Wish to avoid need to snack, while maintaining equivalent blood glucose control**
- **Individual lifestyle factors such as irregular eating patterns makes a rapid-acting insulin analogue desirable**

| Product | Formulation | Compatible pens | Notes |
|---|---|---|---|
| **Apidra® (Insulin Glulisine) 100 units/mL** (2nd Line) | 10mL vial<br>3mL cartridge*<br>3mL Solostar® (prefilled device) | *Compatible pens for 3mL cartridges = ClikSTAR®, Autopen® 24 | NICE does not advise routine use of rapid-acting insulin analogues after meals for adults with type 1 diabetes[1]. |
| **Insulin Lispro Sanofi® 100 units/mL** (2nd Line) | 10mL vial<br>3mL cartridge*<br>3mL Solostar® (prefilled device) | *Compatible pens for 3mL cartridges = AllStar Pro® and JuniorSTAR® | |
| **NovoRapid (Insulin Aspart) 100 units/mL** (2nd Line) | 10mL vial<br>3 mL Penfill® cartridge*<br>3mL Flexpen® (prefilled device)<br>3mL FlexTouch® (prefilled device) | *Compatible pens for 3mL Penfill® - Novopen® devices | |
| **Humalog® (Insulin Lispro) 200 units/mL** (2nd Line) | 3ml KwikPen (prefilled device) | | TAG Green: Prescribable on request of Diabetes Specialist for adults who require greater than 20units of fast acting insulin and more than 200 units of insulin per day, with poor glycaemic control i.e. HbA1c of greater than 75mmol/mol. |

## Intermediate and Long Acting Insulins

**See local insulin pathway for patients with Type 2 diabetes**

### Isophane Insulin (NPH)

**First-line for adults with type-2 diabetes requiring insulin.**

| Product | Formulation | Compatible pens | Notes |
|---|---|---|---|
| **Insuman Basal (100 units/mL)** (Encouraged) | 5mL vial<br>3mL cartridge*<br>3mL Solostar® (prefilled device) | *Compatible pens for 3mL cartridges = ClikSTAR®, Autopen® 24 | Key Message Bulletin on the use of insulin in Type 2 Diabetes is available at Knowledge Anglia |
| **Humulin I (100 units/mL)** (On Formulary) | 10mL vial<br>3mL cartridge*<br>3mL Kwikpen® (prefilled device) | *Compatible pens for 3mL cartridges = HumaPen®, Autopen® Classic | |
| **Insulatard** (On Formulary) | 10mL vial<br>3mL cartridge*<br>3mL Innolet (prefilled device) | *Compatible pens for 3mL cartridges =NovoPen® 5 or NovoPen® Echo | |

### Long Acting Insulin Analogues

**First line for adults with type-1 diabetes**

**Multiple daily injection basal–bolus insulin regimens should be offered to people with Type 1 Diabetes rather than twice-daily mixed insulin regimens[3].**

| Product | Formulation | Compatible pens | Notes |
|---|---|---|---|
| **Levemir® (Insulin Detemir) 100 units/mL** (On Formulary) | 3 mL Penfill® cartridge*<br>3mL Flexpen® (prefilled device)<br>3mL InnoLet® (prefilled device) | *Compatible pens for 3mL Penfill® - NovoPen 5 or NovoPen Echo<br>InnoLet® devices are useful for persons with visual acuity and/or dexterity problems | Offer twice-daily insulin detemir as basal insulin therapy for adults with type 1 diabetes or once daily if twice daily basal injection not acceptable[1] |

**Second-Line for adults with Type-2 Diabetes requiring insulin.**
**Second-line for adults with Type-1 Diabetes if twice daily Levemir not acceptable or not tolerated.**

| Product | Formulation | Compatible pens | Notes |
|---|---|---|---|
| **Abasaglar® (Insulin Glargine) 100 units/mL** (2nd Line)<br><br>Diabetes mellitus type 1 and type 2: insulin glargine biosimilar (Abasaglar)<br><br>NICE advice [ESNM64] | 3mL cartridge*<br>3mL KwikPen® (prefilled device) | *Compatible pens for 3mL cartridges = Autopen® Classic or HumaPen ranges | **Type 2 diabetes consider only if:**[1]<br>• the person needs help with injecting insulin (e.g. from a district nurse) and a long-acting insulin analogue would reduce injections from twice to once daily, or<br>• the person suffers from recurrent hypoglycaemic episodes. |

| | | | |
|---|---|---|---|
| **Super Long Acting and High Strength Analogue Insulins** | | | |
| **Restricted use in Type 1 and Type 2 Diabetes for:**<br>*** Patients with significant nocturnal hypoglycaemia, despite optimal adjustments of lifestyle**<br>*** "Chaotic patients" who may be at significant risk of diabetic ketoacidosis (DKA) or hyperosmolar hyperglycaemic state (HHS) (previously known as hyperosmolar non - ketotic diabetic state or hyper HONK) if daily basal insulin is missed, despite optimal adjustments of lifestyle, and diet and optimising basal insulin/multiple daily injections.**<br>*** Patients with psychological problems (e.g. eating disorders or patients with intermittent compliance issues with insulin injections), who are not supervised by a daily carer and do not qualify to receive district nurse injections of daily insulin glargine, and who may be at significant risk of DKA or HHS if daily basal insulin is missed.**<br>*** Patients with a diagnosed allergy to either insulin detemir or insulin degludec.** | | | |
| **Initiation should be by a Diabetes consultant / specialist only and all patients should be managed by the initiating specialist team for a minimum of three months or until stable.**<br>**Patients should be returned to previous treatment if no improvement in overall disease control from baseline is demonstrated.** | | | |
| **Tresiba (Insulin Degludec) 100 units/ml** | 3ml Penfill® cartridges*<br>3mL FlexTouch® (prefilled device) | *Compatible pens for 3mL cartridges - NovoPen 5 or NovoPen Echo | **TAG Green** (prescribable on request of consultant / specialist) for restricted use in Type 1 and Type 2 Diabetes as above.<br>**TAG Double Red / Not commissioned** in adults or children in either Type 1 or Type 2 diabetes<br>**High strength insulin degludec 200units/ml is not recommended for routine use:** It may be considered for patients with severe insulin resistance requiring large daily doses of insulin ( ≥3 units/kg/day), where treatment is initiated by a specialist Consultant Diabetologist. |
| **Toujeo® (Insulin Glargine)**<br>High-strength insulin glargine **300 units/ml**<br>NICE Advice [ESNM62]<br>NICE Advice [ESNM65] | 1.5mL SoloStar® pen (prefilled device) | | **TAG Green** (prescribable on request of consultant / specialist) for restricted use in Type 1 and Type 2 Diabetes as above.<br>Insulin glargine **300 units/ml (Toujeo®)** could be considered for patients with severe insulin resistance requiring large daily doses of insulin (≥3units/kg/ day), where treatment is initiated by a Consultant Diabetologist<br>Toujeo is not bioequivalent to Lantus: they are not interchangeable without dose adjustment. |
| **Biphasic (Pre-mixed insulin)** | | | |
| **Isophane (NPH) + Soluble Insulin** | | | |
| **First-line – Type-2 diabetes (where pre-mixed insulin indicated)**<br>**First-line – Type-1 diabetes in adults where twice daily insulin regimens are indicated, including:**<br>• those who find adherence to lunch-time insulin injections difficult<br>• those with learning difficulties and may require assistance | | | |
| **Insuman® Comb 15 (15% soluble, 85% isophane)** | 100units/mL<br>3mL cartridge* | *Compatible pens for 3mL cartridges = ClikSTAR®, Autopen® 24 | |
| **Insuman® Comb 25 (25% soluble, 75% isophane)** | 100units/mL<br>3mL cartridge*<br>3mL Solostar® (prefilled device) | *Compatible pens for 3mL cartridges = ClikSTAR®, Autopen® 24 | |
| **Insuman® Comb 50 (50% soluble, 50% isophane)** | 100units/mL<br>3mL cartridge* | *Compatible pens for 3mL cartridges = ClikSTAR®, Autopen® 24 | |
| **Humulin M3® (30% soluble, 70% isophane) 100 units/mL** | 3mL cartridge*<br>3mL Kwikpen® (prefilled device) | Compatible pens for 3mL cartridges = HumaPen®, Autopen® Classic | |
| **Insulin analogues** | | | |
| **Second-line – Type 2 diabetes (where pre-mixed insulin indicated).** Consider when:<br>• Immediate injection before a meal is preferred, or<br>• Hypoglycaemia is a problem, or<br>• Blood glucose levels rise markedly after meals<br>**Second-line – Type 1 diabetes in adults** where twice daily insulin regimens indicated and hypoglycaemia affects quality of life[1]. | | | |
| **Preferred choice** | | | |
| **Humalog® Mix25 (25% insulin lispro, 75% insulin lispro protamine) 100 units/mL** | 10mL vial 3mL cartridge*<br>3mL Kwikpen® (prefilled device) | *Compatible pens for 3mL cartridges = HumaPen®, Autopen® Classic | |
| **Humalog® Mix50 (50% insulin lispro, 50% insulin lispro protamine) 100 units/mL** | 3mL cartridge*<br>3mL Kwikpen® (prefilled device) | *Compatible pens for 3mL cartridges = HumaPen®, Autopen® Classic | |
| **Second line choice** | | | |
| **Novomix® 30 (30% insulin aspart, 70% insulin aspart protamine) 100 units/mL** | 3 mL Penfill® cartridge*<br>3mL Flexpen® (prefilled device) | *Compatible pens for 3mL Penfill® - Novopen® devices | |

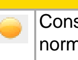
# Antidiabetic drugs

## Metformin

**First-line for all persons with type 2 diabetes requiring blood glucose lowering treatment (unless contraindicated)**

| Drug | | Notes | Cautions |
|---|---|---|---|
| **Metformin tablets 500mg, 850mg First Line** | | Step up dose over several weeks to minimise GI side-effects.<br>Dose: 500mg OD for one week (tea-time), then 500mg BD for one week (breakfast and tea-time), then increase by 500mg increments as required (usual max 2g daily). | Review metformin dose if serum creatinine > 130 micromol/l or eGFR < 45ml/min/1.73m2<br>Stop metformin if serum creatinine > 150 micromol/l or eGFR < 30ml/min/1.73m2 |

**Second line choice**

| Drug | | Notes | Cautions |
|---|---|---|---|
| **Metformin MR tablets 500mg, 750mg, 1g** |  | Consider if GI side effects prevent person from continuing with normal release metformin rather than prescribing an alternative drug. | Review metformin dose if serum creatinine > 130 micromol/l or eGFR < 45ml/min/1.73m2<br>Stop metformin if serum creatinine > 150 micromol/l or eGFR < 30ml/min/1.73m2 |

## Sulphonylureas

**First-line add-on therapy where HbA1c remains above target despite optimal dosing with metformin.**

**Option for Second-line monotherapy for persons with type 2 diabetes where metformin is contraindicated or not tolerated.**

| Drug | | Notes | Cautions |
|---|---|---|---|
| **Gliclazide tablets 80mg** | | Tablets are half-scored to enable 40mg dosing. 40mg tablets - expensive choice | |

## Thiazolidinediones

**Option for Second-line add-on therapy**

- **Consider adding to metformin if there is a significant risk of hypoglycaemia (or its consequences e.g. those who rely on driving for their income).**
- **Consider addition to sulphonylurea where metformin is contraindicated or not tolerated.**
- **Option for triple therapy (with metformin and sulphonylurea) where the use of insulin is unacceptable.**

| Drug | | Notes | Cautions |
|---|---|---|---|
| **Pioglitazone tablets 15mg, 30mg, 45mg** | | Continue pioglitazone therapy only if there is a reduction of ≥ 0.5 percentage points (5.5mmol/L) in HbA1c in 6 months.<br><br>LFT monitoring required. | **DO NOT start or continue therapy in persons with heart failure.**<br><br>**Incidence of heart failure increased when glitazones combined with insulin – careful monitoring required.**<br>**Use with caution in those with increased risk of fractures (especially post menopausal women).**<br>**Contra-indicated in active or previous bladder cancer.**<br>**AVOID in hepatic impairment.** |

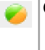
## DPP- 4 Inhibitors (Gliptins)

**Option for Second-line add-on therapy**

- **Consider adding to metformin if there is a significant risk of hypoglycaemia (or its consequences e.g. those who rely on driving for their income).**
- **Consider addition to sulphonylurea where metformin is contraindicated or not tolerated**

**Option for triple therapy** with metformin and sulphonylurea where the use of insulin is unacceptable.

**Option for use with insulin** with or without metformin when stable dose of insulin has not provided adequate glycaemic control.

| Drug | | Dosing | Renal/hepatic | Notes |
|---|---|---|---|---|
| **Alogliptin tablets 25mg, 12.5mg, 6.25mg (Vipidia)** ▼ | | Once daily | **Dose reduction required for renal impairment: 12.5mg for moderate renal impairment, 6.25mg for severe or end stage renal impairment** | Stop gliptin therapy if a reduction of ≥ 0.5 percentage points (5.5mmol/L) in HbA1c is not acheived after 6 months.<br>A gliptin may be preferable to pioglitazone if:<br>• Further weight gain would cause significant problems, or<br>• Pioglitazone is contraindicated, or<br>• The person had a poor response to or did not tolerate pioglitazone in the past. |
| **Linagliptin tablets 5mg (Trajenta)** ▼ |  | Once daily | No dose reduction required in renal or hepatic impairment. | |

**Combination gliptin products: Suitable for patients on stable regimes with separate tablets where the reduction in number of tablets is beneficial for compliance.**

## SGLT-2 Inhibitors

**Option for use in**

- **Dual therapy regimens** in combination with metformin only if a sulfonylurea is contraindicated or not tolerated, or there is significant risk of hypoglycaemia.
- **Combination with insulin** with or without other antidiabetic drugs
- **Triple therapy regimens** in combination with metformin and a sulfonylurea. **Canagliflozin** and **empagliflozin** may be also be used in triple therapy with metformin and a thiazolidinedione.

May be used as **monotherapy** where metformin is contraindicated or not tolerated and when diet and exercise alone do not provide adequate glycaemic control, only if:

- a dipeptidyl peptidase-4 (DPP-4) inhibitor would otherwise be prescribed and
- a sulfonylurea or pioglitazone is not appropriate.

NICE TA 390

**Serious, life-threatening, and fatal cases of DKA have been reported in patients taking an SGLT2 inhibitor. In several cases, presentation of DKA was atypical with only moderately elevated blood glucose levels (eg <14mmol/L). This could delay diagnosis and treatment. Patients should be informed of the signs and symptoms of DKA (eg rapid weight loss, feeling sick or being sick, stomach pain, fast and deep breathing, sleepiness, a sweet smell to the breath, a sweet or metallic taste in the mouth, or a different odour to urine or sweat). Patients presenting with these signs and symptoms should be tested for raised ketones.**

MHRA Drug Safety Update: SGLT2 inhibitors: updated advice on the risk of diabetic ketoacidosis

| Drug | | Dose | Renal | Comments |
|---|---|---|---|---|
| **Dapagliflozin 5mg, 10mg Tablets (Forxiga)** ▼<br>[NICE TA288]<br>[NICE TA418] | | 10 mg once daily. Initial dose 5mg in severe hepatic impairment. Elderly over 75 years - initiation not recommended | Avoid if eGFR less than 60mL/min/1.73m$^2$ as ineffective. | **TAG Green - GP prescribable at the request of a Specialist or Consultant.** |
| **Canagliflozin 100mg, 300mg Tablets (Invokana)** ▼<br>[NICE TA315] | | 100 mg once daily preferably before breakfast; if necessary and if tolerated, increase to 300 mg once daily | Avoid initiation if eGFR less than 60 mL/minute/1.73 m$^2$ as ineffective. Reduce dose to 100 mg once daily if eGFR falls persistently below 60 mL/minute/1.73m$^2$ and existing canagliflozin treatment tolerated; stop if eGFR less than 45 mL/minute/1.73m$^2$ | **Increased risk of urinary tract and genital infections. Possible increased risk of breast and bladder cancer.**<br>**Do not use in combination with pioglitazone.** |
| **Empagliflozin 10mg, 25mg Tablets (Jardiance)** ▼<br>[NICE TA336] | | 10 mg once daily, increasing to 25mg max. dose if necessary and tolerated. | Avoid initiation if eGFR less than 60 mL/minute/1.73 m2 as ineffective. In patientswhose eGFR falls below 60 ml/min/1.73 m$^2$, adjust or maintain dose at 10 mg once daily. stop if eGFR less than 45 mL/minute/1.73m$^2$ | |
| **Injectable non-Insulin Antidiabetic Drugs (GLP-1 Agonist)** | | | | |
| **[TAG Green:] prescribable on request of specialist** | | | | |
| **Option for Third-line add-on therapy in addition to metformin and a sulphonylurea or metformin and a thiazolidinedione or earlier as dual therapy if contraindications to these drugs or not tolerated in patients with:** | | | | |
| **• a BMI ≥ 35 kg/m2 in those of European family origin (with appropriate adjustment for other ethnic groups) and specific psychological or medical problems associated with high body weight or**<br>**• a BMI < 35 kg/m2, and therapy with insulin would have significant occupational implications**<br>**• or weight loss would benefit other significant obesity-related comorbidities.** | | | | |
| **Lixisenatide 50micrograms/ml (Lyxumia)** | | 10micrograms dose pre-filled pen (14 doses) for SC injection<br>**ONCE DAILY administration**<br>10 micrograms once daily for 14 days, then increased to 20 micrograms once daily, dose to be taken within 1 hour before the first meal of the day or the evening meal. | Use with caution if eGFR <30-50ml/min/1.73m$^2$<br>Avoid if eGFR <30ml/min/1.73m$^2$ | Treatment with a GLP-1 Agonist should only be continued if a beneficial response occurs and is maintained: NICE recommend continuing only if a reduction in HbA1c of at least 1 percentage point [11 mmol/mol] and a weight loss of at least 3% of initial body weight is acheived at 6 months. If this is achieved, patients should be reviewed at 12 months and a weight loss of 5% compared with baseline should be achieved[1]. If these targets are not reached the use of GLP-1 agonist should be reconsidered. |
| **Semaglutide 1.34mg/ml (Ozempic)** ▼ | | **0.25 mg/dose, 0.5 mg/dose, 1 mg/dose** solution for SC injection in pre-filled pen<br>**ONCE WEEKLY administration**<br>0.25 mg once weekly for 4 weeks, increased to 0.5 mg once weekly for at least 4 weeks, then increased if necessary to 1 mg once weekly. | No dose adjustment is required for patients with mild, moderate or severe renal impairment. Experience with the use of semaglutide in patients with severe renal impairment is limited. Avoid in patients with end-stage renal disease | |
| **Liraglutide 6mg/mL (Victoza)** ▼<br>[NICE TA203] | | 3mL pre-filled pen<br>**ONCE DAILY administration**<br>0.6mg once daily, increased after at least 1 week to 1.2 mg once daily.<br>**Liraglutide 1.8 mg daily is not recommended.** | Avoid if eGFR <60ml/min/1.73m$^2$ | |
| **Dulaglutide (Trulicity®)** ▼ | | 750 microgram/0.5ml, 1.5mg/0.5ml prefilled pen for SC injection<br>**ONCE WEEKLY** administration<br>**Monotherapy:** 750 microgram by sc inj (pre-filled pen) once weekly. **Add on therapy:** 1.5mg by sc inj (pre-filled pen) once weekly | Combination therapy, consider lower dose of sulfonylurea/insulin. Avoid if eGFR <15ml/min/1.73m2 | |
| **Exenatide MR (Bydureon)** ▼<br>[NICE TA248] | | 2 mg powder and solvent in pre-filled pen<br>**ONCE WEEKLY administration** | Avoid if eGFR <50ml/min/1.73m$^2$ | |
| **Exenatide 250micrograms/mL (Byetta)** ▼ | | 5micrograms/dose, 10micrograms/dose pre-filled pen (60 doses) for SC injection<br>**TWICE DAILY administration**<br>5 micrograms twice daily for at least 1 month, then increased if necessary up to 10 micrograms twice daily, dose to be taken within 1 hour before 2 main meals (at least 6 hours apart). | Use with caution if eGFR <30-50ml/min/1.73m$^2$<br>Avoid if eGFR <30ml/min/1.73m$^2$. May be used in conbination with insulin. | |
| **Co - use of GLP-1 agonists with insulin (SPECIALIST INITIATION ONLY)** | | | | |

## Blood Glucose Testing Strips

Monitoring should be available to the following groups of patients[1];
- to those on insulin treatment
- to those on oral glucose lowering medications (i.e. sulphonylureas) to provide information on hypoglycaemia
- to assess changes in glucose control resulting from medications and lifestyle changes
- to monitor changes during inter-current illness
- to ensure safety during activities, including driving

Patients should understand the benefits of monitoring and understand how to interpret the results.

| **Use low cost choice blood glucose and ketone test strips < £10.00/50. Refer to:** Cost comparison document & Key message Bulletin available on Knowledge Anglia | SPECIFIC METERS MAY BE REQUIRED FOR SOME PATIENTS e.g.<br>• Type 1 Diabetes: may test for ketones or use carbohydrate counting meters.<br>• Children: need to consider safety/convenience/continued engagement with testing.<br>• Pregnant: may need to test for ketones<br>• Dexterity problems: some meters / lancing devices etc may be more appropriate<br>• Visual impairment: care needed but appropriate cost effective choices are available. |
|---|---|

## Hypodermic Equipment

### Needles for Pre-filled and Re-usable Pen Injectors

For adults there is no clinical reason for recommending needles longer than 8mm. 4, 5 and 6mm needles are suitable for all people regardless of BMI; they may not require a lifted skin fold and can be given at 90 degrees to the skin

**Use low cost choice of Insulin Pen Needles < £6.00/100. Refer to:**

**Key Message Bulletin and cost comparison document available on Knowledge Anglia**

### Lancets

**Use low cost choice of Lancets < £3.00/100. Refer to:**

Key Message Bulletin and cost comparison document available on Knowledge Anglia

1. NICE CG17 2015
https://www.nice.org.uk/guidance/ng17

## Types, presentations and profiles of insulin products Feb 2018

https://www.mims.co.uk/table-insulin-preparations/diabetes/article/1427971

| Insulin Preparations | | | | | | |
|---|---|---|---|---|---|---|
| Neutral Insulin Injection | | | | | | |
| Preparation | Manufacturer | Species | Form | Onset (approx) | Peak activity (approx) | Duration of action (approx) |
| Actrapid | Novo Nordisk | | V | <30min | 1.5-3.5hr | 7-8hr |
| Apidra (insulin glulisine*) | Sanofi | | V, P, $C_4$, $C_5$ | 10-20 min | 55 min | 1.5-4hr |
| Fiasp (insulin aspart*) | Novo Nordisk | | V, P, $C_1$ | 4min | 1-3hr | 3-5hr |
| Humalog (insulin lispro*) | Lilly | | V, P, $C_3$ | 15min | 1.5hr | 2-5hr |
| Humulin S | Lilly | | V, $C_3$ | 30min-1hr | 1-6hr | 6-12hr |
| Hypurin Bovine Neutral | Wockhardt | | V, $C_2$ | 30min-1hr | 1.5-4.5hr | 6-8hr |
| Hypurin Porcine Neutral | Wockhardt | | V, $C_2$ | 30min-1hr | 1.5-4.5hr | 6-8hr |
| Insulin Lispro Sanofi | Sanofi | | V, P, $C_5$ | 15min | 1.5hr | 2-5hr |
| Insuman Rapid | Sanofi | | P, $C_4$, $C_5$ | <30min | 1-4hr | 7-9h |
| NovoRapid (insulin aspart*) | Novo Nordisk | | V, P, $C_1$ | 10-20min | 1-3hr | 3-5hr |

| Biphasic Insulin Injection** | | | | | | |
|---|---|---|---|---|---|---|
| Preparation | Manufacturer | Species | Form | Onset (approx) | Peak activity (approx) | Duration of action (approx) |
| Humalog Mix25 | Lilly | | V, P, $C_3$ | 15min | 2hr | 22hr |
| Humalog Mix50 | Lilly | | P, $C_3$ | 15min | 2hr | 22hr |
| Humulin M3 | Lilly | | V, P, $C_3$ | 30min-1hr | 1-12hr | 22hr |
| Hypurin Porcine 30/70 | Wockhardt | | V, $C_2$ | <2hr | 4-12hr | 24hr |
| Insuman Comb 15 | Sanofi | | $C_4$, $C_5$ | 30min-1hr | 2-4hr | 11-20hr |
| Insuman Comb 25 | Sanofi | | V, P, $C_4$, $C_5$ | 30min-1hr | 2-4hr | 12-19hr |
| Insuman Comb 50 | Sanofi | | $C_4$, $C_5$ | <30min | 1.5-4hr | 12-16hr |
| NovoMix 30 | Novo Nordisk | | P, $C_1$ | 10-20 min | 1-4hr | 24hr |

| Isophane Insulin Injection | | | | | | |
|---|---|---|---|---|---|---|
| Preparation | Manufacturer | Species | Form | Onset (approx) | Peak activity (approx) | Duration of action (approx) |
| Humulin I | Lilly | | V, P, $C_3$ | 30min-1hr | 1-8hr | 22hr |
| Hypurin Porcine Isophane | Wockhardt | | V, $C_2$ | <2hr | 6-12hr | 18-24hr |
| Insulatard | Novo Nordisk | | V, $C_1$, D | <1.5hr | 4-12hr | 24hr |
| Insuman Basal | Sanofi | | V, P, $C_4$, $C_5$ | <1hr | 3-4hr | 11-20hr |

| Insulin Zinc Suspension (Mixed) | | | | | | |
|---|---|---|---|---|---|---|
| Preparation | Manufacturer | Species | Form | Onset (approx) | Peak activity (approx) | Duration of action (approx) |
| Hypurin Bovine Lente | Wockhardt | | V | 2hr | 8-12hr | 30hr |

| Protamine Zinc Insulin Injection | | | | | | |
|---|---|---|---|---|---|---|
| Preparation | Manufacturer | Species | Form | Onset (approx) | Peak activity (approx) | Duration of action (approx) |
| Hypurin Bovine PZI | Wockhardt | | V | 4-6hr | 10-20hr | 24-36hr |

| Long-acting Insulin Analogues | | | | | | |
|---|---|---|---|---|---|---|
| Preparation | Manufacturer | Species | Form | Onset (approx) | Peak activity (approx) | Duration of action (approx) |
| Abasaglar (insulin glargine) | Lilly | | P, $C_3$ | 30min-1hr | - | 24hr |
| Lantus (insulin glargine) | Sanofi | | V, P, $C_4$, $C_5$ | 30min-1hr | - | 24hr |
| Levemir (insulin detemir) | Novo Nordisk | | P, $C_1$, D | 30min-1hr | - | 24hr |
| Toujeo (insulin glargine 300 units/ml) | Sanofi | | P | 30min-1hr | - | 24-36hr |
| Tresiba (insulin degludec) | Novo Nordisk | | P, $C_1$, L | 30min-1.5hr | - | >42hr |

# Non Specialist Insulin Pathway for Type 2 Diabetes

Ensure insulin quantities on repeat prescription and frequency prescription issues reflect current dose of insulin to avoid stockpiling and waste.

At each stage of treatment, ensure continued monitoring of diabetes control and revert to original treatment if desired outcomes are not achieved.

When starting insulin, use a structured programme and continue metformin for people without contraindications or intolerance. Review the continued need for other blood glucose lowering therapies NG28.

**Consider other non-insulin therapies if not tried previously.**

**Do not delay initiation of insulin therapy where indicated.**

Offer **NPH basal insulin first line** once daily:

- Insuman Basal
- Humulin I
- Insulatard

If HbA1c is 75mmol/mol or higher consider starting both NPH and short-acting insulin either separately or as pre-mixed (biphasic) human insulin:

**Biphasic (Isophane + soluble insulin)**

- Insuman Comb 15, 25, 50
- Humulin M3

Is patient at risk of hypoglycaemia i.e. frail, elderly, lives alone or needs assistance to administer?

- No → continue with NPH basal insulin (above)
- Yes → Consider Abasaglar (biosimilar insulin glargine) once daily TAG Green ESNM64

Then:

- Do blood glucose levels rise markedly after meals?
- Does lifestyle affects timing of injections
- Does hypoglycaemia is affect quality of life?

Yes → Consider changing to pre-mixed (**biphasic**) preparations that include short-acting insulin analogues:

- Humalog Mix 25, 50
- Novomix 30

**Or** if lifestyle / occupation affects insulin regime – refer to specialist diabetes team for consideration of basal bolus insulin regime.

No → Does patient have:

- Significant hypoglycaemia despite optimal adjustments of lifestyle?
- Chaotic lifestyle with risk of DKA if daily insulin is missed?
- Psychological problems (i.e. eating disorders or compliance issues)?
- Allergy to insulin glargine or detemir

Yes → **Refer to specialist diabetes team:** Maybe considered for Tresiba (Insulin Degludec) **100 units/ml** TAG Green ESNM65

**Initiation by consultant/ specialist only and managed by specialist team for 3 months or until stable. Specialist to provide first prescription.**

*Patients should be returned to their previous treatment if no improvement in overall disease control from baseline*

(Yes also →) **Refer to specialist diabetes team:** If severe insulin resistance, maybe considered for Toujeo (insulin glargine) **300units/ml** TAG Green ESMN25

**Initiation by consultant /specialist only and managed by specialist team for 3 months or until stable. Specialist to provide first prescription.**

*Patients should be returned to their previous treatment if no improvement in overall disease control from baseline*

No → Is patient on large daily doses of insulin (≥3units/kg/day)?

- Yes → Refer to specialist diabetes team (Toujeo, above)
- No → Continue with **NPH Insulin**, review HbA1c in line with individualised targets, lifestyle, co-morbidities and risk of hypoglycaemia.

→ Refer to specialist diabetes team if continued poor control

V1.0 Oct 2018

See AGEM CSU Diabetes Formulary for more information